

**National Natural
Science Fund
Guide to Programs
2022**

National Natural Science

Foundation of China

Brief Introduction

The National Natural Science Foundation of China publishes the *National Natural Science Fund Guide to Programs 2022(The Guide)*, in accordance with the *National Natural Science Foundation Regulations* and relevant documents on program management, to provide applicants with useful guidance on seeking support from the National Natural Science Fund. The *Guide* details NSFC's latest reform measures, application requirements, funding policies and funding priorities, and introduces different program types and their respective requirements. It is an important basis for the allocation of the National Natural Science Fund, and also a must-read reference for applicants.

This book can be used as a reference for researchers in universities and colleges of higher education and research institutions, and for people working in areas of S&T management and policy research.

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Foreword

China has embarked on a new journey to achieve the second centenary goal of building a modern socialist country in all respects, which requires high-quality development that is in urgent need of scientific and technological innovation. General Secretary Xi Jinping pointed out, “At present, a new round of scientific and technological revolution and industrial transformation is advancing by leaps and bounds, the paradigm shift in scientific research is profound, the transdisciplinary and convergent researches are constantly developing, and the infiltration and integration of science and technology and socioeconomic development is accelerating.” “Strengthening basic research is crucial for scientific and technological self-reliance and self-improvement, and is inevitable in supporting us to explore the unknown and leading us from uncertainty to certainty.” In this very critical historical period, the National Natural Science Foundation of China (hereinafter referred to as NSFC) must insist on the strategic positioning that “basic research is the source of the entire scientific system and the main trigger for solving all the technical problems”, constantly enhance the sense of responsibility and purpose to strengthen basic research, have the top priorities of the country in mind, adhere to the "four aspects", dare to explore, emphasize original innovation, use applied research as a driving force for basic research, use basic research to support applied research, and ensure a good start for the realization of high-level scientific and technological self-reliance and self-improvement.

We will continue advancing the systematic reform of science funding. By unswervingly implementing the guiding spirit that “science and technology are the fields that most need continuous reform”, we will insist on deepening reform as the fundamental driving force for development, strive to solve current problems with higher standards and actively pursue future development. We will also continue the reform of the layout of research areas that have been grouped into four sections, namely, “basic sciences, technological and integration sciences, life and medical sciences, and interdisciplinary sciences”, stimulate the vitality and creativity of category-specific management, promote the interaction between knowledge and application, and incubate major original research outcomes. We will steadily advance the three core reform tasks of identifying funding categories, improving evaluation mechanism, and optimizing the layout of research areas, emphasize original exploration, promote interdisciplinary convergence, optimize project and funding management, increase professionalism and strengthen research integrity, and deepen

international cooperation, so as to give full play to the unique role of science funding in the national innovation system and boost the high-quality development of basic research.

We will put talents first and continuously upgrade the talent funding system, and consolidate the talent pool for basic research. We will thoroughly study and implement the spirit of General Secretary Xi Jinping's important speech at the Central Talent Work Conference, and follow the law of innovation and development and the law of talent growth, to strengthen stable support for young talents, leading talents and innovative teams in basic research. More attention will be paid to stimulating the innovative vitality of young talents, improving the mechanism for discovering and cultivating excellent talents, ensuring a smooth career path for basic research talents, and creating a complete funding chain for the growth of basic research talents. We will also continue expanding the opening up of science fund and improve the funding system for international scientists.

We will take the initiative to seize the important opportunity of paradigm shift in scientific research. Fundamental research has never faced such complex and major challenges, and only a paradigm shift in scientific research can tackle the problem. Global major challenges such as building a dual cycle, achieving peak carbon emission and carbon neutrality, and the United Nations Sustainable Development Goals, are forcing a paradigm shift in scientific research. For issues that cannot be solved by traditional methods, new breakthroughs can only be achieved through paradigm shift. Different disciplines have different characteristics and research paradigms. However, it is necessary to clearly explore new scientific research paradigms as the key to major breakthroughs in the future. We should challenge conventional thinking and get rid of the scientific research concept of following and copying.

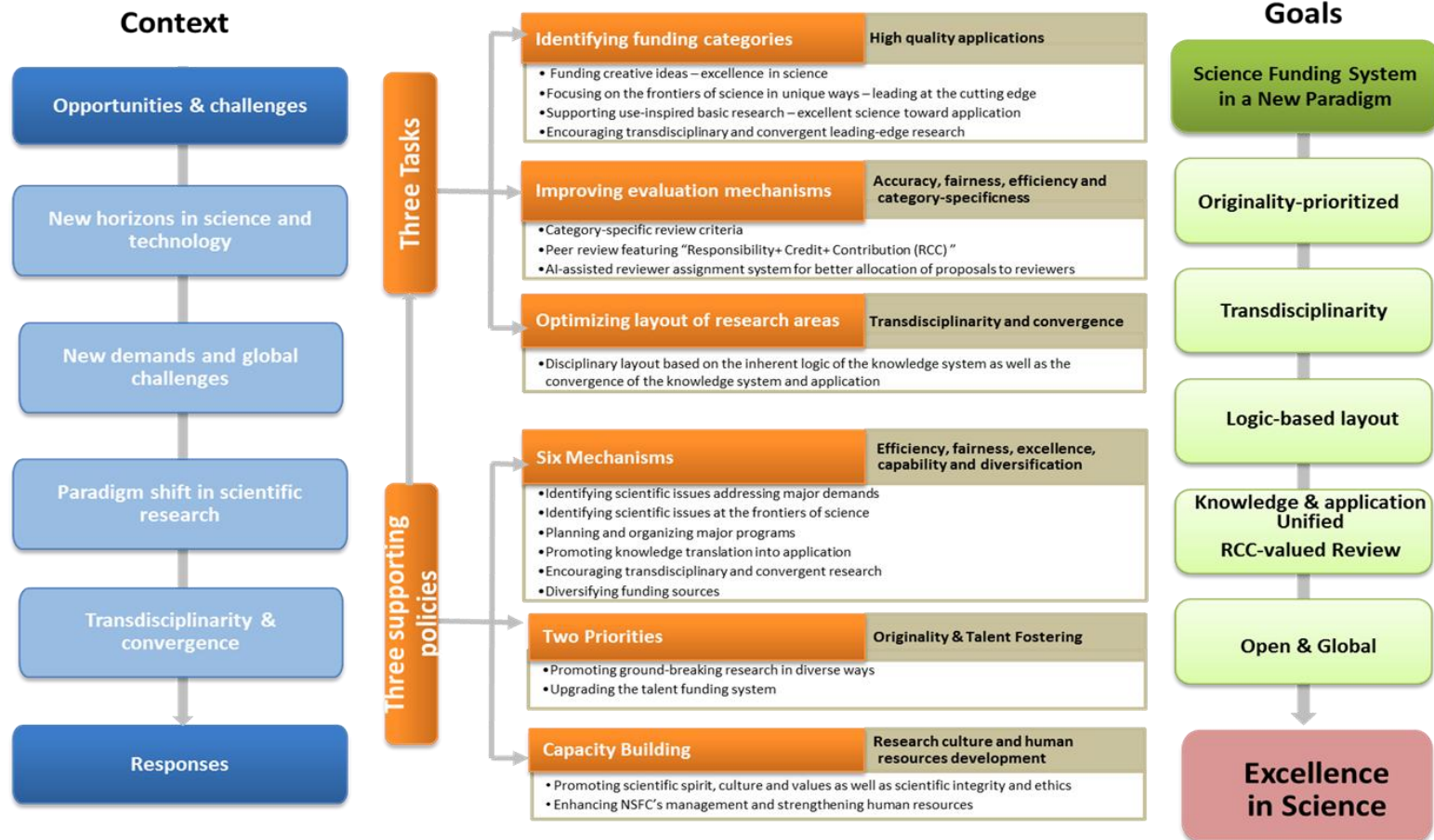
Efforts should be made to improve the capability of identifying and refining scientific issues. The selection of scientific research topic is the primary problem that researchers need to solve. Basic research is a research activity that is fundamentally oriented to raise and solve scientific issues. Scientific issues should reflect the content that needs to be filled in the current knowledge system, or the common key theories, laws or methods that lead technological development and change. Identifying and refining high-quality scientific issues is an important way to address current challenges and lead future research directions. It should be based on the characteristics of different disciplines and research areas, and tailored to different funding categories, i.e. “fund creative ideas to achieve excellence in science; focus on the frontiers of science in unique ways to lead the cutting edge; support use-inspired basic research to translate excellent science into application; support transdisciplinary and convergent leading-edge research”. Identifying and refining scientific issues should be progressive, from having doubts to exploring the essence, running through the whole process of scientific research.

We will focus on the interaction between identifying and refining scientific issues and promoting the paradigm shift in scientific research. It is necessary not only to find methods and approaches to address major challenges through the paradigm shift in scientific research, but also to promote the paradigm shift in the process of responding to challenges. When identifying, refining and resolving scientific issues, we should pay attention to the role of way of thinking, behavior and organization of scientific research in promoting paradigm shift in scientific research, and at the same time, use the new methods and ideas brought about by the shift to guide researchers to be more accurate and efficient.

During his inspection of NSFC, Premier Li Keqiang emphasized, "we have come to a critical moment to urgently appeal for the strengthening of basic research". The year of 2022 is crucial for the implementation of the "14th Five-Year Plan". Guided by Xi Jinping's Thoughts on Socialism with Chinese Characteristics for a New Era, NSFC will fully implement the spirit of the 19th CPC National Congress and all its plenary sessions, thoroughly implement the spirit of President Xi Jinping's important speeches and instructions on scientific and technological innovation, especially on basic research, seriously carry out the instructions of the Central Economic Work Conference and the Central Talent Work Conference, and strengthen consciousness of the need to maintain political integrity, think in big-picture terms, follow the leadership core, and keep in alignment with the central party leadership; stay confident of socialism with Chinese characteristics; and uphold Comrade Xi Jinping's core position on the Party Central Committee and in the Party as a whole and uphold the Central Committee's authority and its centralized, unified leadership. NSFC will implement the new development philosophy and construct a new development paradigm based on the new stage of development, by strengthening the capabilities of addressing challenges through and for the paradigm shift in scientific research, emphasizing identifying and refining scientific issues, further promoting the systematic science funding reform, continuously improving the funding efficiency, and ensuring the high-quality development of basic research together with scientists and host institutions, and make due contributions to building a world science and technology power and achieving the second centenary goal, with outstanding performance as a tribute to the 20th CPC National Congress.

Editorial Committee
January 13, 2022

Roadmap of NSFC's Reform



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2022 NSFC Reform Measures

NSFC thoroughly studies and implements General Secretary Xi Jinping's important expositions on scientific and technological innovation and basic research, and the spirit of important speeches at the Academician Conference of CAS and CAE, and the 10th National Congress of the China Association for Science and Technology. To implement the new development philosophy and construct a new development paradigm based on the new stage of development, NSFC will comprehensively implement the reform plan, and strive to create a new situation in science funding management by taking the following measures.

I. Deepen the section-based reform of funding management mechanism

In 2021, NSFC launched the reform of funding layout in accordance with the principle that “based on the inherent logic of the knowledge system and the convergence of knowledge system and application, as well as the highlight of interdisciplinary integration”, and grouped the nine scientific departments into four sections, i.e. “basic sciences, technological sciences, life and medical sciences, interdisciplinary integration”, in an effort to fully implement the "Four Aspects", advance the paradigm shift in scientific research, optimize the allocation of resources, and stimulate the vitality and creativity of category-specific funding management. Basic Sciences Section is composed of Departments of Mathematical and Physical Sciences, Chemical Sciences and Earth Sciences; Technology Sciences Section is composed of Departments of Engineering and Material Sciences, and Information Sciences; Life and Medical Sciences Section is composed of Departments of Life Sciences and Health Sciences; Interdisciplinary and Integration Section is composed of Departments of Management Sciences and Interdisciplinary Sciences.

In 2022, NSFC continues to deepen the section-based reform of funding layout, focus on building a relatively complete performance appraisal index system and evaluation methods for resource allocation, gradually explore the consultation methods and decision-making procedures that conform to the characteristics of the sections, set up advisory committee for each section, to ensure that program design, and review and management mechanism are tailored for the funding management of different research areas.

II. Continue implementing the category-specific review

NSFC continues the pilot category-specific review based on the four attributes of scientific questions, i.e. “exploration and highlight originality; cutting-edge area with the development of new methodology; demand-driven bottleneck; and universal orientation and transdisciplinary convergence”, for Young Scientists Fund Program, General and Key Programs, which account for over 85% of the proposals received. At the same time, NSFC will strengthen publicity and guidance, further improve the case database, and update the category-specific application and review lecture videos so as to help the applicants and reviewers better understand the four attributes of scientific questions.

III. Upgrade the talent program portfolio

NSFC steadily expands the funding scale of the Young Scientists Fund, organize and implement funding renewal for Basic Science Center awards, continue to pilot special projects on science and technology management, and explore to establish a long-term innovation mechanism for the discovery, selection, training and long-term stable support of young talents in basic research.

In addition to the pilot implementation of the Excellent Young Scientists Fund awards (Hong Kong and Macau), the application for the Young Scientists Fund is open to the young researchers at the host institutions in the Hong Kong Special Administrative Region and the Macao Special Administrative Region, with the same funding pattern and review criteria adopted.

NSFC continues being dedicated to the organization and implementation of the Excellent Young Scientists Fund (overseas), to put forth more efforts on attracting and encouraging excellent overseas young talents to return to (or come to) China. NSFC also upgrades the Research Fund for International Scientists, to support international researchers at different career stages to conduct collaborative research in China.

IV. Implement the Original Exploratory Program

NSFC will select non-consensual, high-risk original proposals of disruptive innovation, and guide and motivate researchers to engage in original basic research. For details, please refer to the “*Guide to NSFC Original Exploratory Program 2022*” later to be released. Based on the lessons and experience drawn from previous practice, NSFC further optimizes grant management, conducts post-award evaluations, and explores to establish funding renewal mechanism to support promising researches that are likely to bear disruptive and innovative outcomes.

V. Promote transdisciplinary integration and convergence

NSFC will continue to bolster the development of transdisciplinary convergence and the Department of Interdisciplinary Sciences, and improve the funding portfolio for interdisciplinary researches and develop an interdisciplinary evaluation mechanism by strengthening top-level design and emphasizing the identification and refinement of common scientific questions in interdisciplinary sciences. Facing the frontiers of science and major national needs, NSFC focuses on the comprehensive and complex major issues which human society development faces, and organizes multidisciplinary collaborative research. NSFC will create an academic environment conducive to the development of transdisciplinarity and interdisciplinary sciences, by breaking down disciplinary barriers, opening up disciplinary frontiers, generating disciplinary growth points and exploring new research paradigms for cultivating interdisciplinary scientific innovation talents and teams.

VI. Continue to pilot the evaluation mechanism that features “Responsibility + Credibility + Contribution” (RCC)

Adhering to the principle of positive guidance and incentives, NSFC steadily advances in piloting the RCC evaluation mechanism. Meanwhile, NSFC improves the interpretation of the RCC review mechanism policy, widely publicizes the reviewers’ code of conduct, and creates a good atmosphere for consciously practicing responsible review. Learning from the pilot experience, NSFC addresses the problems in an effort to improve the quality of review.

VII. Encourage diversified investment and collaborative innovation

As of December 2021, 23 provinces (autonomous regions and municipalities) have joined the Joint Fund for Regional Innovation and Development, 9 enterprises have joined the Joint Fund for Corporate Innovation and Development, and 6 industry sectors have established the Joint Fund the New Era, which has initially formed a joint funding system for the new era. It has become an important carrier for the science fund management mechanism in strengthening diversified investment and promoting collaborative innovation in the process of NSFC reform. In 2022, NSFC will continue to expand the scope of collaboration of Joint Funds, and explore effective channels and methods for social and individual donations to the science fund.

VIII. Promote the reform of fund management

NSFC implements the "Fund Management of National Natural Science Fund Grants" (hereinafter referred to as the "Fund Management").

NSFC adheres to scientific laws, and give scientific researchers greater autonomy in the use of funds. In addition to National Science Fund for Distinguished Young Scholars, Excellent Young Scientists Fund, and Young Scientists Fund, NSFC will steadily expand the implementation scope of the lump sum payment system; simplify the budget statement to three accounts, i.e. equipment cost, labor cost and operating expenses; delegate the authority of budget adjustment, i.e., the equipment cost to the host institutions, and other direct costs except for the equipment cost to the PIs.

NSFC puts scientists first, and increases incentives for scientific researchers. The first is to further increase the proportion of indirect costs for grants that use budgeting system and need to have indirect costs verified. The indirect cost is determined according to a certain ratio after deducting the equipment cost from the direct cost, 30% for the part of 5 million yuan and below, 25% for the part exceeding 5 million to 10 million yuan, and 20% for the part exceeding 10 million yuan. For grants in areas of mathematical sciences (referring to those whose application codes 1 are A01-A06 and received by the Department of Mathematical and Physical Sciences), the ratio is further increased to 60%/50%/40%. The second is to expand the scope of labor expenses. The social insurance subsidies and housing provident funds paid by the project employees from the host institutions can be included in the labor cost. The third is to improve the management of surplus funds. After the project is concluded, the surplus funds will be retained for use by host institutions and will not be recovered.

At the same time, NSFC will track and evaluate the practice of the "Fund Management", improve fund management, consolidate the main responsibilities of host institutions for fund management and use, to ensure thorough implementation of the new policy, and establish a science fund management mechanism that conforms to the development law of basic research.

IX. Further simplify requirements for application management

Students are no longer included when filling in the main participants. Information of the main participants in the proposal is collected online, "one form is used for multiple purposes". NSFC gradually establishes a paperless management mechanism to provide more convenient services for researchers. When filling in research outcomes such as papers, all the authors should be listed the same as those at the time of publication, and the first author or corresponding author will not be marked, so as to reduce the paperwork for researchers. For specific requirements, please refer to "Information on Application".

X. Develop transfer mechanism of research outcomes

On the basis of further improving the attribute description and categorization of NSFC funded research outcomes, NSFC gradually improves the service and application capabilities of the big data intelligent service platform for NSFC funded research outcomes; promotes the sharing and dissemination of theoretical achievements, and continuously facilitates their integration to other applied science and technology plans; accelerates the translation of promising research outcomes, and strengthens their application at local governments, industries and enterprises, so as to serve the needs of socioeconomic development.

XI. Strengthen the management of host institutions

NSFC maintains dynamic management of host institutions by improving the entry and exit mechanism and enabling strict admission control; establishes a classification and categorized management system to adopt differentiated management models according to natures and scales of the host institutions, so that they can better perform the main responsibilities of management and supervision; continues reinforcing the responsibilities of host institutions, to effectively improve the quality of proposals and ensure the implementation of NSFC reform tasks.

XII. Strengthen scientific integrity

NSFC continues to establish a scientific research integrity system that integrates five aspects of education, motivation, regulation, supervision, and discipline. NSFC will take education as the foundation, positive incentives as the guidance, regulation as the criterion, supervision as the starting point, and punishment as the last resort, consider both the long term and the short term, and treat both symptoms and root causes for promoting scientific research integrity and scientific spirit, culture and values during the “14th Five-Year Plan” period.

Information on Application

When applying for NSFC funds in 2022, applicants and their host institutions shall first read carefully the following documents: *the National Natural Science Foundation Regulations* (hereinafter referred to as the *Regulations*), this *Guide*, relevant guidelines for program management, *Regulations on National Natural Science Fund Management*, and notifications and announcements pertaining to application. Should there be any conflicts between guidelines for program management and *Regulations* and this *Guide*, *Regulations* and this *Guide* shall prevail. Information on Application includes eligibility of applicants and requirements on applications, application limits, requirements on scientific integrity, responsibilities and accountability of host institutions, and etc.

I. Eligibility of applicants and requirements on applications

i. Eligibility of applicants

1. As the principal investigator (PI), the applicant should comply with Article 10 Clause 1 of the *Regulations*, i.e., the applicant shall have (1) the experience of undertaking basic research program(s) or other basic research activities; (2) a senior academic rank (title) or a doctoral degree, or recommendation from two researchers who are in the same research field and have a senior academic rank (title). Besides, those who apply for certain types of programs shall meet other specific requirements. (For more information, please refer to the text of this *Guide*.)

When an applicant not employed as a full-time staff member at his or her host institutions submits the applications, he or she shall truthfully state his or her position, term of employment and annual working duration at the host institution in the application.

2. When a researcher conducting basic research satisfies the requirements as prescribed in the preceding paragraph but has no employer or whose employer is not a registered host institution, on the condition that he or she has obtained the consent from a registered host institution, he or she is eligible to apply for the General Programs and Young Scientists Fund, but cannot apply for other programs.

Under this circumstance, the applicant shall fill in truthfully personal information in the basic information page of the proposal and research experiences in

CV, and sign the agreement in written form with the host institution (for more information please refer to the *Guideline on Management of National Natural Science Fund Host Institutions*). **The hard copy of the agreement shall be archived at the host institution for future reference instead of submitting to NSFC.**

Researchers with overseas identity who are not employed in any host institution shall not apply for NSFC programs as researchers with no employer or whose employer is not a registered host institution.

3. NSFC continues to implement Excellent Young Scientists Fund (Hong Kong and Macao). An applicant whose host institution is one of the following eight universities, i.e. Hong Kong University, Chinese University of Hong Kong, Hong Kong University of Science and Technology, Hong Kong Polytechnic University, City University of Hong Kong, Hong Kong Baptist University, University of Macao, and Macao University of Science and Technology, can also apply for Young Scientists Fund. [Please refer to *Excellent Young Scientists Fund (Hong Kong and Macao)* and *Young Scientists Fund* sections in this *Guide* for details.]

4. Students pursuing the postgraduate degree (not obtained by the deadline for NSFC submission) cannot apply for any fund as the PI. However, with the supervisor's consent, in-service personnel can apply for certain categories of programs including General Program, Young Scientists Fund and Fund for less Developed Regions. Con-the-job postgraduation students cannot apply for Young Scientist Fund through the host institution excluding host institutions in Hong Kong and Macao. The applicant should submit the hard copy of application with the following attachments: signed certification of the supervisor's consent which explains the connection between the dissertation and the proposal, and the guarantee of working hours and conditions after the project starts, etc. On-the-job postgraduate students whose employer is not a registered host institution is not eligible to apply for any type of programs.

5. Postdoctoral fellows can apply for the following programs only: General Programs, Young Scientists Fund, Fund for Less Developed Regions, and others to be determined by the corresponding solicitations. However, postdoctoral fellows are not allowed to apply for Young Scientists Fund from any host institution in Hong Kong or Macao.

6. The applicants for the Fund for Less Developed Regions should be full-time employees in the specified host institutions (for more information, please refer to the chapter on Fund for Less Developed Regions in this *Guide to Programs*), or the technical personnel following national policy and sent by the Organization Department of the CPC central committee on the 3-year or longer aiding mission in Xinjiang and Tibet, who should provide the supporting materials of the aiding mission issued by organization or personnel department of the aided institutions. If the unit that a researcher is working at for the aiding mission in Xinjiang or Tibet is not a registered host institution, they are allowed to apply for Fund for Less Developed Regions

through the eligible host institutions in the aided autonomous regions. Part-time employees in the specified host institutions, technical personnel from the specified host institutions affiliated to Chinese central government or the People's Liberation Army or host institutions outside the regions are not qualified to apply for the Fund for Less Developed Regions.

7. Any overseas researcher employed by a registered host institution shall not apply for projects as both domestic applicant and overseas collaborator (referring to overseas collaborators in international (regional) joint research projects).

The PI of the Joint Research Fund for Overseas Chinese Scholars and Scholars in Hong Kong and Macao project, and the overseas collaborator of the International (Regional) Joint Research project (including Key International (Regional) Joint Research Program and International (Regional) Joint Research Program under Agreements/MoUs) shall not apply for other types of program (except for the Excellent Young Scientists Fund (Hong Kong and Macao)) as the PI before the end date of their projects.

Domestic PI who has an ongoing project shall not participate in the application for International (Regional) Joint Research Program (including Key International (Regional) Joint Research Program and International (Regional) Joint Research Program under Agreements/MoUs) as an overseas collaborator before the end date of the ongoing project.

8. To avoid duplication of funding, NSFC's Department of Management Sciences and National Social Science Fund jointly limit applications. Please refer to the Funding Areas and Precautions under Department of Management Sciences section of this *Guide* for specific requirements.

ii. Requirements on applications

1. The proposal shall be prepared by the applicant in person and in accordance with the outline. The applicant and the main participants should fill in their CVs accordingly. **Please note that any unlawful, confidential or sensitive information shall not appear in the proposal.** The applicant shall be responsible for the authenticity and legitimacy of the proposal submitted.

2. In accordance with program types, the applicant shall make accurate selection of the "funding category", "subclass introduction" and "annotation". For some programs, annotation should be selected strictly in accordance with this *Guide*. When there is no relevant requirement, the annotation should be left blank.

3. **Pilot category-specific application and review based on the four scientific natures of research will continue being adopted for all the General and Key Programs, and Young Scientists Fund.** Applicants shall choose one out of the four scientific attributes according to the critical scientific problem they aim to solve and the research they hope to conduct, and justify their choice in the proposal. When the

proposed research fits multiple scientific attributes, applicants shall choose one that best describes the characteristics of their proposed research.

4. Applicants shall select the application code accurately based on the research directions or research areas of their proposals, in accordance with the “NSFC Application Code” in this *Guide*. Particular attention shall be paid to the following aspects:

(1) When selecting the application code, please make sure to include the secondary application code (four digits).

(2) Key Programs, Major Research Programs and Joint Funds Programs, etc., may have special requirements for the application codes. For details, please refer to the relevant sections in this *Guide*.

(3) Applicants shall accurately select “Application Code 1” and the corresponding “research direction” and “key word” when filling out the proposal form.

(4) For any questions regarding the application code, please contact relevant scientific departments.

5. In 2022, the applicant does not need to list students as main participants, but only need to include them in the total number of participants. Main participants will complete their CV online the same way as the applicant. The applicant shall invite main participants to complete their CV via the ISIS system and upload the PDF version of their CV generated by the system. Applications that fail to include complete CV of main participants cannot be submitted.

When main participants do not work at the same host institution as the applicant (including graduate students), the employer of the main participants shall be regarded as a collaborative research institution (overseas institutions are not regarded as such). Applicants shall select online or accurately fill in the employer information of the main participants. **The information on collaborative research institution in the basic information section of the application form is automatically generated by the online application system.** The number of collaborative research institution for each application shall not exceed two (unless otherwise specified).

6. If the proposed research involves issues related to scientific research ethics and scientific and technological security (such as biosecurity, information security), the applicant shall strictly follow relevant national laws, regulations and codes of ethics, and provide corresponding materials as attachment in accordance with the requirements of relevant scientific departments (a scanned copy shall be attached to the electronic application).

7. Applicants and the main participants with a senior academic rank (title) shall indicate in the proposal if:

(1) They have more than one host institution when applying or participating in NSFC projects in one year;

(2) They have different host institutions for on-going NSFC projects.

8. If a research has been funded through other sources, the applicant shall specify the funding details and their difference and connection with the current proposal. Applying for funding from different funding agencies for the same research content should be avoided.

If an applicant applies for different types of NSFC programs during the same year, he or she should specify in the application the other NSFC program applications, their titles and information, and the connection and difference with the current application.

9. The start date for research in proposal shall be January 1, 2023, and the end date December 31, 20xx, depending on the funding periods (unless otherwise specified in this *Guide*).

10. The applicant and the main participants shall use the same and only document of identity for application.

When filling in names of oneself and main participants, the applicant shall make sure the names are in standard characters and exactly the same as the ones on documents of identity. Those who have received funds as applicants or main participants using other identifications shall declare and provide details in the proposal. Host institutions are accountable for verification.

11. Host institutions should download the “2022 NSFC Host Institution Letter of Commitment for Project Application” from the ISIS system in advance, and then upload the scanned electronic copy after it is signed by the legal representative and stamped with the official seal of the host institution to the system (only once a year). The host institution can submit the proposals only after completing the above-mentioned commitment procedures.

12. Applications for all types of programs will continue to be paperless. In process of submission, the host institution shall confirm the online applications and attachments in the ISIS system before the deadline, and submit the list of applications within 24 hours after the deadline. Host institutions do not need to mail hard copies of applications.

After a grant is awarded, the applicant and the main participants shall sign on the signature and seal page of the application form **themselves**. The overseas participants who cannot sign the page shall send a signed paper document by letter, fax, and etc, stating their consent to participate and perform the related responsibilities in the application and the research work, which will be submitted together with the signature and seal page. The collaborative research institution shall stamp the official seal on the signature and seal page, and ensure the name on the official seal is consistent with the name of the institution in the application. A collaborative research institution that has been registered as a host institution with NSFC shall stamp the official seal of the host institution; a collaborative research institution that is not registered shall stamp the official seal of the legal entity. **The host institution should stamp the official seal on**

the signature and seal page of the application form and submit it together with the Project Plan. The signature and seal information shall be consistent with that of the electronic application.

iii. About application reception conditions

According to the *Regulations*, the application for NSFC funds shall not be accepted under any of the following circumstances:

1. The applicant does not meet requirements stated in the *Regulations*, this *Guide* and relevant management methods.
2. The application materials do not comply with conditions in this *Guide*.
3. The number of proposals does not comply with the Application Limit's conditions.

II. Application limit

i. Application limit in general

1. Applicants shall only apply for one type of program once in a year, excluding Integrated Program and Strategic Research Program in the Major Research Plan, Scientific Activity Program in Special Program and International (Regional) Exchange Program; for Joint Funds, the same type refers to the same program title.

2. Applicants cannot apply for the same type of program if they received funding for General Program, Key Program, Major Program, Major Research Plan Program (excluding Integrated Program and Strategic Research Program), Program of Joint Funds (referring to the Joint Fund with the same name), and Fund for Less Developed Regions as the PI in the previous year.

3. For Special Fund for Research on National Major Research Instruments (department recommendation) or Basic Science Center Program, applicants shall only apply for one project in the same year.

4. The PI of an International (Regional) Joint Research Project shall not apply as an applicant for the same type of program.

5. For International (Regional) Joint Exchange Program, each researcher shall apply for as applicant and undertake as PI only one project under the same Agreement/MoU.

ii. One-year suspension from application after unsuccessful application for the General Program for two consecutive years

Applicants with unsuccessful application for the General Program both in 2020 and 2021 (including eligibility rejection) cannot apply for General Program as the PI in

2022.

iii. Restriction on the total number of projects for researchers applying for and undertaking

Unless specified otherwise, projects whose funding period terminates in the year of application are not included in the total number for applying and undertaking. Proposals that fail to pass the compliance check will not be subject to the restriction on the total number for applying and undertaking.

1. Limit for researchers with a senior academic rank (title)

The total number of the following programs a researcher with senior academic rank (title) applies for (including as applicant and main participant) and undertakes (including as applicant and main participant) shall not exceed **two**: General Program, Key Program, Major Program, Major Research Plan (excluding the Fostering Program and Strategy Research Program), Program of Joint Funds, Young Scientists Fund, Fund for Less Developed Regions, Excellent Young Scientists Fund, National Science Fund for Distinguished Young Scholars, Key International (Regional) Joint Research Program, International (Regional) Joint Research Program under Agreements/MoUs with direct cost of more than 2 million yuan per project (only the PI are counted, main participants are not counted), National R&D Program for Major Research Instruments (including Special Fund for Major Research Instruments and Special Program of National Major Research Instruments), Basic Science Center Program, Original Exploratory Program, and Emergency Program and Special Program with funding period of over one year (unless otherwise specified; and except for the bureau (division) of NSFC ad hoc task and soft research projects under Emergency Program, and scientific activities projects under Special Program).

Projects that were granted in 2019 or before and are undertaken by researchers with a senior academic rank(title) as main participants are not included in the total number. However, projects that researchers apply for as applicants and main participants and those awarded to researchers as PI and main participants in 2020 and beyond are included in the total number.

2. Limit for researchers without a senior academic rank (title)

(1) The total number of projects a researcher applies for or undertakes as the PI should not exceed one.

(2) Under the premise of adequate time and energy, the total number of projects a researcher applies for or undertakes as main participant is not limited.

(3) In case a researcher receives the senior academic rank (title), the projects he or she undertakes as the PI shall be counted into the total number whereas those a researcher undertakes as the major participant shall not.

3. Special requirements for some types of programs

(1) Excellent Young Scientists Fund Program and National Science Fund for

Distinguished Young Scholars

At the stage of application, Excellent Young Scientists Fund and National Science Fund for Distinguished Young Scholars are not counted, but are counted between submission and receiving NSFC's formal funding decision and after approval.

(2) Basic Science Center Program and Science Fund for Creative Research Group

At the stage of application, proposals for Basic Science Center Program are not counted, but are counted between submission and receiving NSFC's formal funding decision and after approval. Proposals for Basic Science Center Program that do not enter the site inspection procedure will not be counted.

Applicants and main participants shall only apply for and participate in one project for Science Fund for Creative Research Groups or Basic Science Center Program in the same year.

The PI and main participants with senior academic rank (title) who is funded by Science Fund for Creative Research Groups shall not apply for Basic Science Center Program; however, application is allowed in the year of conclusion.

The PI and main participants (key members) shall not apply for any NSFC grants before the awarded project concludes except for National Science Fund for Distinguished Young Scholars and Excellent Young Scientists Fund, neither can they use similar materials to apply for any S&T Programs.

Participants who withdraw from Science Fund for Creative Research Groups or Basic Science Center Program shall not apply for or participate in the applications for those two types of programs within 2 years.

(3) Special Fund for Research on National Major Research Instruments

Researchers with senior academic rank (title) shall apply (as applicant and main participant) for Special Fund for Research on National Major Research Instruments only once in the same year.

The PI and main participants of a project of Special Fund for Research on National Major Research Instruments are not allowed to apply for or participate in the application for the same program before the ongoing one concludes.

The PI of a project of Special Fund for Research on National Major Research Instruments (ministry's nomination) is not allowed to apply for any type of NSFC program except for National Science Fund for Distinguished Young Scholars.

The PI of Special Fund for Research on National Major Research Instruments grant and major participants with senior academic rank (titles) shall not apply for or participate in the application for this program before the ongoing project is approved for conclusion.

When funded, the PI shall not apply for any other NSFC funds other than the National Science Fund for Distinguished Young Scholars before the awarded project concludes.

For researchers with senior academic rank (title), the total number of Special Fund for Research on National Major Research Instruments (including Special Program on National Major Research Instruments) and the National Major Instrument R&D Program and the Key Special Program for Basic Scientific Research Infrastructure and Major Research Instrument R&D (Scientific Equipment direction) by Ministry of Science and Technology one may apply for (including as applicant and main participant) and undertake (including as PI and main participants) shall not exceed one.

(4) Original Exploratory Program

The Original Exploratory Program is not included in the scope of the total number of applications and grants at the time of application, but will be included in the scope of the total number of applications and grants after the grant is awarded (except for projects with funding period of no longer than 1 year).

Researchers can only apply for one project under Original Exploratory Program (including pre-application) in the same year.

iv. The limit on the PI for accumulated number of funding

1. For Young Scientists Fund, Excellent Young Scientists Fund, National Science Fund for Distinguished Young Scientists, and Science Fund for Creative Research Groups, the applicant can receive the funding only once.

2. An applicant can only be awarded as PI once for each of the three categories of the Funds i.e. Research Fund for International Young Scientists, Research Fund for International Excellent Young Scientists, and Research Fund for International Senior Scientists.

3. Beginning from 2016, for Fund for Less Developed Regions, the applicant's accumulated number of funding cannot exceed three. Projects approved in and before 2015 are not counted.

v. Programs not subject to the total number limit

There is no number limit for Science Fund for Creative Research Groups, Joint Research Fund for Overseas Chinese Scholars and Scholars in Hong Kong and Macao, Tianyuan Fund for Mathematics, International (Regional) Joint Research Program under Agreements/MoUs with direct cost of no more than 2 million yuan per project, International (Regional) Exchange Program, Research Fund for International Scientists, ad hoc and soft projects by bureaus and divisions of NSFC under Emergency Program, scientific activity projects under Special Program, other types of program with funding period of no more than 1 year, and other programs specified in this *Guide*.

vi. Special notice

1. During the evaluation period (prior to NSFC's final decision), the application

shall be counted in the total number, except for those under Original Exploratory Program. Applications that are not subject to the restriction on the total number of projects include: applications for Basic Science Center Program that do not enter the site inspection procedure, applications for Special Fund for Research on National Major Research Instruments (Bottom-up application) that do not enter the budget review procedure, applications for Special Fund for Research on National Major Research Instruments (Ministry's nomination) that do not enter the budget review or site inspection procedure.

2. In the case that applicants engaged in multiple host institutions apply for or undertake through different host institutions, the Limit is still applicable.

3. In case of an inconsistency between other management regulations and this Limit in terms of total project numbers, the latter shall prevail.

III. Budget Preparation

i. General requirements

The applicants shall make and submit the project budget in accordance with the guidelines of relevant official documents of the central government and the *Measures for Fund Management* and the *Specification of Budget Table Preparation for NSFC-Awarded Projects*, following the principle of "policy compliance, target relevance and economic rationality". The proposed budget shall reflect the actual needs of the proposed research. The host institution shall carry out a careful review and approval of the proposed budget in line with relevant regulations.

ii. Contents

There are two categories of financial management system for NSFC-funded projects, i.e., the contract-based system and the budget-based system.

1. Projects under the contract-based system (Hereinafter referred to as contract-based projects)

Applicants of contract-based projects shall apply for the funding amount in a scientific and reasonable way to ensure well-organized and effective use of funding, while without the need to make a project budget.

The funding management of contract-based projects shall be carried out in accordance with *Measures for Fund Management* as well as the internal regulations formulated by respective host institutions on the financial management system of contract-based projects.

The Principal Investigator (PI) of contract-based projects, independently in charge of the use of award funding, shall manage the expenditures within the respective

amount of direct costs and indirect costs. Transfers of funds between all other budget subjects are permitted without seeking prior consent from the NSFC.

2. Projects under the budget-based system (Hereinafter referred to as budget-based projects)

Applicants of budget-based projects shall fill in each subject on the budget table in accordance with the actual needs of the proposed research. Only direct costs of each subject are required to be filled in, while the indirect costs would be uniformly calculated by NSFC. Both a Budget Table of the NSFC-funded Projects (hereinafter referred to as Budget Table) and a Budget Justification should be filled in and submitted by the applicants.

The direct cost on the Budget table are as follows:

Equipment expenses refer to the costs of purchase or trial- production of special instruments and equipment, the upgrading and modification of existing instruments and equipment, and the rent of instruments and equipment from other institutes during the implementation period of the project. Computing instruments and software tools can be included in the equipment expense. The purchase of new equipment should be strictly controlled to avoid duplicate purchases by encouraging open sharing, independent research and development, renting special instruments and equipment, and upgrading existing instruments and equipment.

Experimental and Operating expenses refer to the purchase, transportation, handling and arranging of low-value consumables such as materials and auxiliary materials consumed during the implementation period of the project, as well as test and processing costs, fuel and power costs, publication /documentation/ dissemination/IPR services costs, conference /travel/international cooperation and exchange costs, and other related expenses.

Labor costs refer to the labor fees paid to graduate students, postdoctoral students, visiting scholars, and researchers and research assistants employed for the project, as well as the consulting fees paid to the experts hired on a temporary basis during the implementation period of the project.

The expenditure standard of labor costs for the hired personnel should be level with the average salary of the employees of local research community and technical service industry, depending on the assignments they undertake in the project. The social insurance subsidies and housing provident funds paid by the host institution are included in the labor costs subject.

The consulting fees paid to the temporarily hired experts shall not be paid to the relevant personnel involved in the research and management of this project, and shall be managed in accordance with the relevant national regulations

Self-raised funds: for this subject, please fill in the funds obtained from the host institution and other sources.

Expenses of each subject on the Budget Table should be direct costs. There is no

restriction on the proportion of direct costs for each subject. Applicants shall truthfully list the expenses according to the definition, scope and standard of relevant subjects on the basis of the actual needs of the proposed research.

In the Budget Justification, applicants shall describe in details the expenses of each subject on the Budget Table, and specify the qualifications, funding allocation and self-raised funds of the cooperative research institutes. Detailed explanations should be made for a single purchase of equipment totaling 500,000 yuan or above; and classified explanations should be made for the purchase of equipment totaling less than 500,000 yuan.

When filling out the Research Plan, the total amount of direct costs on the Budget Table should not exceed the approved total budget of direct costs, and the amount of each subject should not exceed the amount of each subject proposed in the application in principle. Projects that have undergone budget review should be adjusted according to the review comments. During the implementation process, adjustments of labor and experimental and operating expenses should be subject to the project PI according to the actual research needs, while the adjustments of equipment costs need to be submitted to the host institution for approval.

iii. Funding transfer for cooperative research institutions

1. If the applicant and the main participant of a project are not from the same host institutions, the main participant's host institution (based in China's mainland) is regarded as a cooperative research institution.

2. Both parties of the project shall sign a cooperative research agreement (or contract) before the submission of the Research Plan, with specification of the funding transferred to the cooperative research institution in the Budget Justification.

The cooperative research agreement (or contract) needs not to be submitted to NSFC, but rather kept by the host institutions for future reference.

3. The applicant and the main participant of the project shall prepare their respective budgets (hereinafter referred to as sub-budgets) according to their respective research tasks. Once the sub-budgets are reviewed and signed by the respective host institutions, the applicant shall complete a total budget of the project and submit it to NSFC. The sub-budgets in the application submission stage needs to be signed by the main participants (in the blank of the Budget Table), and the sub-budgets at the Research Plan submission stage needs to be signed by the main participants with the seal of the cooperative research institutions (in the blank of the Budget Table). The sub-budgets need not to be submitted to NSFC, but rather kept in the respective host institutions for future reference.

4. During the implementation of the project, the host institution shall make funding transfers to respective cooperative research institutions according to the project Research Plan and the cooperative research agreement, and strengthen the

supervision and management of the transferred funds.

5. If the applicant and main participants have agreed not to make any funding transfers to the cooperative institutions, there will be no need to sign a cooperative research agreement, nor need to make sub-budgets, given that relevant specification should be made in the Budget Justification.

iv. Responsibilities of Host Institutions

The host institution, bearing the responsibility of the project funding management, shall establish and improve the funding management mechanism following the principle of “unified leadership, multi-level management, and individualized responsibility”. With internal regulation, performance management and supervision and restraint mechanisms put in place, the host institution shall review and approval the project budget, expenditure, final account as well as the budget adjustment carefully, so as to achieve "consistency between real expenditure and final account", and ensure that all expenditures are "truthful, legitimate and effective". The PI in charge of the project is directly responsible for the use of the grant, and bears legal responsibility to ensure the compliance, rationality, authenticity and relevance of the use of the grant.

v. Management of unexpended funds

The NSFC-funded grants are earmarked for supporting scientific researchers to carry out basic research and explorations at frontiers of science, as well as strengthening personnel capability and team-building. The host institution shall enhance the management of the unexpended funds, maintain a dynamic supervision of the fund expenditure and provide real-time early reminder, revitalize the use of unexpended funds, speed up the progress of fund use, and improve the efficiency of fund expenditure. The PI in charge of the project shall arrange the expenditures reasonably according to the needs of scientific research activities, not only to avoid crash expenditure, but also to prevent from excessive leftovers.

When a project is concluded and approved by the NSFC, the host institution will be fully in charge of coordinating the use of the remaining funds, prioritizing the research needs of the team undertaking the project. The host institution shall formulate regulations on the use of unexpended funds. If a project conclusion is not approved by the NSFC, the host institution shall return the remaining funds to NSFC within 30 days upon receiving the written notice from NSFC.

vi. Miscellaneous

1. In accordance with the guidelines of the Opinions of The General Office of the State Council on Reforming and Improving the Management of Scientific Research Funds Financed by the Central Government and The Regulation on the Funding

Management of NSFC-funded Projects, the host institution shall fulfill its responsibility for the funding management, improve timely its internal administrative systems, enhance the relevant services for researchers, fully implement the financial assistant system for scientific research, improve the management of financial reimbursement, and thus establishing an information-based reimbursement mechanism addressing actual needs of scientific research.

2. Projects funded by NSFC under the Young Scientists Fund, Excellent Young Scientists Fund, and National Science Fund for Distinguished Young Scholars are subject to the contract-based financial management system, and thus without the need to make project budgets.

3. The figures on the budget table shall be measured in “ten thousand yuan” rounding up to 2 decimal places. The costs or prices of each item are measured in “yuan”, accurate to single digit. Foreign currency must be converted into RMB at the spot exchange rate published by the People's Bank of China.

IV. Requirements on scientific integrity

To enhance scientific research integrity, prevent scientific misconduct in science fund application, NSFC proposes instructions and requirements on scientific integrity to be followed.

i. About personal information

1. The science fund project shall be applied for by the applicant himself or herself. It is strictly prohibited to apply under another person's name, or fabricate false applicants and main participants.

2. Applicants and main participants shall truthfully fill in the personal information and be responsible for its authenticity; at the same time, the applicant shall also be responsible for the authenticity of the personal information of all the main participants. It is strictly prohibited to forge or provide false information.

3. The academic degree information of applicants and main participants shall be consistent with that on the diploma. The time of degree acquisition shall be the same as on the diploma.

4. Applicants and main participants shall faithfully and accurately fill in the title information of their formal employment at host institutions. Forgery or providing false title information is strictly prohibited.

5. Applicants who are unemployed or whose employer is not a registered host institution shall truthfully fill in the work unit and the employment information. Giving false information is strictly prohibited.

6. Applicants and main participants shall faithfully and accurately complete their curricula vitae, including a detailed list of academic titles and their corresponding

periods. It is strictly prohibited to omit the middle academic title and only write the highest one, for example, “1986 to present, Professor”. It is strictly prohibited to forge or alter relevant information.

7. Applicants shall accurately provide the information of their postgraduate and postdoctoral tutors, and shall not provide false information or omit any information in that regard.

ii. About research content

1. The applicant shall fill out the body part of the proposal in accordance with the *Guide*, instructions indicated in the online application system and requirements of the outline, and faithfully fill in relevant research work and research contents. Plagiarism or fraud is strictly prohibited. Violation of law and regulations, codes of ethics and regulations regarding S&T security is also strictly prohibited.

2. When filling in the research achievements such as papers, the applicant and main participants shall truthfully list the names of all authors (inventors or completers) of the research results as they appeared when published, and shall not alter the order of authors (inventors or completers). For the representative papers listed in the CV, the e-copies of the full texts in PDF format should be uploaded; for the representative monographs, the scanned copies of the cover, abstract, table of contents, copyright page, etc. in PDF format should be uploaded.

3. Applicants and main participants shall strictly abide by the academic norms, research ethics and codes of conduct recognized by the scientific community, and the research involving human subjects shall be submitted for ethics review according to the requirements of relevant government departments and employer institutions; Applicants and main participants shall not include “research results” that are generated from scientific misconducts such as forgery, tampering, plagiarism, entrusting “third party” to compose or submit the proposal, and peer-review fraud as the basis of applying for science funds.

4. Proposals with same or similar research contents shall not be submitted by different applicants through different host institutions to apply for different types of programs simultaneously. Projects that have already been funded are not allowed to be proposed.

5. The research content of the proposal should not be the same as that of the proposal that has been submitted through another channel and is being reviewed. If the research content has been funded through other channels or programs, applicants shall state the funding situation and the difference and connection with the proposed project in the application. Applicants shall not submit the same research content once again to NSFC for funding.

iii. Other relevant requirements

1. Host institutions and collaborative institutions shall implement the specific requirements of the “Several Opinions on Further Strengthening Scientific Integrity” and “Opinions on Further Promoting Scientific Spirit, Culture and Values” issued by the General Office of the CPC Central Committee and the General Office of the State Council, follow the instruction of the “Notice of NSFC and MoST on Further Consolidating the Primary Responsibility of Institutions Undertaking National Science and Technology Programs (Special Projects, Funds, etc.) in Upholding Academic Culture and Scientific Integrity”, establish and improve the education, management and supervision system for upholding scientific research integrity, examine and verify application materials more strictly, and eliminate exaggeration, falseness and fraud.

2. Applicants shall inform main participants of the relevant contents of the application and the scientific integrity requirements, so as to ensure that main participants fully understand the relevant contents of the application and are responsible for the authenticity, completeness and compliance of the contents involved.

3. Prior to submitting the proposals, applicants together with host institutions shall strictly comply with their commitments in the process of application and review.

4. It is strictly prohibited to engage in any activities that may affect the fairness of NSFC review.

V. Responsibilities of host institutions

1. In organizing applications, host institutions shall strictly abide by the *Regulations, the Guide to Programs, Regulations on Fund Management of National Natural Science Fund Host Institutions*, other relevant notices and management methods and Funding Management Method, Budget Preparation Notes and Notes on National Natural Science Foundation of China Program Budget Form.

2. Host institutions shall implement “Several Opinions of NSFC on Further Strengthening the Science Fund Management of Host Institution”, seriously fulfill the responsibilities of management, and strengthen and standardize science fund management.

3. **Host institutions shall establish a scientific research ethics review mechanism to prevent ethical risks.** In accordance with relevant laws, regulations and codes of ethics, host institutions shall establish and improve scientific research ethics management systems; strengthen ethical review mechanism and process supervision; improve the sense of responsibility and legal awareness of scientific research personnel with regard to scientific research ethics through publicity, education and training.

4. **Host institutions shall establish a scientific and technological security review mechanism to ensure no confidential or sensitive information appears in the proposals.** In accordance with relevant laws and regulations, host institutions shall

establish and improve scientific and technological security management systems; strengthen liability system for biosecurity, information security and other scientific and technological security; improve the sense of responsibility and legal awareness of scientific research personnel with regard to scientific and technological security and etc. through publicity, education and training.

5. Host institutions are held accountable for the eligibility of applicants, and shall examine and verify the authenticity and completeness of proposals. Host institutions that allow applicants without employer or whose employer is not a registered host institution as listed in Article 10 Clause 2 of *Regulations* to apply for funds via their institutions shall bear the responsibilities listed in Article 13 of *Regulations*, and sign the written contract. The written contract shall be archived at the host institution for further reference instead of being submitted to NSFC.

6. Host institutions should focus on the quality of the proposals, rather than the number of proposals attained by mass mobilization, setting rigid goal, and adopting reward and punishment measures linked to proposal submissions, so as to gradually improve the overall level of basic research of the institution.

7. Host institutions should upload the electronic scanned copy of the 2022 NSFC Host Institution Letter of Commitment for Project Application that is signed by the legal representative and stamped with the official seal in a timely manner, to ensure applicants can finish and submit their proposals online on time; and confirm and submit each and every proposal and its attachments, and the list of proposals of the host institution within the set time frame, to ensure all the proposals will be accepted properly.

VI. Accountability

1. Host institutions that neglect management and fail to perform the duties of examining the authenticity, completeness and compliance of the application materials, or host institutions and cooperative institutions violating commitments, shall be punished depending on the severity of the situation by NSFC in accordance with the *Regulations*, “*Notice of NSFC and MoST on Further Consolidating the Primary Responsibility of Institutions Undertaking National Science and Technology Programs(Special Projects, Funds, etc.) in Upholding Academic Culture and Scientific Integrity*”, “*Rules for the investigation and handling of scientific integrity cases (for trial implementation)*”, “*NSFC Measures for Investigation and Handling of Research Misconduct*”, *the Guide to Programs* and other provisions.

2. Applicants and main participants violating the requirements and commitments stated in this *Guide* or other scientific and technological activities, once discovered, shall be punished (such as termination of review) depending on the severity of the situation by NSFC in accordance with the provisions of the *Regulations* and the *Guide*.

Suspected violations of scientific research integrity requirements will be investigated, and verified cases will be handled with seriousness.

3. Clues and whistle-blowing reports related to the violation of disciplines and laws will be transferred to relevant discipline inspection and supervision departments in accordance with management authority.

Funding and Instructions

Basic Science Section

The Basic Science section is formed by the integration of the Department of Mathematical and Physical Sciences, the Department of Chemical Sciences and the Department of Earth Sciences. It focuses on the frontiers of world science and technology, strengthens the development of basic sciences, contributes to the human knowledge system, and cultivates first-mover advantages for cutting-edge technological innovation in various fields.

Department of Mathematical and Physical Sciences

Mathematical and physical sciences including mathematics, mechanics, astronomy, physics I and physics II are important foundations of natural science, and the precursor and basis for the development of contemporary science. In their own development, mathematical and physical sciences also provide theories, methods and means for other disciplines. Research findings in mathematics and physics play a key role in promoting the progress of both basic and applied scientific disciplines. Disciplines in mathematical and physical sciences are peculiar in characteristics, and big differences between or among disciplines, such as pure theoretical research (such as mathematics and theoretical physics, etc.) and experimental studies. Many disciplines feature “mega-science”, such as high energy physics, nuclear physics, astronomical physics, and high temperature plasma physics, etc.

Mathematical and physical sciences have extensive interactions with other sciences, for example, mathematics with information science, life science and management science, physics with materials science, life science, information science and chemistry, astronomy with earth science, and mechanics with engineering science, material science and earth science. The interactions produce a series of interdisciplinary and cross-boundary disciplines, new research areas have emerged, and research objects and areas are also expanding at the same time.

The Department will continue to increase its support on basic research that takes as its primary goals advancing the disciplinary development, promoting original innovation and training talented researchers and meeting the needs of national long-term development, as well as interdisciplinary research within the Department

and with other departments.

Funding of Programs in Department of Mathematical and Physical Sciences in 2021

Unit: 10,000 yuan

Divisions		General Program			Young Scientist Program			Less Developed Region Program		
		Projects	Direct cost	Success rate(%)	Projects	Direct cost	Success rate(%)	Projects	Direct cost	Success rate(%)
Mathematics	Mathematics I	239	12 057	23.18	309	9240	26.78	50	1 626.5	21.28
	Mathematics II	259	13 066	22.23	321	9630	25.70	45	1 463.5	17.18
Mechanics	Dynamics and control	72	4 363	24.41	75	2250	27.88	9	335	23.68
	Solid mechanics	148	9 011	22.39	200	5940	27.17	14	517	19.18
	Fluid mechanics	83	5 069	22.68	116	3430	25.78	5	184	14.71
	Bio-mechanics	21	1 277	24.71	28	830	25.45	2	74	22.22
Mechanics	Physical mechanics	6	366	42.86	—	—	—	—	—	—
	Explosive and impact dynamics	40	2 440	22.86	57	1710	24.36	1	38	25
	Environmental mechanics	18	1 108	21.18	17	500	25.37	1	37	12.50
Astronomy	Astrophysics	60	3631	25.75	57	1 670	27.94	5	185	19.23
	Astrometry and celestial mechanics	46	2825	19.83	41	1 200	25.15	2	74	18.18
Physics I	Condensed matter physics	214	13 100	22.55	244	7 230	26.44	29	1 068	19.08
	Atomic and molecular physics	41	2 474	22.65	48	1 410	27.27	5	188	19.23
	Optics	148	8 957	22.63	155	4 580	26.50	16	597	19.75
	Acoustics	34	2 079	23.29	39	1 170	26.53	2	72	18.18
	Quantum regulations	25	1 532	23.15	38	1 110	27.54	1	37	16.67
Physics II	Fundamental physics and particle physics	99	5 937	23.57	107	3 170	28.08	17	614	30.36
	Nuclear physics, nuclear technology and its applications	121	7 394	21.76	143	4 230	26.00	3	120	9.68
	Accelerator, reactor and detectors	46	2 829	22.77	64	1 900	25.91	—	—	—
	Plasma physics	58	3 575	23.20	64	1 920	25.60	2	80	8.33
Total or average		1 778	103 090	22.68	2 123	63120	26.42	209	7 310	19.16
Direct cost per project		57.98			—			34.98		

In 2021, the Department received 7,839 applications for General Programs, which is 40 more than 2020, increasing 0.51%. 1,778 proposals were funded, the funding rate was 22.68%, and the funding per project was 579,800 yuan in average. The funding per project was 504,500 yuan for mathematics, and 609,100 yuan for other disciplines.

In 2021, the Department received 8,036 applications for Young Scientists Fund, and funded 2,123. The success rate was 26.42%. The maturity of young scientists is particularly important for the development of mathematical and physical sciences. The Department has always been paying attention to fostering and supporting young

scientists, and the funding rate of the Young Scientists Fund projects has always been higher than General Program Fund for projects.

In 2021, the Department received 1,091 applications for Less Developed Region, and funded 209. The success rate was 19.16%. The funding per project was 349,800 yuan in average.

Division of Mathematics

Mathematics(A01~06)

The Division encourages creative research on important issues in the mainstream and frontier of mathematics, explorations of new ideas, new theories and methods in mathematics and interdisciplinary applications, inter-crossing of different branch disciplines with mathematics, and applied mathematical research on practical issues. Applicants are required to have sound research background and capability. Proposal should be prepared based on deep understanding of the current status of the research involved, main issues and relevant research methods and available approaches. The Division encourages researchers to consolidate research team, foster talents and promote academic exchanges through the funded research projects. Research direction adjustment is allowable when needed.

For basic mathematics, the funding aims at maintaining stable development of research directions where China is traditionally strong and has comparatively large-scale research capability, promoting fast development of research areas that are within the mainstream of international mathematical research but relatively weak in China, and promoting interdisciplinary research among branches of mathematics. Focus is given to algorithm, grid theory and its algorithm, geometrical method in representation theory, comparative geometry and geometric analysis in non-smooth space, application in of modern harmonic analysis in number theory, associate geometry and geometric measure, random analysis method and application, and mathematical problems in quantum field theory.

The funding for applied mathematics and computational mathematics aims at improving applications in solving practical problems, and gives more emphasis on basic theory and new methods with strong practical background and sound potentials for application. NSFC encourages mathematical modeling of practical problems, analysis and computation, and statistical methods and theory for big data, supports research on mathematical physical logic, algorithm complexity, discrete probability modeling, optimal algorithm, and combinational algorithm. Focus is given to applied researches such as mathematical modeling and theory of new materials, uncertainty theory in data processing, coding theory and information security, mathematical modeling and analysis in environmental and energy sciences, bio information and life

system, pathogenesis and control of infectious disease, mathematical methods for complex bio process and development of diseases, statistical methods in industry and medical science, statistical and optimization method in deep learning and artificial intelligence, modeling and analysis in economic prediction and financial risk management, and mathematical theory and new method for industrial, medical imaging and image processing.

For applications that intercross with other disciplines and submitted through the Department of Mathematical and Physical Sciences, Code 1 should be selected as those of the Department of Mathematical and Physical Sciences, Code 2 should be selected as those of other related Departments.

Division of Mechanics

Mechanics(A07~A13)

The Division mainly supports research on dynamics and control, solid mechanics, fluid mechanics, biomechanics, physical mechanics, explosion and impact dynamics, and environmental mechanics. The Division supports projects with creative ideas in the frontiers of mechanical research on the one hand and projects closely related to the sustainable development of economy, society and national security, and the development of engineering and technology on the other hand. The Division supports interdisciplinary research and encourages experimental research using the available experimental facilities and key labs in China and advocates development of engineering analysis software in computational mechanics.

Applications for research in areas of dynamics and control should pay attention to the theory, methods and experimental studies on nonlinear dynamics and control of vibration and noise in frontiers of the discipline and major national needs, strengthen research on complex systems such as non-smooth system, uncertain system, random system, new structure and flexible system, the coupling of solid, flexible bodies, and multi fields interactions. The Division encourages studies on flight mechanics and space environmental dynamics, and analytical mechanics and multi body dynamics, and key issues of dynamics and control problems in major engineering projects, and encourages experimental studies on dynamics and control.

Applications in the area of solid mechanics should pay attention to international frontier and creative ideas, and give more consideration to intercrossing with physics, materials science, chemistry, information and biological sciences, and strengthen on proposing and studying topics in major engineering application, expand basic theory of continuum mechanics, and promote the development of multi-scale mechanics and multi-field coupled mechanics. Proposals in such areas will be encouraged as follows: the constitutive theory of materials at macro, meso and micro scales; the theory of

strength, crack, fatigue and failure mechanism; the mechanical behavior of new materials and structures; experimental measurement techniques and representation methods, new theory and method in computation mechanics and high performance computational software; structural response, optimization, and completeness evaluations.

Applications in fluid mechanics should pay attention to studies on the laws and mechanisms governing complex flows. The Division encourages researches on micro-nano scale flow, rarefied gas flow, hypersonic aerodynamics, aerodynamic noise, measurement techniques in experimental fluid mechanics, flow control technique, new methods in CFD and high performance computational software, especially theory, simulation and experimental studies on high temperature, high pressure and compressible turbulent flow, high speed hydrodynamics, multi-phase complex flow, non-Newtonian flow, and key fluid dynamic problems in aerospace, energy and ocean, and transportation areas.

Applications in biomechanics should pay attention to bio mechanical and mechanical biology problems related to human health and disease, life process, biomechanics and biology in sports, and strength research on the mechanism and transformation medicine related areas such as cardiovascular, bone joint and cancer, rehabilitation, tissue engineering, bio-material and bionics, medical materials and equipment, national defense and public health will be encouraged, and encourage experimental studies and software development on biomechanics.

Applications for physical mechanics should pay attention to mechanical properties of solids and fluids from the perspective of atoms and molecules, strengthen the intersection with chemistry, biology, information and other disciplines, and promote the research of physical mechanics theories, methods and applications of complex media and intelligent systems.

Applications for explosive and impact dynamics should pay attention to frontier areas and major national needs, focusing on studies of the dynamic mechanical behaviors of materials, structural response to explosive impacts and detonation mechanisms, dynamic loading and diagnosis, strengthen mechanism of explosive energy release and encourage studies on dynamic response of material and structure in multi field coupling under extreme dynamic loading environment, and protection of human bodies.

Applications for environmental mechanics should pay attention to basic theory of rock mechanics, environmental fluid mechanics, mechanics in extreme conditions and disaster damage, experimental method and numerical methods. The Division encourages studies on wind-sand and water-sand disasters water pollution, urban smog, carbon dioxide reduction and rock deformation, damage and mechanism of disaster formation.

The Division continues to support studies on instruments, new experimental

methods and techniques with innovative ideas. The Division will keep supporting projects in computational software development, giving stress on the integration and standardization research on the development of the computational mechanics software which may produce independent or shared IPR.

Division of Astronomy

Astronomy(A14~A19)

The Division mainly supports researches on astrophysics, basic astronomy, astronomical instruments and technology. In accordance with the trend of astronomical development in the world and the present situation in China, the Division supports research proposals with emphasis on the development of technology and instrumentation. Studies based on existing observation apparatus or facilities to be built soon in China will be encouraged. The Division promotes the combination of innovative ideas, observation and theories, and studies on new technologies and methodologies for astronomy, especially those closely related to mega-science projects under construction in China. Interdisciplinary research is strongly encouraged so as to gradually build up research teams with special features and influence in international scientific communities. International cooperation and exchange will be given much attention.

In the General Program projects funded in recent years, a good balance has been achieved between astrophysics (including galaxies and cosmology, stellar and galaxy matters, solar and planetary system), basic astronomy (including astrometry, celestial mechanics and history of astronomy) and astronomical technology and methods. Young researchers have become the main force in astronomical research and more than half of the awardees are under the age of 40.

In 2022, in addition to strengthening continuous support for projects integrating theory and observation and projects conducted by young scientists, the Division will emphasize on interdisciplinary research with physics, space science, earth science and information science, etc., maintain its support on advantageous research directions, promote research related to using large observatory facilities in China, and foster research topics that have the potential of making breakthroughs. The Division encourages research on basic physical process on celestial bodies, celestial chemical evolution, and celestial bodies in the solar system, extra solar system planetary system, infrared astronomy, space astronomical measurement, and astronomical research that addresses the national needs. The priority will be given continuously to researches in basic astronomy, astronomical technology and methods, and to relative small scaled astronomical research institutions.

In the next few years, the Division plans to give special support to pre-research

around the research based on equipment that has already been built or being built, and conceptual studies on new technologies that are urgently needed for large-scale telescope and space exploration. **For applicant in these research areas, please mark “Major S&T Basic Facilities Project” or “New Astronomical Technology” in the application forms.**

Division I of Physics

Physics I(A20~A24)

The funding scope of the Division covers research on condensed matter physics, atomic and molecular physics, optics, acoustics and new research areas formed between above four disciplines and other disciplines.

According to the current status and requirements of disciplinary development, the Division pays attention to study on experimental methods and techniques motivated by creative ideas, encourages researches in new computational methods and simulation software closely related to experimental physics and exploratory types, key basic physical issues serving national needs, and new physical concepts and methods in interdisciplinary areas. The Division encourages especially in-depth and sustained studies on important physical problems and potential applications that have not become hot topics, and researches in basic physical problems on devices, and emphasize innovative researches on new concept, new method, new technology and new application in physics.

The condensed matter physics studies the structure, interaction, dynamic process of condensed matters and the relations between its macro properties. The Division pays attention to modeling and computation in electron related systems, macro quantum phenomenon, quantum phenomena and quantum effects in various low dimensional and small-scale systems, quantum information and solid state quantum computation, superconducting physical properties, self-spinning and magnetism, poly ferric properties and magnetic electro coupling, topological state and topological order, condensed matter physics in extreme conditions, device physics and advanced technologies and methods of characterization, surface and interface physics, semiconductor physics, and physical problems in energy transformation, transport, and storage, non-linear response analysis, temporary physical phenomena in non-equilibrium conditions, Non-Hermitian physics, physics and application of advanced functional materials. Encouraged areas include physical issues and experimental methods related to soft matters, biophysics, and AI. The Division pays special attention to creative studies on material, device and physics having important application prospects.

The atomic and molecular physics studies structure, property, interaction and laws of motion of atoms and molecules, and their interactions with surrounding environment. The Division encourages researchers to pay attention to atomic, molecular structures, spectrum and regulations, complex interactions of atomic and molecular systems, cluster structure, physical property and assembly, atomic and molecular impact physics, atomic and molecular interactions with laser, atomic and molecular properties and regulation in external field, strong field atomic molecular dynamics, atomic and molecular physics in extreme conditions, cold atomic molecular physics, and their applications in quantum computation and quantum simulation, and precision measurement physics based on atoms and molecules. The Division encourages studies on frontier problems in atomic and molecular physics and interdisciplinary areas.

Optics studies generation, propagation of light and its interaction with matter. The Division supports research on generation and regulation of new optical field, superfast and strong light physics and interference regulation, physical problems of light in complex media and micro nano structures, new optical materials and device physics, precision spectrum and high resolution imaging, physical problems in new wave band optics and new light sources, photo quantum physics and quantum optics, topological and Non-Hermitian physics in optics and optical systems. The Division emphasizes on precision regulation on optical field phase and structure, ultrahigh spatial and temporal resolution, super strong and extreme weak optical field, novel optical materials, physics and applications, especially photoelectric integration and photon chip physics and application. The Division encourages studies on optical problems in life sciences and health as well as energy and environment, and pay attention to applications in information, chemistry and material sciences.

Acoustics studies the generation, propagation, reception of sound and its effects. The Division mainly supports researches on basic and applied basic acoustic problems, including physical acoustic, linear and nonlinear acoustics, marine acoustic signal propagation and inversion, underwater sound communication and signal process, aerodynamic acoustics, ultrasonic and acoustic effects, acoustic coupling with multiple field and propagation in complex media, sound regulation, biological acoustics and language acoustics, information acoustics and intelligent acoustics, noise control, environmental acoustics and earthquake sound, novel acoustic materials and devices, properties of acoustic energy exchanger materials and its preparation, etc. The Division encourages interdisciplinary research in the areas of biomedical, material science, information science and engineering mechanics.

Quantum regulation is a new area funded in the Division, so as to promote researches in related material and physics, new quantum structure, quantum effect and applications. The Division encourages exploratory studies on precision measurement physics, quantum computation and communication, and quantum simulation, and

research on quantum device physics and new quantum techniques. Focus will be given to condensed matter physics, atomic molecular physics and optics, and interdisciplinary research in areas of information science and material science.

Division II of Physics

Physics II(A25~A30)

The Division mainly supports research on fundamental physics, particle physics, nuclear physics, accelerator, reactor and detector, plasma physics, and nuclear techniques and applications.

For fundamental physics, funding will be focused on original studies and interdisciplinary research with other disciplines. Stress will be given to important theoretical physical issue arising from scientific experiments and applications.

For particle physics and nuclear physics, the Division will support creative theoretical and experimental research, in particular, the combination of theoretical and experimental studies related to selected large-scale experimental facilities that are in operation, upgrading or to be completed soon both in China and abroad. Funding will be used to guide research towards the understanding of important physical rules related to the latest experimental results, such as the theory and experiments of phenomenology in particle physics and interdisciplinary research of nuclear physics under extreme conditions with nuclear astrophysics and other disciplines.

For support to nuclear technology, accelerator, reactor and detector, low-temperature plasma and synchronized radiation method and technology, it is hoped that fundamental issues should be drawn from the disciplinary development, national demands and intercrossing with other disciplines, which may facilitate a deeper understanding of physical laws underlying the development of the disciplines and important applications at the same time. Emphasis will be laid on key technologies and innovative ideas in methodology and intercrossing with other disciplines. In addition, the exploration of mechanisms and rules governing the interaction of matter with instantaneous, high energy, high power and strong field radiation (such as charged particles, X/ γ , neutron and electromagnetic fields) are key areas for funding. Attention will be given to new acceleration principles, nano-metre micro-beam, high power ion beam, strong current accelerators, plasma radiation source in accelerator and detector and plasma research, and physics and key technologies of all other advanced radiation sources. The Division gives strong support to new types of nuclear detection technology and method such as large area, high counting rate, high temporal resolution, low cost and weak signals, etc., and relevant studies on nuclear electronics.

For nuclear fusion and plasma physics, more attention will be given to the exploration of new diagnostic means related to large facilities which are in operation at

present or will be built soon. In particular, basic research on advanced magnetic confinement fusion and new approaches to inertial confinement fusion and related fundamental physical problems, and computer simulation and experimental studies of various kinds of plasma will be stressed.

In order to make more efficient use of limited funds, the Division encourages researchers all over China to make full use of big science facilities, small and medium equipment to conduct research, so as to achieve sustainable development in the research. The Division encourages experimental studies with innovative methods of high resolution diagnosis and detection, as well as the development of experimental facilities, detection and diagnosis devices which are important for the development of accelerators, detectors and gravitational wave detection. Applicants may increase the funding request in applications in these areas according to the actual needs. Projects with more young scientists involved in the research team under the same condition will be preferred.

Department of Chemical Sciences

Chemistry is the science that deals with the composition, structures, properties, reactions and transformations of matters, which plays a central role in multidisciplinary integration. Chemical engineering, involved as the unique industrial characteristic of the chemistry subject, aims to realize large-scale production by applying the principles of transfer and conversion of matters and energy, and ultimately to construct substantial foundation for essentials and sustainable development of human society.

The Department of Chemical Sciences is dedicated to raise the overall quality and international status of China's fundamental research, and the creative talents and groups with international impact in the fields of chemistry and chemical engineering. Specifically, the Department stimulates and financially supports research on the reaction, process and function at different levels of atoms, molecules, molecular aggregation and condensed state. Studies on complex chemical systems are also encouraged to secure the precise control and logic cognition of chemical synthesis, process and function. Moreover, the Department focuses on expanding knowledge of chemistry and chemical engineering in multiple research fields, such as biology, materials, energy, information, resources, environmental science and human health, targeted at the critical scientific issues confronting economy, society, national security and sustainable development. Accordingly, the projects funded by the Department of Chemical Sciences basically focus on the frontier research in chemistry and chemical engineering by applying various strategies, including the combination of microscopy and macroscopy, statics and dynamics, theoretical chemistry, empirical approach and

precise analytical technologies, and fundamental experiments and process engineering. In addition, innovative and interdisciplinary research addressing new theories, technologies and achievements from other disciplines are highly encouraged.

The Department of Chemical Sciences will consistently promote innovative and high-quality research in the cutting-edge fields, with a focus on in-depth and systematic research, and a priority support to proposals on the basis of multidisciplinary integration. The Department supports creative projects by placing emphasis on the research diversity of ideas, methods and contents, whereas research similarity and convergence are highly discouraged. Besides, the Department will be committed to supporting original research, so as to overcome innovation bottleneck that limited the rapid development of chemistry and chemical engineering in China, and ultimately to enabling a breakthrough from high-quantity to high-quality research. In the review process, scientific excellence is the core criterion for selection and discipline development with balance, coordination and sustainability will be comprehensively considered. The Department aims to promote the fundamental research of chemistry and chemical engineering in China to the international frontier.

Funding for General Program, Young Scientists Fund and Fund for Less Developed Regions Projects in Department of Chemical Sciences in 2021

Unit: 10000 yuan

Disciplines	General Program			Young Scientists Fund			Fund for Less Developed Regions		
	No. of Projects	Direct cost	Funding rate (%)	No. of Projects	Direct cost	Funding rate (%)	No. of Projects	Direct cost	Funding rate (%)
Synthetic Chemistry	295	17 706	21.52	310	9 230	18.57	57	2 001	17.43
Catalysis and Surface/ Interface Chemistry	196	11 757	21.66	221	6 550	18.59	28	983	16.87
Chemical Theory and Mechanism	118	7 082	21.57	99	2 910	18.79	12	421	18.75
Chemical Measurement	167	10 017	21.63	160	4 760	18.60	22	772	17.19
Materials Chemistry	203	12 185	21.46	231	6 790	18.54	34	1 194	17.26
Environmental Chemistry	230	13 798	21.58	189	5 630	18.51	35	1 229	17.50
Chemical Biology	143	8 700	21.00	126	3 750	18.61	23	807	17.29
Chemical Engineering and Industrial Chemistry	396	23 753	21.62	320	9 580	18.48	44	1 545	17.39
Energy Chemistry	149	8 943	21.53	186	5 540	18.62	24	843	17.78
Total or Average	1 897	113 941	21.53	1 842	54 740	18.57	279	9 795	17.40
Direct cost funding per project	60.06			—			35.11		

For the General Program projects, the Department of Chemical Sciences received 8,812 proposals in 2021, which was 77 proposals less than in 2020 with a decreasing rate of 0.87%. After review, 1,897 proposals were funded with a success rate of 21.53% and the average direct cost of 600,600 yuan per project. In 2021, the average funding per project decreased slightly, and the success rate increased by 1.11% compared with that of 2020. The received proposals in the main research areas of chemistry and chemical engineering were slightly decreased compared with those of 2020, while proposals in the interdisciplinary research areas, such as materials and

energy, life health and environmental resources, were maintained a similar amount.

For the Young Scientists Fund projects, the Department of Chemical Sciences received 9,920 proposals in 2021, which include 691 new proposals with a increasing rate of 7.49% than that in 2020. After review, 1,842 proposals were funded with a success rate of 18.57%. In 2021, the success rate increased by 1.43% compared with that of 2020. The Department of Chemical Sciences upholds the principle of people-orientation and fostering innovative talents, which plays the maintaining and fostering role of the Young Scientists Fund and ensures the fundings for excellent young researchers. Innovative research is highly encouraged to differentiate the advisors' topics. The review criteria will put less emphasis on previous publications, so as to facilitate the growth of young scientists.

For the Fund for Less Developed Regions projects, the Department of Chemical Sciences received 1,603 proposals in 2021, which include 49 new proposals with a increasing rate of 3.15% compared to that in 2020. After review, 279 proposals were funded with a success rate of 17.40% and the average direct cost of 351,100 yuan per project. In 2021, the average funding per project decreased slightly and the success rate increased by 2.28% compared with that of 2020. On the basis of stabilizing the funding scale of the Fund for Less Developed Regions, the Department of Chemical Sciences will make efforts to further promote the research quality and efficiency of the Fund, stabilize a batch of talents for fundamental research, and continuously bridge the gap with the developed regions. Applicants are encouraged to carry out research by taking advantage of the local resources, in order to promote the economic development of the regions in a coordinated way.

The average direct cost per project for the General Program and the Fund for Less Developed Regions in 2022 is expected to be close to that in 2021.

Notices:

1. The proposals that have the same or similar research contents cannot be applied by different applicants.

2. Requirements on research ethics and scientific securities (including biology and information security):

(1) For proposals involved in research ethics, applicants shall submit the approval certificate (upload a scanned copy in attachment) granted by ethics committee of the institution or higher authorities. Proposals without the proper ethics certificate will not be accepted or funded.

(2) For proposals involved in scientific securities (including biology and information security), applicants shall strictly comply with the relevant national laws and regulations; supporting institutions shall make a security commitment and submit a scanned copy in attachment. Proposals without the proper security

commitment will not be accepted or funded.

(3) For funded proposals involved in research ethics and scientific securities (including biology and information security), if the research plan is changed during the implementation period, the applicant is required to resubmit the ethics certificate and scientific security commitment to the National Natural Science Foundation of China in accordance with the above requirements.

3. To ensure the outcome of funded projects, the applicants supported by high-level funding programs (including Key Program, International (Regional) Joint Research Program, Major Program, Major Research Project, key supported projects of Joint Funds, and Special Fund for Research on National Major Research Instruments) during the recent two years, would in principle not be supported while applying for low-level funding programs this year. The application will be not funded by the situation that the research proposal has similar contents or used repeatedly in other applications for national science and technology projects.

Division I of Chemistry

The Division I supports the research in the field of synthetic chemistry.

Synthetic Chemistry (B01)

Synthetic chemistry is the science dealing with the synthesis and transformation of matter, which involves the synthesis of inorganic, organic, polymeric compounds, etc. It aims to realize the precise synthesis and application of new substances with specific properties and/or functions, through controlling the selectivity of matter transformation and aggregation process.

Synthetic chemistry is to fulfill the demand for new compounds, new materials, new devices, and new technologies in the fields of chemical science, life science, materials science, information science, energy and environmental science. It mainly explores the mechanisms and rules of matter synthesis and transformation, develops novel synthesis strategies, and establishes related theoretical systems and technical methodologies. The majority of research in synthetic chemistry is conducted to achieve functional substances, focusing on the rational design, structural control, transformation and compounding processes, efficient and high-selectivity synthesis and assembly of matter. It aims to achieve precise synthesis of substances in a green, safe and economic way, with particular emphasis on human health, environment, effective utilization of natural resources and sustainable development. To this end, the following research directions are encouraged but not limited to: synthetic chemistry promoted by new reagents, new reactions, new concepts, new strategies and new

theories; synthesis under extreme conditions or non-equilibrium and synergy of multiple external fields; controlled synthesis and high-performance functionalization of macromolecules; surface and interface synthesis based on covalent and/or non-covalent binding; biological and biomimetic synthesis rationalized by chemical principles; molecular design and synthesis of novel functional materials; function-oriented rational design and precise synthesis; in-situ and diverse characterization techniques and structure-property relationships of substances; mechanisms, rules and theories of substance synthesis; synthetic methodologies of atom economy, precise control and sustainability.

The Division of Synthetic Chemistry is the foundation and core of chemistry. It advocates the cross-integration of multiple disciplines, encourages original innovations and breakthroughs on material creation and transformation, promotes the solutions of major scientific problems in related fields, and finally boosts the development of the national economy and society.

Division II of Chemistry

The Division II supports the research in the field of catalysis and surface/interface chemistry and chemical theory and mechanism.

Catalysis and Surface/Interface Chemistry (B02)

Catalysis and surface/interface chemistry is intended to study catalytic processes and the structure and properties of the surface/interface and reveal the physical and chemical basic rules of catalysis and the surface/interface.

The areas funded by catalysis and surface/interface chemistry include chemical catalysis, surface chemistry, colloid and interface chemistry and electrochemistry. These areas involve surfaces, gas-solid interfaces, gas-liquid interfaces, liquid-liquid interfaces, liquid-solid interfaces and solid-solid interfaces and gas-liquid-solid multi-phase interfaces.

Catalysis and surface/interface chemistry emphasizes on the fundamental theory and characterization methods. By developing time-, space- and energy-resolved in-situ characterization techniques, applying large scientific facilities, and combining theoretical calculations and artificial intelligence technologies, it reveals the physical chemistry processes and structural evolution rules of the surface/interface chemistry.

Supports in the field of chemical catalysis are focused on developing new concepts and catalytic theories, discovering new catalytic reactions, creating new catalytic materials, promoting the cross-over and fusion between heterogeneous, homogeneous and biological catalysis, fostering the understanding, rational design and regulation of catalytic active site structures, the research on catalytic reaction

mechanisms as well as structure-performance relationships and the coupling and integration during the catalytic reactions.

Surface chemistry mainly supports the research at atomic and molecular levels on chemical and physical processes related to solid surface interfaces. Encouraged research orientations include: solid surface/interface structure, performance and control; dynamics and energy transfer theories in the assembly and reactions at surface/interface; the new methods for physical and chemical processes at surface/interface.

Colloid and interface chemistry supports the research on the usage of new methods and techniques to reveal the essences of colloids and interface chemistry; the design and synthesis of new surfactants and the construction of aggregation; the development of new dispersion systems; the understanding of assembly processes, interface adsorption and infiltration behaviors; construction of a colloidal material with self-healing and outfield responsiveness; the enhancement of basic research for applications of colloid and interface chemistry in the fields of material, life science and environment science.

Electrochemistry mainly supports the research including the construction, characterization, and the theory and simulation methods of the electrochemical interface system; recognition and control of electric charge transfer, mass transport and conversion at electrochemical interfaces; in-depth understanding of the active center structure and performance of electrocatalysts; design and synthesis for electrocatalysts; reveal of surface/interface scientific problems in the fields of electrochemical energy conversion and storage, electrochemical synthesis, bioelectrochemistry and photo electrocatalysis and electrochemical engineering and manufacturing; emphasizing on electrochemical process in the high-end manufacturing of electronics.

Chemical Theory and Mechanism (B03)

Chemical theory and mechanism aims to establish and develop new chemical theories and experimental methods to reveal the mechanism and basic rules of chemical reaction and its related processes.

The areas supported by chemical theory and mechanism include theoretical chemistry, computational chemistry, chemical thermodynamics, chemical kinetics and reaction dynamics, structural chemistry, photochemistry and spectroscopy, chemical reaction mechanisms, moletronics and molecular magnetism, polymer physics and polymer physical chemistry, chemical informatics and artificial intelligent.

Theoretical and computational chemistry focuses on the new methods of electronic structure theories, dynamics and statistical mechanics, and emphasizes on the development of computational methods and softwares with independent intellectual property rights. The rational design and computational simulation is aimed at complex systems such as materials and biology, as well as the fields of energy, chemical

engineering, environment, medicine and information. For chemical thermodynamics, there is a need to develop theoretical and experimental methods suitable for complex systems, revealing the internal logic between microstructures and system thermodynamic properties, and to focus on the interdisciplinary applications. Researches in chemical kinetics and reaction dynamics focus on the development and utilization of new experimental and theoretical methods to explore the essence and reaction processes of chemical reactions in gas, surface and condensed phases, as well as chemical kinetics under extreme conditions. Applicants are encouraged to conduct research employing advanced coherent light source and focus on the work of ultrafast dynamics, microstructure and mechanisms of condensed phase. Structural chemistry focuses on the structural characterization and techniques of complex functional systems, controllable synthesis and assembly, dynamic bonding and transformation, encouraging the rational design, construction and application of new multi-porous structures. Research of photochemistry and spectroscopy should focus on the development of spatial resolved, time-resolved and energy-resolved new technologies and their new assembly methods to the study of photochemical and photophysical mechanisms of luminescent and light conversion materials. The research of chemical reaction mechanisms will be focused on exploring microscopic mechanisms and basic rules of chemical reactions by means of theoretical chemistry, computational chemistry, artificial intelligence and experimental strategies, as well as the microscopic mechanism and basic rules of chemical reactions and catalytic processes. Molecular electronics and molecular magnetism focus on the clarification of molecular polarization, electronic coupling, and mechanism of spin conversion. Polymer physics and polymer physical chemistry mainly focus on the chain behavior and interaction of macromolecules, the evolution mechanism and control over different scales of the structure, the essence of the connection between microstructure and macroscopic properties. For chemical informatics, it is encouraged to develop algorithms for storage, retrieval, transformation and data mining of molecular structure information based on general system principles, and focus on the applications of big data and artificial intelligence in chemistry, chemical engineering, materials, energy, and life science.

Division III of Chemistry

The Division III supports research in the field of materials chemistry and energy chemistry.

Materials Chemistry (B05)

Materials chemistry utilizes chemical principles and methodology to study the design, preparation, structure, property and application of materials. It connects chemistry with other disciplines including materials science, life science, medical

science and information science. Materials chemistry designs new materials at the atomic and molecular levels, develops preparation methods and techniques, and reveals the structure-property relationships of materials. It aims to modulate materials' macroscopic properties by means of structure engineering across multiple length, energy, and time scales, as well as to develop new high-performance and multi-functional materials for targeted applications in the fields of energy, environment, human health and information.

Materials chemistry focuses on precise preparation of new materials with specific structure and function via tailoring the materials' structure and properties. It places a strong emphasis on enabling research at the intersection between multidisciplines to facilitate interdisciplinary integration for unravelling the structure-property relationships. A shared feature of the research is to investigate the fundamental principles governing the materials function using a combination of multiple characterization techniques. By doing so, it strives to address the major national needs and achieve the efficient utilization of characteristic resources in China.

Materials chemistry encourages not only fundamental research on materials with electrical, optical, magnetic and other properties, but also interdisciplinary research related to biology, medicine and pharmacy. Encouragement will be also given to following studies the structural design and preparation of advanced materials assisted by artificial intelligence, development of chemical methods and principles in advanced processing technologies, and basic sciences underlying the high-density storage, on-demand release and efficient utilization of energetic materials.

Energy Chemistry (B09)

Energy chemistry is a science focused on the conversion, storage, transmission and utilization of energy based on chemical principles and methods. Its fundamental task is to achieve efficient and clean utilization of chemical energy by establishing new theories, methods, and mechanisms of energy conversion and storage and developing new materials, systems, and devices.

Energy chemistry focuses on the basic chemistry issues and reaction processes of energy-related systems. Major research areas will be included as the clean and efficient conversion and utilization of fossil fuels (coal, oil, natural gas, etc.); the preparation, storage and efficient conversion of non-fossil liquid fuels and other clean energy such as hydrogen fuels; the development and performance optimization of electrochemical devices such as power and energy storage batteries, fuel cells, and supercapacitors; the design and fabrication of efficient solar cell materials; the fundamental chemistry of biomass energy and resource utilization to promote the catalytic conversion of biomass for high-quality fuels; the energy chemical processes under extreme conditions; new systems for energy conversion and storage enabled by developing interconversion process between light energy, thermal energy, electrical energy, mechanical energy and

chemical energy and understanding the fundamental rules governing such conversions.

Division IV of Chemistry

The Division IV supports research in the field of chemical measurement science, environmental chemistry and chemical biology.

Chemical Measurement Science (B04)

Chemical measurement science aims to expand chemistry and interdiscipline-related measurement theories, principles, techniques and methods; to develop related instruments, devices, analytical reagents and software for obtaining the space-time variation rules of the matter's composition, structure, morphology, properties and interactions.

Chemical measurement science, oriented to the science frontiers, major national needs, the main field of national economy and human health, and emphasizes interdisciplinarity, methodological innovation, instruments creation based on new principles, and the development of key technologies. It covers multiple areas which include: detection and analysis from macroscopic to microscopic systems with high sensitivity, high specificity, high resolution and high throughput; establishing new theories, principles, methods and technologies. Accordingly, the research directions include but not limited to: chemical measurement theory; sample treatment and separation; spectroscopic methodologies; chemical imaging; micro/nano analysis; chemical and biological sensing; big data analysis and artificial intelligence; *in vivo* analysis; analysis of single particle, single cell and single molecule; analytical instruments and reagents and chemical measurement related to major diseases and national security.

The priority funding areas for chemical measurement science include the following: processing, separation and identification methods for complex sample; space-time resolved spectroscopy and chemical imaging; new spectroscopic principle and technology; precise measurement of single atom, single molecule, single cell and single particle; micro/nano analysis and devices; structural and functional analysis of biological macromolecules; *in vivo* and real-time detection of living organisms; omics analysis; biomolecular recognition and probes; *in situ* and on-line characterization techniques; analysis technology for diagnosis of major diseases; analysis technology under deep space, deep earth and deep sea environment; early warning, screening and traceability of public safety; creation of instruments and devices; chemical measurements based on the big science facility, and artificial intelligent in chemical measurement science.

Environmental Chemistry (B06)

Environmental chemistry is a science that studies the existence, characteristics, behaviors, effects of chemical substances in environment and the principles and methods for pollution control. It is an important branch of chemical science and the core discipline of environmental science.

Environmental chemistry faces the frontier of the discipline and the national strategic demands, adheres to the problem orientation, and highlights foresight, innovation, cross-over and application. Major funding areas of environmental chemistry cover the following branches: environmental pollution and analysis, pollution process and mechanism, pollution control and remediation, environmental toxicology and health effects, environmental theory and computation, radio chemistry and radiation chemistry, bio-safety and chemical protection.

Facing the major issues of ecological environment protection in China to refine the key scientific issues, environmental chemistry encourages to develop new detection and monitoring technologies and methods, and study the environmental chemical behaviors, ecological and health effects and its prevention and control principles and methods through the combination of laboratory research, field experiment, theoretical simulation and environmental big data. The priority funding areas include: characterization and analysis of pollutants in complex environmental media; tracing and behaviors of emerging contaminants on multi-media interface; new principles and technologies in environmental catalysis; forming mechanism and control techniques of atmospheric combined pollution; pollution process of soil and water and their control and remediation; treatment and utilization of solid wastes; fundamental research of environmental chemistry targeted at carbon neutrality; environmental exposure and health effects of new toxic pollutants; environmental behaviors and toxicology of micro/nano-materials; formation and control of antibiotic resistance of microorganisms; environmental computational chemistry and big data; prevention and control of radioactive pollution and utilization of radioactive nuclides; key chemical issues in the prevention and control of hazardous chemicals and radiation, etc.

Chemical Biology (B07)

Chemical biology utilizes exogenous chemicals to precisely modify or regulate the biosystem at the molecular level by interventional chemical methods. Chemical biology provides new ideas and concepts for life science research through the development of new reaction technologies and molecular tools, and it promotes the realization of visual, controllable and creative research concerning life processes (or functions).

Chemical biology focuses on the processes and dynamic rules of critical molecular events in life sciences, and it gives full play to the characteristics and creativity of chemical sciences. Our mission focuses on: 1) the development of novel

molecular probes to explore and regulate vital activities quantitatively, in real-time, and in-situ; 2) to develop new biocompatible chemical reactions to modify and label biological molecules by orthogonal coupling technologies for the study on biological functions of biological macromolecules (*e.g.*, proteins, nucleic acids, polysaccharides, lipid compounds) as well as active small molecules and key ions; 3) to discover functional- or biogenic-oriented active natural products of novel structures and skeletons, and to reveal their mechanisms of action and targets; 4) to establish and optimize small molecule compound libraries and screening technologies to explore and interfere with biological processes in cells, thereby revealing interactions between unknown pathways in vital activities and biological molecules, to promote the study of signal transduction and gene transcription based on functional small molecules, to realize the identification of drug targets, discovery of biomarkers and development of leading compounds, and to reveal the biological functions of active molecules; 5) to analyze biosynthetic mechanisms of substances involved in vital activities, and to use biosystem and/or biological components to develop special chemical reactions and synthesize new functional molecules or specific target molecules; 6) to carry out chemical assembly and simulation of complex living systems, to develop new theories for chemical biology, and to reveal chemical essences of life activities, on the basis of created and developed innovative chemical tools and techniques.

Chemical biology encourages original innovation. It supports preferentially research using molecular probes to investigate the molecular function and functional regulation of major biological processes and diseases; it encourages research oriented to solving biological and medical problems by chemical means and methods; it supports fundamental research of chemical reaction mechanisms and chemical theories of biological systems; it explores the chemical origins of life and chemical communications of living systems; it promotes the integration and cooperation of chemistry, biology and medicine.

Young scientists are encouraged to conduct independent and original research. Proposals without attributes of Chemical Biology will not be considered.

Division V of Chemistry

The Division V supports research in the field of chemical engineering and industrial chemistry.

Chemical Engineering and Industrial Chemistry (B08)

Chemical engineering and industrial chemistry study the flow, transfer, reaction and interrelation in the conversion processes of matter, with the missions of revealing

the transfer, reaction phenomena and rules in matter conversion processes, and the correlation to the process efficiency and products properties; studying theories, methods and technologies for efficient matter conversion; and developing new technologies, new processes and new equipment suitable for industrialization. Chemical engineering aims to provide scientific foundation and methods for national major demands in areas of modern manufacturing industries, energy safety, strategic emerging industries and human health. To this end, research has been conducted on the fundamentals of engineering science and the integration with other disciplines such as chemistry, materials, biology and information.

Chemical engineering and industrial chemistry encourage the research on process engineering, products engineering, systems engineering and multiscale science. In recent years, it has been more focused on the following aspects: measurement, simulation and modulation of micro-/meso-structure, interface and mesoscales; scientific rules for processes intensification and engineering scale-up; uncommon and extreme processes as well as the relevant research of informatization and intellectualization; and the deep integration with other research fields such as human health, ocean, electronic information, new materials and new energy.

Innovative research with a feature of chemical engineering would be rewarded with priority support, which includes but not limited to the following areas: spatial and temporal dynamic structure at mesoscale; big data and intelligent processes in chemical engineering; systems engineering and chemical process security; thermodynamics, transfer and reaction under unconventional conditions; green chemical engineering; clean transformation and high-value utilization of resources; agriculture and marine chemical engineering; green biological manufacturing; products engineering as well as the fundamentals of chemical science related to materials, energy, resources, environment and health.

Department of Earth Sciences

Earth sciences aim to understand the earth and to reveal the essential rules of its influence from other celestial bodies. By exploring and studying the evolution of earth and other celestial bodies, the life and human origins, and interactions between natural and anthropogenic processes, earth sciences provide the theoretical basis, advanced knowledge, and scientific foundation for the sustainable utilization of resources, disaster prevention and control management, and conservation and improvement of the human living environments. Earth sciences as multidisciplinary science include geography, geology, geochemistry, geophysics and space physics, atmospheric science, marine science, and environmental geosciences.

Through approving general programs, the Department of Earth Sciences

encourages original innovations, expands scientific frontiers, matches national demands, advance interdisciplinarity, and lays a comprehensive and solid foundation for the balanced, coordinated, and sustainable development of all disciplines in Earth sciences. In 2022, the principles to select general programs are: ① the innovation and academic value of the project; ② the research ability of the applicant; ③ the rationality of the conception and the clarity of the scientific issue in the application; ④ research basis and conditions. Program proposal selection attaches great importance to basic and traditional disciplines, and focuses on primary data accumulation; effectively enhances the research in weak and “endangered” disciplines, and promotes the fields which are relatively weak in China but predominant in the world; strengthens the research in frontiers of disciplines, and encourages integration of multiple disciplines, especially between Earth sciences and other disciplines; maintains the international status of dominant disciplines and fields in China; supports the development of sub-disciplines closely related to experiments, observation, data integration and simulation. Accumulation of research works are paid attention to while advocating innovative researches. For the General Programs with good accumulations in previous studies and a high-quality completion of the recent research, when applying for continued supports, they would be preferentially considered compared with other proposals under the same conditions. Applicants are required to address the relation between the proposed research work and their accomplished projects. As basic researches are characteristic of being exploratory, unpredictable, and long-term, scientists are encouraged to face the most challenging scientific issues and to actively carry out exploratory researches. In the current year, the Department encourages scientists to carry out research related to lunar soils.

One of the most important goals of the NSFC is to nurture and support excellent young scientists continuously and steadily. The Young Scientists Fund mainly plays the role of “cultivation”, shifts the funding focus forward, and provides timely funding for early-career young scholars who are about to independently carry out basic scientific research. The Young Scientist Fund supports them in the critical period of the individual development to help them grow up as quickly as possible.

Funding for the General Programs, Young Scientist programs and Less Developed Region programs in the Department of Earth Sciences in 2021

Unit: 10,000 yuan

Division		General Program			Young Scientists Fund			Fund for Less Developed Regions		
		Projects	Direct cost	Success rate(%)	Projects	Direct cost	Success rate(%)	Projects	Direct cost	Success rate(%)
I	Science of Geography	467	25 494	20.82	481	14 330	21.51	73	2 555	15.73
II	Geology	348	21 072	23.29	353	10 490	21.49	28	980	15.64
	Geochemistry	83	5 036	22.49	86	2 530	21.55	11	385	15.28

III	Geophysics and Space Physics	226	13 253	25.34	176	5 190	21.44	10	350	16.13
	Environmental Geosciences	466	26 274	21.20	514	15 320	21.52	70	2 530	15.84
IV	Marine Science	246	14 300	22.42	233	6 910	21.53	7	245	14.89
V	Atmospheric Science	194	11 186	24.07	176	5 250	21.54	14	490	15.22
Total or average		2 030	116 615	22.31	2019	60 020	21.51	213	7 535	15.68
Direct cost per project		57.45			—			35.38		

In 2021, the Department of Earth Sciences received 9,099 applications for General Program from 865 institutions in total; of these, 2,030 were approved with the fund (direct fund, and the same hereinafter) of 1,166.15 million yuan in total and 574,500 yuan per project in average, and the average approval rate is 22.31%. Among the funded projects in 2021, 1,338 (65.91%) were from colleges and universities, and 671(33.05%) were from scientific institutes. The PIs of 1,542 projects (75.96%) were under 45 years old. There were 114 inter-department and 275 interdisciplinary projects funded. In 2022, the fund of the General Programs is about 700,000 yuan per project in average.

In 2021, the Department of Earth Sciences received 9,387 applications for Young Scientist Fund with 1,055 institutions in total; of these, 6,192 (65.96%) were from colleges and universities, and 2,785 (29.67%) were from scientific institutes. 2,019 were funded with a funding cost of 600.20 million yuan in total and the average funding rate is 21.51%. Among the funded projects in 2021, 1,389 (68.80%) were from colleges and universities, and 586(29.02%) were from scientific institutes.

In 2021, the Department of Earth Sciences received 1,358 applications for Fund for Less Developed Regions with 168 institutions in total; of these, 1,201 (88.44%) were from colleges and universities, and 127 (9.35%) were from scientific institutes. 213 were funded with a direct cost of 75.35 million yuan in total and 353,800 yuan in average, and the average funding rate is 15.68%. Among the funded projects in 2021, 193(90.61%) were applied from colleges and universities, and 15(7.04%) were applied from scientific institutes. In 2022, The fund for Less Developed Regions were funded with a funding cost of 440,000 yuan in average.

Notes:

(1) In 2022, the Department of Earth Sciences continues to conduct a trial in carrying out a new system of two-grade application codes. Please carefully read the application code list and the instruction in this "Guide", and select the application code well matching the content of the application. The selected code should generally be a secondary application code.

(2) Please carefully read and abide by the requirements of scientific integrity in this "Guide". Do not list academic papers at the submission stage in the application.

(3) Scientific research must abide by national laws and regulations. Research activities in the fields of biology and toxicology also must abide by relevant national regulations. Projects involving animal experiments must abide by relevant national regulations and requirements on animal ethics and welfare.

(4) The applications from multiple institutions involving ethics research need to respectively provide the proof documents approved by the ethics committee of each participating institution or the superior management departments. If the funded projects involving ethics change on its research plan during the implementation of projects, it is necessary to resubmit the review certificate of the ethics committee after the change plan was submitted to NSFC according to the above requirements.

Division I of Earth Sciences

Geography (D01)

Funding of this discipline is available for research on geography science. This mainly includes physical geography (i.e., D0101 Geomorphology, D0102 Hydrology and Climatology, D0103 Biogeography and Soil Geography, D0104 Environmental Geography and Disaster Geography, D0105 Landscape Geography and Integrated Physical Geography, D0106 Cryospheric Science, D0107 Geographical Environmental Change and Civilization Evolution), human geography (i.e., D0108 Economic Geography, D0109 Urban Geography and Rural Geography, D0110 Human Geography, D0111 Land Science and Natural Resource Management, D0112 Regional Sustainable Development), information geography (i.e., D0113 Remote Sensing, D0114 Geographical Information Science, D0115 Geodesy and Cartography, D0116 Geographical Big Data and Spatial Intelligence), and approaches and tools for observations, simulation and analysis in geographical science (i.e., D0117 Geographical Observation and Simulation Technology).

The geography science focuses on the spatial distribution, temporal evolution and regional features of the physical and human elements, geographical information and geocomplex.

The object of the geography science research is the earth surface system, which is formed from the interactions and interpenetrations of the lithosphere, hydrosphere, atmosphere, biosphere, cryosphere, and anthroposphere. The earth surface system (also known as the “water-soil-air-biology-human” complex) should be considered in its entirety in the geography science research.

The core of the geography science is the interrelationships between human and nature, and their interaction mechanisms in the earth surface system. Owing to the

comprehensive, intersectional, and regional characteristics, the geography science must be studied systematically and comprehensively from the spatio-temporal scale-dependent multi-dimensional and dynamic perspectives.

This discipline encourages the applications of comprehensive, exploratory, and prospective projects, urges the earth surface process research using the theories, methods and technologies of mathematics, physics, chemistry, biology, and information science, and promotes interdisciplinary frontier research on national priorities such as “Ecological Civilization Construction”, “The Belt and Road Initiative”, “Land Spatial Planning” and “Rural Revitalization”.

In response to the changes in the scientific research paradigm caused by the big data and artificial intelligence, the Division encourages the research on the geographical intelligence theories, methods and technologies combining big data, artificial intelligence and geographical issues, aiming to enhance people’s understanding and prediction capabilities of geographical issues and to establish the scientific paradigm and technology system for the spatio-temporal big data analysis.

In front of the frontier sciences such as comprehensive research on terrestrial surface system, global change and sustainable development, the Division encourages to focus on the development, reuse and integration of the geographical observation technologies and simulation methods, and promotes the construction of the scientific research facilities such as the comprehensive geographical modeling and simulation systems, and the decision support system for sustainable development, realizing the integration of the geographical data, geographical mechanism, geographical pattern, and geographic decision-making.

Division II of Earth Sciences

Geology (D02)

The scope of funding of the Division is geology.

As an important subject of natural science, geology is the study of composition, structure, dynamics and evolution of the Earth (Planet). It is not only about illustrating the structure and material composition of the Earth (Planet), the mechanisms that control the matter cycles, the Earth environment and life evolution, and the correlation between them which are all recorded in these substances, but also to unveil the interaction and coupling mechanisms of different layers of our planet, prospect energy, minerals and water resources, reveal geological processes, life evolution and their relationship with human activities, protect the earth's environment, prevent (alarm) and mitigate geo-hazards.

The development of geology is based on the fundamental theory of multiple

disciplines and technology advances. The proposal of plate tectonics theory brought revolutionary leap on understanding the Earth. The exploring of geotectonic system and internal continental dynamics became an important research direction of plate tectonics theory. With the development of Earth system science, exploring the interior dynamics of the Earth and superficial response mechanism became the frontier. The applying of new technology and new methods promoted the development of geological sciences. The improvement of analytical methods on high-precision, in-situ and real-time constituent structure and geochronology strengthened the constrain on the composition and evolutionary history of the Earth. The developments of geophysical probing, earth observation and geological drilling techniques help people precisely understanding the structure and tectonics of the Earth. The applying of high technology such as information system, the internet of things and photoelectron realized the goal of real-time monitoring of crustal movements, earthquakes and volcanic activities. The reproduction and prediction of important geological processes can be achieved based on the developments of high temperature and pressure tests and techniques of computational simulation. The developments of big data and artificial intelligence techniques promoted the changing of research paradigms in geology.

Geological research advocates field works with on-site real-time observations is very necessary. And it promotes the interdisciplinary integration of mathematics, physics, chemistry, biology and computational information science. In order to face the international frontier of the global science & technology, and meet major national needs, fundamental theory and applied research in geology should be carried out from a global perspective.

Geochemistry (D03)

The scope of funding of this discipline is Geochemistry.

Geochemistry is the science to investigate the chemical compositions, formation and evolutionary processes and interaction and material recycling between different spheres in the Earth and extraterrestrial bodies, and to focus the distribution, state, transformation, migration, cycle, and fate of the substances of the Earth surface system under the influence of human activities. It is based on the principles of element geochemistry and isotope geochemistry, and makes use of the tools of modern analytical techniques, experimental simulations and theoretical calculations.

The research objects of geochemistry include celestial bodies (planets), rocks, sediments, soil, waters, atmosphere, ore bodies, oil and gas, living organisms, volatiles in Earth's interior, etc., and stress to quantitatively constrain the chemical compositions of these various media, and then to determine related chemical reactions and chemical evolutions, and to realize cognition of the mechanism of geological processes.

The characteristics of modern geochemistry studies include: (1) In the field of research methods and techniques, dynamically quantitative simulation has gradually

replaced statically qualitative descriptions. The advantages of in-situ micro-analytical techniques and high temperature and high pressure experiments have been valued. The development and application of new isotopic systems have been paid great attention. The rule of four-dimensional time-space evolution has been emphasized. Combined with big data and new methods of artificial intelligence, the multi-dimensional information of geochemical data is deeply mined. (2) In the field of solid earth geochemistry, the research topics have expanded from the chemical compositions, structures and reactions of the materials in Earth's interior to the interactions of different Earth's layers and the corresponding effects of resources and environment. The relationship between these interactions and plate tectonics and global change has drawn much attention. The research objects have expanded from the Earth itself to celestial bodies and other cosmic materials. (3) In the field of the Earth surface system geochemistry, it pays attention not only to the reconstruction of geologic events on long-time scales, but also to the descriptions of effects of physical, chemical, biological processes and human activities on short-time scales and the prediction and simulation of environment changes in the future.

Geochemistry is not only a basic discipline to understand the Earth and explore the universe, but also can provide scientific supporting for solving the problems faced by human survival and sustainable development, such as natural resources, ecological environment, and geologic hazards. Based on the taxonomy of the four scientific natures of research, in the General Program and Young Scientists Fund managed by the Division of Geochemistry at present, the proportions of those with the natures of "exploration and highlight originality" and "cutting-edge area with the development of new methodology" are both highest among all Divisions in the Department of Earth Sciences, while the proportion of those with the nature "demand-driven bottleneck" is clearly lower than those of other Divisions. Thus, geochemistry in the new era should enhance its applications in serving the national needs and the main battlefield of the national economy, and explore its applications in fields of health.

Division III of Earth Sciences

Geophysics and Space Physics (D04)

The scope of funding includes geophysics, space physics and geodesy.

Geophysics, space physics and geodesy are aim to understand the structures, operation mechanism and evolution processes of the Earth, planets and interplanetary space, to explore the internal resources of the Earth and other planets, as well as to reveal the evolution and mechanism of human habitable residential environment by using the theories and methods of physics and related subjects, combining the

observational and experimental means.

Geophysics, aims to study the basic physical fields of the Earth and other planets by multiple methods of direct observations, laboratory experiments and theoretical studies, revealing their internal structures, material components, physical fields and the dynamic processes, exploring the mechanism of earthquakes and other geological disasters, as well as the mineralization and accumulation rules, developing the foundation of new theories, technologies and methods, and finally providing the theoretical and scientific support for the Earth system sciences.

Space physics, aims to study the planets and interplanetary space by space borne or ground-based observations and experiments, theoretical studies and numerical simulations, revealing the physical processes and mechanisms of the middle and upper atmosphere, ionosphere, and magnetosphere of the Earth and planets, as well as the interactions of the solar atmosphere, interplanetary space and heliosphere, finally providing the scientific support for astronautic activities, communications, as well as navigation and deep space explorations.

Geodesy, aims to measure the geometric shape, material movement and response of the near-Earth space environment through the geodetic theory and technology, and the observations of geometrical and physical quantities, determining the spatial-temporal movement of materials and carriers, as well as the geometric shape and deformation of natural bodies and (structural) buildings, finally providing spatial-temporal datum and gravity datum for the national infrastructure and defense activity.

Geophysics and space physics highlight strongly on the basic theoretical studies, observations and experiments. According to the development trend of Earth and space sciences, special encouragement will be paid on the core scientific issues of the deep Earth, deep ocean, deep space, and Earth system. In addition, more efforts will be made for the new and pioneering studies, strengthening the integration with other disciplines, and developing new theories, technologies, methods and detection instruments.

Environmental Geosciences (D07)

The funding scope of this discipline covers research on environmental geosciences.

With the rapid development of society and economy, human beings are confronted with increasingly prominent environmental problems such as the shortages of water and land resources, the frequent occurrence of disasters, the aggravated environmental pollution, the ecosystem degradation, and threats to public health, which seriously restricts the social-economic sustainable development, and the construction of ecological civilization. The historical mission of the environmental geosciences development is to scientifically solve the problem of environmental

pollution, disaster, ecological and health risk.

Based on the principles of geoscience and environmental science, the environmental geosciences take the earth surface system as the object, highlight the characteristics of geoscience and adopt interdisciplinary research methods to study the physical, chemical and biological processes and coupling mechanisms of the pedosphere, hydrosphere, surface lithosphere, atmosphere, biosphere and their interfaces. This discipline aims to reveal the occurrence and development laws of global environmental changes and geological disasters, and construct the risk assessment and prevention system of eco-environment and health. It also investigates the evolution behaviors of regional environmental quality and environmental change prediction and response, and reveals the multi-media and multi-interface environmental behavior, effect and mechanism of pollutants. The discipline is aim to unravel the fundamental scientific problems of environmental remediation and ecosystem restoration.

In accordance with the philosophy of the reform and optimization of discipline layout for the National Natural Science Foundation of China, the discipline of environmental geosciences proposes the optimization plan for the application code based on the challenges of theory, technology, method and discipline paradigm facing by the discipline, and establishes the discipline framework of environmental geosciences as four basic subjects including soil science, environmental water science, environmental atmospheric science and environmental biology; four interdisciplinary subjects including engineering geological environment and disasters, environmental geology, environmental geochemistry and ecotoxicology; and four frontier areas including environmental behavior and effects of pollutants, environment and health risk, quaternary environment and environmental archaeology, environmental information and environmental prediction. New technologies and methods of environmental geosciences are the base of the discipline, and regional environmental quality and safety, environmental protection and sustainable development are the goals of the discipline to serve the national major demands. In order to promote the development of soil science, according to its attributes, it is divided into three secondary application codes: environmental soil science, basic soil science, soil erosion and soil fertility. Combined with the characteristics and advantages of environmental geosciences serving national needs, the connotation of environmental geosciences is defined as pollution-environment, eco-environment, disaster-environment and health-environment.

Facing the national strategic needs, the environmental geosciences discipline encourages the condensation of basic scientific issues in original, interdisciplinary and cutting-edge fields, and the creative application of new theories, new ideas, new methods and new technologies in this discipline. This discipline is dedicated to cultivate new growth points of discipline, leading major breakthroughs for providing

scientific support for a sustainable and habitat earth system.

Division IV of Earth Sciences

Marine Science (D06)

The funding scope of this discipline includes marine science and polar science.

Marine science is a knowledge system that studies the natural phenomena and changing rules of the ocean and its interaction with atmosphere, lithosphere, biosphere, soil circle, and cryosphere, as well as the development, utilization, and protection of the ocean. It is a comprehensive discipline including both the study of the Earth's natural processes (e.g., physical, chemical, biological, and geological processes) and the study of marine social attributes (e.g., resources, environment, economy, national defense, culture, international relations, etc.). Meanwhile, marine science is increasingly integrated with marine engineering technology and marine space development and utilization. It has to be recognized that marine science has multiple attributes such as science, technology, and sociology, and there is an increasingly trend of large-span cross-discipline study guided by basic scientific issues. However, there is still insufficient attention to the comprehensive characteristics of marine science. It is urgent to strengthen the interdisciplinary research and to improve the cognitive level of marine science.

Marine science is a data-intensive discipline based on observations, and the promotion of its academic thoughts and research abilities depends on long-term observation and data accumulation. To meet the demands of research projects in ocean observation, NSFC implemented the Ship-time Sharing Project. For those applications that require field sampling and observations, they need elaborate the cruise plan and observation content during the project implementation depending on the proposed scientific goals and technical route, and apply to participate the research cruise supported by the Ship-time Sharing Project after receiving the funding. The guidelines and the solicitation notice for investigation demands of the Ship-time Sharing Project will be announced separately, and applicants are requested to pay close attention to the relevant notice from the Department of Earth Sciences.

Oceans connect the poles. Polar science is a discipline studying various natural phenomena, including the processes and changing rules peculiarly in polar region, as well as its interaction with other components of the Earth system. It includes polar space, polar atmosphere, polar ocean, polar biosphere, polar soils and lithosphere, polar cryosphere, polar observation and detection technology, polar engineering and environment, polar protection and utilization, and the relationship between the north and south poles of the Earth and the environmental changes of the Qinghai-Tibet

Plateau. The development of polar science would deepen the understanding of the interaction of the Earth's sphere and enhance the ability of polar protection and utilization.

For the past few years, polar science in China has been facing important development opportunities, meanwhile significant progress has been achieved in international polar research. However, it is still the weakest area in earth science. Aiming at the key scientific issues of current global change and sustainable development, the main development trend of earth science is to focus on the integrated research for the characteristics and interactions of the different spheres of the Earth system, as well as the interactions between the polar and other regions on the Earth.

In order to promote the research level of marine and polar sciences in China and achieve continuous support and leadership of cutting-edge research in marine and polar science, it is necessary to improve the scientific funding structure, and expand cross-disciplinary integration, promote the building of research talents. It is encouraged to carry out marine and polar research with coupled nature and social scientific aspects. To deepen the understanding of the Earth system, the integration of the researches of Earth process and the resource and environmental effects is needed. Stable and reliable support need to be provided for the major research subjects of marine and polar science and sharing the information and data of marine scientific investigation need to be accelerated. The research aspects include physical, chemical, biological, ecological, and geological processes of the oceans and polar regions; interaction between marine systems and climate change; interaction between human activities and marine space utilization; environmental protection of marine and polar regions; processes of marine disaster and its prevention and mitigation; formation, evolution, development and utilization of marine energy resources; ecological security and sustainability of marine biological resources; environmental protection of marine and polar region, land and sea coordination and global sustainable development; remote sensing and information sciences; observation and detection technology; marine and polar engineering and its environmental effects.

Division V of Earth Sciences

Atmospheric Science (D05)

The funding scope of this discipline includes meteorology, atmospheric physics, atmospheric chemistry and the atmospheric environment, and other branch disciplines, as well as their corresponding supporting technologies and development fields.

Atmospheric science is the study of various phenomena and their changes in the atmosphere of the Earth and other planets, so as to serve the mankind. The atmosphere

is one of the most active spheres of the Earth system. Its changes are affected and controlled by other spheres of the system and celestial bodies such as the Sun. At the same time, changes in the atmosphere can directly or indirectly impact oceans, the terrestrial surface, the cryosphere, as well as the ecosystem of the Earth. The atmosphere plays an important role in the interactions among different spheres of the Earth system and regulates the functions of the Earth system and its interactions with the other spheres. Besides studying dynamical, physical, chemical, and biological processes within the atmosphere, atmospheric science currently involves comprehensive investigations into the mechanisms underlying atmospheric variability and their interactions with the hydrosphere, lithosphere, cryosphere, biosphere, human activities, and global climate; the evolution of weather and the climate system, and theories of climate change and its prediction and projection methods; new techniques and methods in atmospheric observation, numerical modeling and data fusion; technologies and measures interfering weather and climate; the impact of human activities on weather, climate, and environmental systems; and the impact of weather, climate, and environmental system changes on human society. Attention should also be paid to study the occurrence, variation, mechanisms, and predictions of various disastrous events of weather, climate, and the environment; the issues of global climate and environmental changes and their impacts, adaptation, and mitigation; systematic observation, numerical simulation and comprehensive integration of various processes; and interdisciplinary fusion which could lay the scientific foundation for improving the quality of life and the sustainable development of society.

In 2022, the Atmospheric Division will continue to solicit proposals for exploratory, original and frontier studies in the following areas: the various phenomena, processes, and mechanisms of the atmosphere, and physical, chemical, and biological processes taking place in the atmosphere, and exchanges and interactions of energy and momentum between the atmosphere and other spheres by applying novel ideas, methods, and advanced observation technologies to study synoptic meteorology, climatology, paleoclimate, atmospheric dynamics, hydrometeorology, atmospheric physics, atmospheric chemistry, the atmospheric environment, the health and meteorology, atmospheric in situ observations and remote sensing, the boundary layer, stratosphere, and mesosphere; extreme weather and major climate events; the impact and adaptation of climate change; new theories and methods for weather forecasting, climate prediction, assessment and impact of various complex weather and climate disasters; new theories and methods for numerical modeling and data assimilation; fundamental research on satellite and radar meteorology; analysis and applied studies on the data acquired from major scientific experiments and scientific initiatives that have been conducted and are ongoing, as well as from large observation networks established in China and around the world; the principles and methods of meteorological observation, development of meteorological instruments, data analysis,

and applications; interdisciplinary studies of key national interests such as defense, agriculture, forestry, hydrology, ecology, environment, energy, transportation, health, economy and relative key areas, as well as cross disciplinary research for national strategic needs such as the Belt and Road Initiatives and support of major engineering projects for serving the livelihood and sustainable development of society.

“D0509 Atmospheric Observation Techniques”, “D0510 Atmospheric Data and Information Techniques”, “D0511 Atmospheric Numerical Model Development”, and “D0512 Earth System Model Development” are suitable for the research of new technologies and methods in the field of atmospheric science. Theoretical and applied research based on existing technologies and/or theories is not suitable for selecting the above application codes.

Technological Science Section

The Technological Science Section (TSS) is integrated with the Department of Engineering and Materials Sciences and the Department of Information Sciences, mainly orienting toward the primary demands of the nation and the economic battleground. TSS aims to enhance the fundamental research of cutting-edge technologies, solve the core scientific problems behind national demands, provide sources of important technologies, reinforce the knowledge foundation of Technological science, and generate a technological science system.

Department of Engineering and Materials Sciences

Engineering and materials sciences deliver scientific and technical support to national security, the improvement of people's living standards, and the sustainable development of society and economy. Aiming at cutting-edge fields, meeting the national strategic demands of social and economic development, and starting from the organic combination of national goal orientation and frontier exploration, the Department promotes the combination of basic research and its engineering application, strengthens original innovation, commits to discoveries, inventions, and innovations, enhances the sustainable development of interdisciplinary integration, for achieving a higher level of sustainable development and broad international impact in the field of engineering and materials.

Funding for the General Programs, Young-Scientists Fund Programs and Science Fund for Less Developed Regions Programs in the Department of Engineering and Materials Sciences in 2021

Unit: 10000 yuan

Divisions	General Programs			Young Scientists Fund			Fund for Less Developed Regions		
	Funded projects	Direct cost	Success rate (%)	Funded projects	Cost	Success rate (%)	Funded projects	Direct cost	Success rate (%)
Metallic materials	244	14200	15.74	295	8810	17.13	40	1415	14.60
Inorganic nonmetallic materials	300	17470	16.85	373	11120	18.24	40	1406	14.23
Organic polymer materials	212	12309	16.80	277	8260	17.72	23	810	13.77

Mining and metallurgy engineering	391	22719	15.10	406	12130	17.35	50	1765	14.53
Mechanics design and manufacturing	556	32280	16.19	596	17860	18.00	69	2417	14.29
Engineering thermophysics and energy utilization	215	12481	16.34	285	8540	18.07	18	617	14.88
Electrical science and engineering	227	13179	15.80	241	7180	17.12	22	784	14.01
Architecture and civil engineering	516	30034	15.80	483	14390	17.60	72	2516	14.20
Hydraulic engineering	145	8419	16.84	169	5050	17.98	27	951	16.36
Environmental engineering	190	11059	16.56	220	6560	17.46	26	896	13.54
Ocean engineering	109	6351	16.20	110	3280	17.66	2	75	13.33
Traffic and transportation engineering	110	6379	15.01	105	3140	16.01	11	387	13.58
New concept and general science of materials	94	5438	17.03	88	2610	16.30	11	331	16.67
Total or average	3309	192318	16.06	3648	108930	17.60	411	14370	14.41
Direct cost per project	58.12			-			34.96		

In 2021, the Department received 20,600 applications for General Programs, which decreased by 0.68% compared to that in 2020. Among them, 3,309 were supported with a total direct cost of 1,923,180,000 yuan. The average direct cost is 581,200 yuan per project, and the success rate is 16.06% (15.95% in 2020).

In 2021, the Department received 20,730 applications for the Young Scientist Fund, which increased by 10.44% compared with the previous year. Among them, 3,648 were supported with a total direct cost of 1,089,300,000 yuan, and the success rate was 17.60% (16.66% in 2020).

In 2021, the Department received 2,853 proposals for Fund for less developed Regions Programs, which increased by 5.55% compared with the previous year. Among them, 411 were supported with a total direct cost of 143,700,000 yuan. The average direct cost is 349,600 yuan per project, and the success rate is 14.41% (14.54% in 2020).

The Department encourages interdisciplinary and cutting-edge research,

especially original innovation research, focusing on key scientific problems and fundamental research extracted from engineering practices that are of great significance to promote the development of relevant industry and strengthen the international influence of China. Priority is given to research with crucial scientific research value and potential application prospects, and the potential of being new knowledge growth points, and to research that can guide the development of disciplines and have the potential to obtain independent intellectual properties suitable for national conditions.

Notes: (1) The applicants must ensure the accuracy and completeness of all information in the application. Attention should be paid to correctly filling in the personal information, project funding and academic paper publications of applicants and major participants. In particular, when filling in the representative works, applicants must comply with the instruction and writing outline of the application form and refer to the scientific integrity requirements in the application rules of this *Guide*. The Department will strictly review the representative works provided in the proposals by the applicants, and any items with falsely marked information will be dealt with according to the severity of the problem.

(2) Applicants are highly encouraged to propose projects with innovative and distinctive ideas, conduct substantive interdisciplinary cooperation, promote the development of relevant disciplines. However, the proposals must contain specific scientific problems pertaining to the target discipline.

(3) Please refer to the funding amount of different programs, and put forward proposals with a reasonable budget according to the actual demands of various expenses.

Division I of Materials Sciences

Metallic Materials (E01)

The Discipline supports fundamental research on metallic materials. Research proposals should clearly present the merits of the proposed fundamental research including clear objectives and scientific significance of the project, and the suitability of the methods to be employed. Proposals should target either to advance the materials science in cutting-edge areas or to promote development in the relevant areas that meet the national demands.

The funding scope of the Discipline covers compositions, microstructures, phases, surfaces and interfaces, scales effect, impurities and defects in metals, alloys, metal matrix composites, inter metallic compounds, metal-like materials and metamaterials, and their influence on mechanical, physical and chemical properties and performance;

theories, calculation methods, modern analysis and testing techniques, big data and artificial intelligence analysis methods of metallic material research; basic issues in the preparation and processing of metallic materials including melt structure and properties, solidification and crystal growth, casting, heat treatment, forging, welding, forming, additive manufacturing and powder metallurgy; service behaviors such as corrosion and protection, friction and wear, fatigue and fracture, creep; the interaction between materials and service environment, functional degradation and failure, recycling mechanism and related basis; the behavior of metals under extreme conditions such as irradiation, high temperature, high pressure, high strain rate, strong electric field and magnetic field; the microstructure, structure and properties of metal surface and corresponding surface modification and coating; strengthening and toughening, deformation and fracture of metals; mechanical and functional properties and structural design of metal matrix composites; mechanical and functional characteristics, interaction mechanism of material and structure, matching optimization design, preparation and processing of structural-functional integrated materials; metallic amorphous, quasicrystal and metastable materials; low dimensional metallic materials; optical, electrical, magnetic, acoustic and thermal functional metallic materials; energy, environmental and catalytic materials; metallic materials used in information generation, transmission and storage, conversion and processing as well as biological, intelligent and bionic materials.

It is encouraged to concentrate on common key scientific issues beyond materials systems. Researchers should pay attention to the frontiers and the hot areas and new understandings of the fundamental scientific problems in traditional materials. Applications with a cross-disciplinary background should focus on issues within the funding spectrum of the Discipline. In 2022, this Discipline plans to set up a General Program project group focusing on "Key Scientific Issues of Extended Service Life of Steels for High-strength Fasteners" (E0104), which will be funded with priority under identical conditions. Applicants should indicate the General Program group in the Explanatory Notes of application cover to apply for such projects.

Inorganic non-metallic materials (E02)

The Discipline supports fundamental research with various inorganic non-metallic materials as the main research subject. Along with the development of the basic theory of materials and the innovation in preparation technologies, new inorganic non-metallic materials continue to emerge including two-dimensional materials, smart materials, biomaterials, and new energy materials, etc. The research on inorganic non-metallic materials is very active. At present, in the research of inorganic non-metallic materials, functional materials are developing in the direction of high performance, high reliability, high sensitivity, smartness, and functional integration and structural materials are improving in respect of strength and toughness,

functionalization, extreme environment endurance, eco-friendly preparation and high reliability. With the rapid development of new materials, conventional inorganic non-metallic materials are constantly being remolded, upgraded and developed. Increasing attention has been given to the applications of inorganic non-metallic materials in various engineering sciences and technologies including information technology, life science, energy and environmental science and aerospace technology, etc.

According to the proposals submitted in the past three years, research on inorganic non-metallic materials involves various areas with a broad interdisciplinary range. Among the proposals, the investigations on functional materials were the most active field, forming many subject hotspots, including energy conversion and storage materials, photoelectric information functional materials, low-dimensional carbon and two-dimensional materials, multiferroic and lead-free piezoelectric materials, biomedical materials, and so on. Many of the proposals were associated with energy conversion and storage materials (E0208), about 28.6% of the total. The proposals in the field of structural materials were accounted for 33.3% of the total, which was relatively concentrated among some institutions. There were also a large number of proposals for composite materials based on inorganic non-metallic materials, among which the number of the proposals on functional composite materials has increased compared with the past. However, in terms of quality, quite many of them were low-level repetitions lacking innovative ideas and features.

This Discipline supports the research projects with innovative ideas and substantive interdisciplinary research of inorganic non-metallic materials cross-cutting with other related disciplines. The Discipline encourages and supports the following areas: investigation on key novel materials under the carbon peaking and carbon neutrality goals; exploration of new inorganic non-metallic material systems based on domestic resource status; researches on new theories, new effects, new characterization technologies and methods for inorganic non-metallic materials; applied basic researches on novel inorganic functional materials and smartness materials, advanced structural materials, artificial crystals, photoelectric information functional materials, low-dimensional carbon and two-dimensional materials, biomedical materials, new energy materials, ecological and sustainable environment materials, etc.; researches on the surface, interface, and composite design of materials; basic researches on “structure-function” integrated composite materials; applied basic researches on the improvement and remolding of conventional inorganic non-metallic materials using new theories, new techniques, and new processes; and applied basic researches on efficient recovery and recycling of inorganic non-metallic materials.

Division II of Materials Sciences

Organic Polymer Materials (E03)

The Discipline mainly supports the following areas in the field of organic and polymeric materials science: synthesis and preparation of organic and polymeric materials; physics of polymeric materials; processing of polymeric materials; general polymer materials (plastics, rubbers, fibers, coatings, adhesives, etc.); polymer-based composite/hybrid materials; polymeric materials related to ecological environment; intelligent and biomimetic polymer materials; biomedical organic and polymeric materials; organic and polymeric materials with optical-, electrical- or magnetic-function; other functional organic polymeric materials (such as separation and adsorption materials, flexible electronic materials and devices, low-dimensional functional materials, battery related organic and polymeric materials, information polymer materials, porous materials, COFs and MOFs, catalytic materials, self-assembly functional materials, photonic crystals, and organic-inorganic functional composite materials) as well as special organic polymer materials.

The Discipline encourages interdisciplinary basic and applied basic research involved with mathematics, chemistry, physics, life science, medical science, information science, energy, environment, mechanical and manufacturing science, artificial intelligence, transport and aerospace science, and oceanography, etc., which lead to creativity and innovation. To be specific, the researches in the following areas are encouraged as scientific issues in the preparation of polymeric materials (e.g., highly efficient and controllable synthetic methods of polymer materials, synthesis of polymer materials with high performance by new monomers, new routes and new technologies, polymer theory and simulation, new method and theory in polymer processing, the relationship between the aggregation structures and the properties of polymeric materials and their composite materials); the method and theory in the implementation of the high performance and functional properties of general polymer materials; low-cost and green method in the preparation of functional organic and polymeric materials, the structure-property relationship, and the implementation of their stability; performance-directed biomedical polymer materials and the evaluation method of their application; design and preparation of function-directed organic and polymeric materials with optical-, electrical-, magnetic-, or informatic-functions, and study on the implementation of high performance and stability of their devices; new concept in the design theory and preparation method of smart and biomimetic polymer materials; the design and preparation of novel organic polymer materials and their devices for artificial intelligence application; the controllable preparation and assembly methods of supramolecules and polymer materials with multilevel structures and their

functionalization; polymeric materials related to ecological environment (i.e., the structures, properties and efficient utilization of natural polymers, the design theory and preparation method of environment-friendly polymer materials, the recycling and utilization of polymeric materials; polymeric materials for environmental control and improvement in water, soil and air pollution, and the stability and aging of polymeric materials). The Discipline also encourages enhancing the design of polymer materials with the guidance of theories to develop efficient “theoretical guidance-experimental verification” research method of polymer materials, and the methodological research of material genome based on big data; basic research aiming at the difficult problems existing in the preparation, modification, and processing of the main assortments of domestic polymer materials; basic research aiming at new organic and polymeric materials and new technologies in polymer processing for the national strategic objective, and research on the basic issues of the “Key & Core Technology” related to organic and polymeric materials.

New Conceptual Materials and Common Science of Materials (E13)

The Discipline mainly supports research in the areas of new methods of material design and characterization, new material preparation technology and digital manufacturing, multi-functional integration of materials and devices, new composite and hybrid materials, new conceptual materials, key materials of advanced manufacturing and key engineering materials, etc.

With the rapid development of material sciences and the constant evolution of new theories and technologies, the research and application of materials are no longer rigidly adhered to the current material system. It has now become a general trend to explore new conceptual materials and cross-fused material systems to meet higher requirements for properties and functions of materials. In the paradigm of fundamental research of materials science, it is highly desired to resolve some pending common scientific problems facing new materials, such as the design, preparation, characterization, performance regulation and fracture characteristics. At the same time, many key bottleneck issues encountered in national major projects are also expected to be solved by developing new conceptual materials and coordinating multi-material systems. Therefore, to meet the strong demand of national major industrial technology for pure, superior, unique and new materials, this Discipline will focus on the key common science issues of materials science, as well as the new conceptual and revolutionary materials leading future technology, to advance the integrated development of material sciences and engineering technology.

This Discipline focuses on supporting fundamental research and applied fundamental research highlighting cross discipline, key commonalities and technology transfer. Specifically it focuses on, (1) leading materials and interdisciplinary research, such as new conceptual materials, new composite and hybrid materials,

multi-functional integration of materials and devices. It encourages also initiating projects to develop new materials with unique properties and more superior performance to traditional materials; develop composite and hybrid materials with multi-scale, multi-dimensional, and multi-degree-of-freedom interaction; design multi-functional integrated materials and devices facing intelligence, information and miniaturization, and reveal the principles of collective response and cooperative function of materials, structures and systems. (2) supporting the research on key commonalities of materials, including new methods of material design and characterization, new material preparation technology and digital manufacturing technique, etc. It encourages also initiating projects to establish theories and models for materials design and performance prediction, explore new paradigms for material preparation and digital manufacturing, and develop advanced novel in-situ and ex-situ material characterization techniques to probe the electronic structure, surface and interface, defects, *etc.* (3) supportive materials research on key materials for advanced manufacturing and engineering. It encourages also initiating projects to develop new materials facing high-end manufacturing and supporting national major projects, seek breakthrough of key materials and technologies, and improve the whole chain connection, cross integration and practical application of new materials in key fields of national advanced manufacturing and engineering.

Division I of Engineering Sciences

Mining and Metallurgical Engineering (E04)

The Discipline supports the fundamental research mainly on natural resources exploitation (petroleum, natural gas, and mineral ores), safety science and engineering, mineral engineering and separation science of substances, ferrous and nonferrous metallurgy, materials preparation and processing, resource recycling and utilization, and ecological environment, etc.

In recent years, benefiting from continuous financial support and driven by major national needs, mining and metallurgy engineering science in China has obtained great progress through continuous innovations. The research capability has improved, and some researches have reached international frontiers. Many significant research results have been achieved. The main developmental trends of the Discipline include as (1) Discipline has been deepening and extension. The theory of the Discipline is much deepened and improved by continuously assimilating novel methods and techniques with the changes and expansions of demands for resources, environment, mineral and metallic materials. (2) Interdisciplinary and integration have been strengthened. Basic disciplines such as mathematics, physics, chemistry, mechanics, ultrasonics and

electromagnetism are more deeply and closely involved in this discipline. New research areas have emerged one after another due to further development of interdisciplinary. (3) Fundamental research and application has been further developed. Recently, more attention for research fields in the Discipline, such as mining and metallurgical equipment, system monitoring and control, metallurgical reaction engineering and systems engineering, ecological technology of mining and metallurgy, engineering and safety is being paid to the basic research and the update of basic knowledge. As a result, the obvious characteristics are manifested in following aspects as process integration, technology integration and disciplinary integration. Therefore, it is getting faster and faster in integration, interaction and transformation of technology. At present, the Discipline is in the focal point of resource, energy, environment and safety. In light of the contradiction between demand and development in modern society, such as the upgrading of traditional industries, the improvement of ecological environment and the achievement of carbon peaking neutrality goals, it should be fully implemented with the development concept of innovation, coordination, green, open and sharing, as well as the new connotation of basic research helping industrial upgrading.

Hot research topics of the Discipline include complex oil and natural gas low-carbon exploitation, intelligent green mines, geomechanics in deep formation, low-carbon utilization of high-carbon minerals, dust control theory and technology of mining, environmental management and ecological restoration of mining and metallurgy, basic science of engineering safety, accurate control of mineral separation process, preparation of high value-added mineral materials, technical upgrades of material metallurgical process engineering (intellectualization, greenization, refinement), high-clean and high-homogeneous metal materials metallurgy, precision hot forging for light alloy, integration of production and forming for metallic materials, resource circulation and utilization, integration of mining, as well as metallurgy and materials, etc.

Focusing on engineering science, the Discipline will continuously enhance interdisciplinary research, explore new methods, pay close attention to new theories, concepts and methods, and their creative applications. The Discipline will attach importance to ensure the development of the national economy and improve the quality of people's lives. In the context of carbon peaking and carbon neutralizing, the aim is to enhance the levels of basic research on promoting the core competitiveness in China's petroleum, mining industry, metallurgy, materials preparation and processing, and engineering safety. In the aspect of natural resources exploitation, research will focus on addressing the intellectualization, greenization, refinement of engineering and scientific issues, encouraging reengineering technology and science, improving mining efficiency and safety, accentuating the exploitation and utilization of poor resources, emphasizing source control, cyclic utilization and environmental protection, and

finally achieve both economic and environmental benefits. In the aspect of techniques, process, and equipment, emphasis will be placed on structure optimization and adjustment, process intensification, the scientific law of engineering, whole-process pollution control and innovation in greenization, and basic research for the applications of big data and artificial intelligence. In terms of selecting research topics, priority should be given to the funding of basic research topics that have great theoretical significance, potential applications and foresight, likely to become the growth point of new knowledge, and multidisciplinary research fields. Priority should be especially given to funding Young Scientists Fund projects with original ideas and domestic and international cooperation backgrounds. Researchers are encouraged to conduct long-term research and boldly put forward their hypotheses to form their research features. Research teams and innovation groups are encouraged to conduct collaborative innovation. Continuous support is provided to integrate talents in specific fields to solve technical bottlenecks and promote industrial upgrading in the main industrial chain, which can truly reflect the role of fundamental engineering science research.

The following research fields are encouraged: (1) new theory and method for enhanced recovery of unconventional oil and natural gas resources; (2) theory and method for high-efficiency exploitation of unconventional oil and natural gas resources; (3) safe and efficient development in drilling and production for complex oil and gas resources in deep formation and deep sea; (4) safe and efficient operation of oil and gas pipeline network; (5) theory of high-efficiency mining of geothermal resources in deep formation; (6) theory and technology for intelligent mining of mineral resources; (7) theory and technology for safe, green and low-carbon mining of mineral resources; (8) theory of rock mechanics and strata control under multiple fields; (9) theory of prevention and emergency of major disasters and accidents in the production process and occupational hazards; (10) environmental management and ecological restoration of abandoned mines; (11) theory and technology of green mineral separation; (12) theory and technology for the production of high quality mineral materials; (13) clean and efficient extraction of mineral resources; (14) theory of green metallurgy, new theory, new technology and new process; (15) metallurgical theory and technology for high-quality metallic materials; (16) high-efficiency production, processing and near-net-shape forming of metallic materials and special materials; (17) cyclic utilization of waste gas and waste water produced in the dressing and smelting process; (18) new method and technology for low-carbon emission during the dressing and smelting process; (19) formation, transportation and control of pollutants produced in the dressing and smelting process; (20) treatment of solid waste for minimization, reclamation and harmlessness; (21) efficient cyclic utilization of secondary resources; (22) new theory and method of visualization, digitization and intelligentization for the dressing and smelting and material production processes.

Engineering Thermophysics and Energy Utilization (E06)

The Discipline supports the fundamental research on basic principles and application technology theory in the process of energy conversion, transfer and utilization. The traditional research mainly focuses on the basic laws of conventional energy conversion and utilization in the form of heat and work. At present, it has been extended to the research on the conversion, storage and utilization of a variety of energies, including renewable energy and new energy by using the basic principles of engineering thermos physics, and this would be an important contributor to the realization of Chinese ‘carbon emission peak and neutrality’ goals. The research involves engineering thermodynamics, refrigeration and cryogenics, the dynamic characteristics of thermodynamic systems, internal fluid dynamics, heat and mass transfer, multi-phase flow, combustion, fundamental technologies for measuring thermophysical properties, and thermal science in renewable and new energy utilization, as well as other fundamental and innovative research related to engineering thermos physics and energy utilization.

The primary evolution trends of this Discipline are as follows: (1) Fundamental research has been deepened by extending investigation from macro-scale to meso- and micro-scale, and from conventional parameters to those under extraordinary or extreme conditions. Focus will be shifted towards random, unsteady, multi-dimensional, multi-phase and complicated thermophysical investigation, and towards more quantitative, more accurate and more intellectual studies; (2) Traditional research themes of this Discipline will be extended to promote interdisciplinary research, for instance, integrated with physics, chemistry, chemical engineering, life science, information science, materials science, environment, safety, etc. Current hot research topics include: innovative thermodynamic cycles and non-equilibrium thermal dynamics, refrigeration and cryogenic engineering, the thermodynamics, the optimization and the control of complicated systems, turbulence properties of internal flows and the properties and the control of unsteady flows, porous media and micro-scale heat and mass transfer, radiation and heat exchange by phase transformation, clean, efficient, supersonic, micro-scale, micro-gravity and detonation combustion, combustion pollution and carbon dioxide formation and control, thermo-physical problems in public safety, the interactive mechanism between phases and thermo-physical model in multi-phase flow, new principles and methods in thermophysical measurement, and new thermophysical principles in renewable and new energy utilization, and energy-environment fields.

The Discipline will give priority to fundamental research with significant theoretical significance and scientific value, which aims at international academic frontiers and might foster new knowledge generation, continuously promote discipline development and be beneficial to the economy and society. The Discipline does not

support purely technical product development or repetitive research in general terms. The Discipline will continue to support research with substantial interdisciplinary nature, international cooperation, or excellent achievements in the completed projects. It is expected to produce original research achievements with independent intellectual property rights in China and promote the continuous development of fundamental research in engineering thermos physics and energy utilization.

Division II of Engineering Sciences

Mechanical Design and Manufacturing (E05)

The Discipline supports fundamental research in the fields of mechanical and manufacturing science.

Mechanical science is a fundamental discipline that involves the study of functional synthesis, quantitative representation, performance control for various mechanical products, and the development of novel design theories and methodologies by applying related knowledge and technologies regarding mechanical systems. It mainly includes robotics and mechanism, transmission and drive, mechanical system dynamics, strength theory for mechanical structures, mechanical tribology and surface technology, mechanical design, and mechanical bionics. Manufacturing science primarily involves studying theories, methods, technologies, processes, equipment, and systems concerned with high-efficiency, low-cost, intelligent, and high-performance production. It mainly includes forming, machining, manufacturing systems and intelligence, mechanical measurement theory and technology, micro-nanomechanical systems and biomanufacturing.

The particular focuses of the support in this Discipline are: fundamental research concerning national strategic priorities, academic frontier, and significant potential for engineering applications; research aimed at the eco-friendly, resource-saving, and energy-efficient integration of sustainable design and manufacturing; research concerning innovative design, new manufacturing principles and processing technologies, and measurement theories and equipment prototype for ultrahigh-precision, extreme loading, and in particular, large, heavy or micro equipment and instruments; methodologies for designing, manufacturing and testing under extreme working conditions, for instance, parameters ranging from conventional to extraordinary or extreme conditions, or aimed at extremely big or small scales. In 2022, priority funding will be provided under identical conditions by the General Program to groups in three areas, design, machining, assembly and testing of high-performance composite components (E05), energy-efficient drive and transmission of mobile machines (E0502), and flexible sensor and its manufacturing

technologies (E0512). Applicants should indicate the project group in the Explanatory Notes of application cover for the three types of proposals mentioned above.

Based on the basic mechanical design and manufacturing tasks, the Discipline encourages continual in-depth research in specific fields and high-risk exploratory research for original breakthroughs and disruptive innovation. The research that has yielded innovative achievements and is expected to achieve significant breakthroughs will be preferentially supported. Moreover, substantial and profound interdisciplinary research with natural science and other engineering science is also welcome. However, it should be noted that applications should not deviate from the funding scope of the Discipline.

Applicants are specially reminded to pay attention to the following items:

(1) It is suggested that the principle investigators should focus on executing projects. If an applicant has been funded from the National Natural Science Foundation in recent two years, the new application will be strictly considered.

(2) The Discipline insists on project performance evaluation. New applications from high-quality executed project leaders will be given priority funding under equal conditions; new applications submitted by the principal investigator of a poorly executed project will be strictly controlled.

Division III of Engineering Sciences

Environmental Engineering (E10)

The Environmental Engineering discipline that aims at better understanding and solving environmental problems, is an emerging interdisciplinary developed on the basis of natural science, engineering science, humanity and social science. The Discipline focuses on national major demands pertaining ecological environment protection and related cutting-edge areas to undertake fundamental research for developing basic theories, engineering technologies and management methods in the aspects of environmental pollution control, environmental quality improvement, remediation of the contaminated environment, restoration of damaged ecosystem and recycling and safe utilization of waste resources. Environmental engineering is a strategic discipline providing support for building a community of shared future to humanity and nature and implementing sustainable development of human society. The Discipline possesses problem-oriented and interdisciplinary characteristics.

The research areas of environmental engineering discipline include drinking water engineering, urban wastewater treatment and reclamation, industrial wastewater treatment and reuse, urban and rural water system and ecological cycle, air pollution control, solid waste recycling and safe disposal, environmental pollution abatement

and remediation, regional and urban eco-environmental system engineering, and eco-environmental risk control. There are nine subcodes for application in total. To avoid mistakes in the application, applicants should carefully understand the funding scope of the discipline and correctly select and use the application code together with corresponding research directions and keywords. The adoption of new theories, new technologies and new methods in interdiscipline should be integrated with related cutting-edge areas, national strategic demands and industrial bottle-necked challenges in the field of environmental engineering.

The Discipline emphasizes the identification, analysis and resolution of key scientific problems encountered in the processes of environmental pollution control, ecosystem restoration, waste resource utilization and carbon emission reduction. It is encouraged to develop original theories, new methods, and disruptive technology in high-level fundamental and interdisciplinary research in environmental engineering. Innovative research is preferentially encouraged in the fields of “environmental pollution control and health security”, “environmental quality improvement and ecological remediation”, and “waste resource recycling and safe utilization”.

Ocean Engineering (E11)

The Ocean Engineering discipline includes four research fields: coastal & ocean engineering, ship engineering, marine technology, and navigation & maritime technology. The funding scope covers: ① Fundamental theories of coastal and ocean engineering, port and waterway engineering, debouche sand coasts (estuarine coast) and delta engineering, subsea engineering, offshore and deep-sea engineering, polar engineering, offshore equipment and system, marine disaster prevention and mitigation, exploitation and utilization of ocean resources; ② Surface ships, underwater vehicles, unmanned vehicles, ship equipment and systems, energy for ships and energy-saving-and-emission-reducing technology; ③ Ocean observation and exploration, marine communication, information, positioning and navigation, marine materials and anti-corrosion & anti-fouling technology; ④ Fundamental theories of navigation and maritime technology, maritime communications and navigation, ship maneuvering and intelligent control, smart and green shipping, polar shipping, shipping safety and risk control.

Ocean Engineering is a new discipline established by NSFC through deepening reform. It involves comprehensive coverage and strong crossing-cutting with other sciences, such as mathematical science, information science, engineering science, earth science and management science. In 2021, the areas with more applications and funding were coastal and ocean engineering and ship engineering, while the fields with fewer applications for funding were marine technology and navigation and maritime technology. The fields of marine technology and navigation & maritime engineering have received less applications and grants. In 2022, the following two research fields

will be encouraged: ① Intelligent ships and navigations; ② Exploitation and utilization of ocean environment and resources. The applications falling in the above two categories are to be labeled in the first line of the proposal “the present application falls in the encouraging research fields listed in the General Program Guidelines”.

The main development trends of this Discipline are as follows. The active research trend in the field of coastal & ocean engineering refers to the protection and utilization of coastal zone resources, disaster prevention and mitigation in extreme cases, safety and intelligent operations in the port, waterway and coastal engineering, marine geotechnical engineering and exploration of subsea minerals, polar engineering equipment and technology, research and development of island and reef engineering equipment, deep-sea fishery equipment and technology, exploitation and utilization of new ocean energy, development and design technology of deep-sea engineering equipment, and key technologies of the deep-sea space station. The active research trend in ship engineering refers to the design and manufacture of green and intelligent ships, extreme environments and ship safety, intellectualization and informatization of ship equipment, uncrewed marine vehicles, new marine power systems and special auxiliary devices and systems. The active research trend in the field of marine technology includes marine environmental characteristics, marine sensors, acoustic and non-acoustic environment perception and target recognition, underwater communication, positioning and navigation, offshore operations and information assurance, and unique marine materials. The active research trend in navigation and maritime technology refers to maritime warning and emergency prevention and control, maritime safety and maritime search and rescue, autonomous navigation, green shipping, polar shipping, and waterborne autonomous transportation systems.

Division IV of Engineering Sciences

Architecture and Civil Engineering (E08)

The Discipline funds fundamental research in architecture and civil engineering. The architecture research aims to develop urban/rural regions and buildings from the viewpoint of a harmonic relationship between human beings and the built environment. It promotes innovations in the fundamental theories and methods for planning and design based on a sustainable development strategy. Civil engineering research aims to meet the critical demands for high-quality construction, operation and maintenance of the nation’s key civil projects and infrastructure. It explores the basic theories and cutting-edge technologies that arise from the engineering construction practice, promotes the application of advanced experimental methods and information technologies, and enhances the development and implementation of new materials,

new structural systems, and new constructional technologies.

In the Discipline, the field of architecture is subdivided into three categories, namely, architecture, urban/rural planning, and building physics. The field of civil engineering is subdivided into seven categories, namely, structural engineering, engineering materials, construction and service, rock and foundation engineering, underground and tunnel engineering, and engineering disaster mitigation. In 2020, the categories in the Discipline were partially revised. Please select the correct category and keywords. The applicants are recommended to submit their applications to other disciplines if their key scientific problems or research topics are out of the scope of the Discipline.

Applications in the field of architecture should focus on new scientific problems that arise from the urban/rural development practice and the scientific methods in architectural design and urban/rural planning. The Discipline encourages innovation in the priority field of “theories and technical systems for architecture and urban/rural environment design”. Applications in the field of civil engineering should focus on the synthetic design of high-performance materials and structural systems, the maintenance and performance enhancement of existing structures, the stability mechanism and control of geotechnical and foundation structures under complex and severe environments, and the life-cycle design theories and methods for civil engineering projects. The Discipline encourages innovation in crucial scientific problems, such as the basic theories of the synthesis of materials and structures, the failure mechanism and performance control of engineering structures under extreme loads and severe environments, the multi-hazard effect and enhanced resilience of civil engineering projects, trials and simulations of modern civil engineering, and the informatization and intellectualization of civil engineering.

Transportation and Vehicle Engineering (E12)

The Discipline mainly supports the research of fundamental theories and key technologies in transportation engineering and vehicle engineering.

The funding scope covers different modes of transportation, including road transportation, rail transportation, waterway transportation, air transportation, aerospace transportation, pipeline transportation, and operation transportation. Specifically, this discipline studies the complex system composed of transportation participants, vehicles, infrastructures, environment, information and other elements, as well as the interaction and internal laws of various system elements. It also studies the planning and design, operation and control, integration and matching, operation and maintenance of the system, aiming to achieve safety, economy, efficiency, energy-saving, and environmental protection in each mode of transportation and the integrated transportation system. The funding scope includes basic theoretical research and key technological breakthroughs in the fields of road transportation and vehicle

engineering, rail transportation and vehicle engineering, waterway transportation and vehicle engineering, air transportation and vehicle engineering, aerospace vehicle engineering, pipeline transportation engineering, operation transportation and specialized vehicles, integrated transportation system, novel modes of transportation and interdisciplinary technology.

This Discipline will further promote the assessment of engineering technologies based on reliability, availability, maintainability and safety, prioritize supporting theoretically significant, forward-looking, and fundamental exploratory research, and encourage cross-integration research of transportation and vehicle engineering.

Division V of Engineering Sciences

Electrical Science and Engineering (E07)

The Discipline includes two main fields: electric (magnetic) energy science and the interaction between the electromagnetic field and matter. The key areas of funding include the basic research and applied basic research with objects or means of electric/magnetic phenomenon and principle, oriented the related scientific problems in electric (magnetic) energy generation, transformation, conversion, transmission and utilization, as well as the mechanism and laws of the interaction between electromagnetic field and matter. This Discipline is based on electromagnetic field, circuit (electric network), electrical materials, and other fields of electrical science. It focuses on the electric machine and its system, power and integrated energy system, high voltage and insulation, electrical apparatus, pulse power, discharge plasma, power electronics, electric energy storage and application, superconducting electrotechnics, bio-electromagnetics, and other electrical engineering fields. Research on new phenomena, new theories, new models, new methods, new devices and new equipment are encouraged.

The areas of electromagnetic field and circuit mainly include: electromagnetic field, circuit (electric network), static electricity, electromagnetic measurement and sensing, new energy conversion and power transmission technology, electromagnetic environment, and electromagnetic compatibility. The areas of superconducting and electrical materials mainly include: superconducting conductor and magnet, superconducting power technology, engineering dielectrics, conductor/semiconductor/insulation/magnetic/energy storage/sensing materials and other new electrical materials. The areas of electric machine and its system mainly include: analysis and design of electric machine, conversion and control of electric machine system, integration of electric machine system, and electric drive. The areas of power and integrated energy system mainly include: power system analysis, power

system control, power system protection, electricity market, electricity information, integrated energy system and energy internet. The areas of high voltage and discharge mainly include: high voltage and large current, electrical equipment insulation, overvoltage and its protection, arc and electric contact, electrical apparatus, pulse power technology, discharge plasma technology. The areas of power electronics include: power electronic device and its application, and power electronic system and its control. The areas of electric energy storage and application mainly include: principles of electric energy storage and conversion, as well as device, equipment and system of electric energy storage. The areas of bio-electromagnetic technology mainly include: bio-electromagnetic phenomenon and mechanism, biological effect of electromagnetic field, electromagnetic diagnosis, and treatment of disease.

In recent years, electrical science and engineering discipline presents a new trend of development as follows: (1) The scope of researches is constantly enriched. For example, integrated energy system; independent power system; electrical materials, devices and equipment under extraordinary environment and extreme condition, etc. (2) The application fields are expanding continuously. For instance, electric machines used in robots and servo systems; power supply, storage, conversion, power transmission and drive (propulsion) in the fields of electrified traffic, new energy transport equipment, more electric ships and aircrafts, aeronautics and astronautics; electromagnetic launch, metallurgy, and environmental protection technology, etc. (3) The interdisciplinary becomes more noticeable. For instance, the research fields of smart grid, energy and electricity market, electrical safety, intellisense, electric energy storage, pulse power, plasma, and bio-electromagnetic technology, etc. have been intercrossed deeply with the disciplines like physics, chemistry, materials, information, management and biomedicine, etc.

For electrical science and engineering discipline, free exploration and interdisciplinary, tracking and leading the frontiers of the discipline, and solving the scientific problems existing in the technical bottlenecks are encouraged. The research about basic interdisciplinary theory and key technology, in aspects of the interaction between electromagnetic energy and materials, electrical equipment, power electronic devices, bio-electromagnetic technology and electromagnetic medical equipment, are particularly encouraged.

Hydraulic Engineering (E09)

This Discipline covers two scientific areas, i.e. hydro-science and hydraulic engineering, primarily targets at water security as well as sustainable and efficient water utilization, seeks scientific understanding of watershed-wide hydrological cycle and engineering hydrology, river dynamics and watershed-wide water and sediment changes, engineering hydraulics and hydropower utilization, watershed and river/reservoir ecology, etc. under natural and anthropogenic impacts, and addresses

engineering-oriented scientific issues including sustainable and efficient water resources utilization, causes of floods and droughts and disasters prevention and mitigation, agricultural high-efficiency water conservation, sediment dynamics and fluvial geomorphological evolution, watershed-wide river/reservoir ecosystem and environmental regulation, water network planning and inter-watershed water transfer, safe and stable operation and regulation of hydraulic-mechanical-electrical systems, hydraulic and hydropower engineering and water network engineering construction and safe operation and maintenance, as well as disaster risk prevention and control etc. This Discipline has both a theoretical and engineering/technological nature and is a fundamental and strategic discipline that is critical for safeguarding national water security.

The primary research areas of the Discipline include six sub-disciplines: Engineering Hydrology and Water Resources Utilization, Agricultural and Rural Water Conservancy, Hydraulics and River Dynamics, Hydro-machinery and Systems, Hydraulic Geotechnical Engineering and Hydraulic Structures.

In 2021, the Department received 861 applications for General Programs, which decreased by 10.31% compared to that in 2020. Among them, 145 were supported. The average direct cost is 580,600 yuan per project, and the success rate is 16.84%.

Funding application for the Discipline should target both major national needs and frontiers of international scientific and technological development and focus on formulating, analyzing, and solving key scientific issues, especially through theoretical innovations. Engineering Hydrology and Water Resources Utilization sub-discipline focus on the evolution mechanism of the watershed-wide hydrological cycle under climatic and environmental changes, eco-hydrological processes and effects, water resources evolution pattern and regulation mechanism, principle and methodology of engineering hydrology, flood and drought disasters monitoring, early warning, prevention and mitigation, water resources optimized allocation, sustainable and efficient water resources utilization, etc. Agricultural and Rural Water Conservancy sub-discipline focuses on conservation and protection of agricultural and rural water resources, agricultural water and soil ecosystem and environment, irrigation and drainage engineering technology and equipment, amelioration and restoration of middle and low yield fields, smart irrigation areas and rural water network, etc. Hydraulics and River Dynamics sub-discipline focus on water body dynamics and engineering regulation, water and sediment change and engineering safety, transport and transformation of sediment and environmental substance across watersheds and rivers/reservoirs, aquatic ecosystem health maintenance and restoration, watershed-wide aquatic ecosystem evolution, etc. Hydro-machinery and Systems sub-discipline focuses on the stable and safe operation of hydraulic-mechanical-electrical systems, intelligent monitoring and regulation, etc. Hydraulic Geotechnical Engineering focuses on methodological innovation in rock and

soil physical experiment and numerical simulation, coupling effects of multiphase flow in rock and soil, monitoring and early warning technological advances, geotechnical engineering hazard and risk management, etc. Hydraulic Structures sub-discipline focuses on novel structures in hydraulic and hydropower complex projects and water diversion projects, high-performance hydraulic engineering material, intelligent construction, safe operation and maintenance, disaster risk prevention and control, etc.

To tackle the challenges such as climate and environmental change adaptation, critical infrastructure security, the Discipline encourages innovative research on fundamental scientific issues, including watershed-wide water resources optimized allocation and high-efficiency utilization, causes of floods and waterlogging and disasters prevention and mitigation, drought monitoring, early warning and disasters prevention, agricultural high-efficiency water utilization and conservation, watershed-wide water network and urban/rural water system, inter-watershed water transfer, river water and sediment change and engineering safety, intelligent construction of hydraulic and hydropower complex projects, intelligent integrated regulation and control and disaster chain risk prevention and control, etc.

Department of Information Sciences

The Department funds fundamental and innovative application researches in areas of the generation of signals, acquisition, storage, transmission, processing and utilization of information. Information science is based on informatics, control theory and system theory, and its main method is information methodology, and its main platform and means of research are computer, integrated circuitry and photo electric devices.

Based on the trends of disciplinary development and social progress, the Department give priorities on funding research on electronics, communication and network, electric devices and integrated circuit, computer science, automation, AI, photo electronics and microelectronics, network security, quantum information. Preferential support will be given to basic researches that meet national demands and have far-reaching importance in promoting the national economic and disciplinary development.

Scientific and technological issues in information sciences are increasingly interdisciplinary in nature. Therefore, the Department pays great attention to proposals for interdisciplinary researches between information science and mathematics, physics, chemistry, life sciences, medical sciences, materials sciences, engineering, geo-sciences and management sciences, and so on. The Department encourages cooperative research among scientists with different backgrounds and knowledge to put forward cross-disciplinary research proposals in areas of smart city, smart

agriculture, health, service and education information technology sciences. It also encourages scientists to combine theory with practice and explore basic theory and key technology that have important application potentials for national economy and security. It is encouraged for research on basic theory and key technology driven by national need, and deep integration of industry and research. The Department will continue to encourage scientists to conduct substantial international cooperative research with scientists abroad in frontier areas of information sciences.

In 2022, the Department encourages creative basic research that is different from traditional research ideas, and welcomes researchers conduct discussions and studies on new concepts, new theories, new methods and new technologies.

Funding of NSFC Programs in Department of Information Sciences in 2021

Unit: 10,000 yuan

Divisions		General Program			Young Scientist Fund			Fund for Less Developed Region		
		Projects	Direct cost	Success rate(%)	Projects	Direct cost	Success rate(%)	Projects	Direct cost	Success rate(%)
I	Electronics and technology	171	9 960	17.74	233	6960	24.15	17	605	14.91
	Information and communication system	159	9 232	17.81	184	5460	24.21	16	567	15.09
	Information acquisition and Processing	157	9 128	17.74	197	5870	24.44	19	680	14.96
II	Theoretical computer science, computer software and hardware	243	14 207	17.66	248	7390	24.39	32	1 145	15.02
	Computer applications, education information science and technology	262	15 108	17.79	256	7560	24.28	45	1 556	15.36
	Artificial intelligence Network and information security	273	15 714	17.79	290	8610	24.20	50	1 794	14.88
III	Automation I: control theory and technology	171	9 919	17.78	236	7080	24.08	18	642	15.13
	Automation II: automation system and applications	185	10 735	17.77	220	6500	24.34	18	607	15.65
I V	Semiconductor science and information devices	181	10 482	17.90	270	8000	24.30	14	494	14.89
	Information optics and photoelectric devices	108	6 325	17.70	156	4670	24.07	8	282	15.38
	Laser and technical optics	160	9 370	17.74	225	6710	24.17	11	388	15.28
Total or average		2 070	120 180	17.77	2 515	74810	24.26	248	8 760	15.11
Direct cost per project		58.06			—			35.32		

In 2021, the Department received 11,652 applications for General Program, and funded 2,070 projects with a total direct cost funding of 1.20180 billion yuan, and a

funding rate of 17.77%. In 2021, the Department received 10,366 applications for Young Scientists Fund, and funded 2,515 projects with direct cost of 748.10 million yuan. The success rate was 24.26%. In 2021, the Department received 1,641 applications for Fund for Less Developed Region, and funded 248 projects with a direct cost of 87.6 million yuan. The success rate was 15.11%.

Notes:

(1) If the proposed research involves issues related to scientific research ethics and scientific and technological security (such as biological information security, etc.), the applicant shall provide the review opinions from the supporting unit or its superior competent department.

(2) Abide by the relevant requirements of scientific research integrity in the application regulations of this *Guide*, and fill in the information of applicants and representatives in a practical and realistic manner.

Division I of Information Sciences

Electronics and information system (F01)

The Division mainly funds basic research in areas of electronic science and technology, information and information system, information acquisition and processing and related interdisciplinary studies.

Researches funded in areas of electronic science and technology include circuit and system, electronic science and technology, magnetic field and wave, as well as electronics and applications. Researches funded in information and information system include the theory and key technologies for information transmission, exchange and application in fields information of and communication. Researches funded in information acquisition and processing include the theory, methods and applied technology of information sensing, acquisition and processing.

In 2022, the Division will continue to support researches in areas of basic theory and key technologies that are significant to the national security in areas of new method of circuit and system design, wave transmission and antenna, microwave and millimeter wave integrated circuit, acquisition of electromagnetic energy, tetra hertz device and system, magnetic electronics, quantum electronics, micro wave photonics, new sensor mechanism and design method, bio data and information analysis, TCM information acquisition and processing, medical image processing, space, sea and land information network, mobile internet, vehicle internet, smart communication, communication system security and wireless connection security, optical communication, underwater communication and sensor network, new principle and method of radar, detection and imaging, remote sensing image processing, multimedia

information processing, space information acquisition and processing, underwater information acquisition and processing. The innovative and cross-disciplinary research and exploratory studies with good prospects will be supported, and preferential funding will be given to the projects which have scored outstanding achievements in previous research. Preferential support will be given and encouraged to the combination of theory and practice to focus on innovation and to study and solve basic problems in important application areas, so as to improve China's research capabilities in this discipline.

Division II of Information Sciences

The Division mainly funds researches in computer science, artificial intelligence, education information science and technology.

Computer Science (F02)

The Division mainly funds researches in areas of basic theories, basic methods and key techniques related to computer science and technology and relevant interdisciplinary areas. The important trend of computer science and technology development is to obtain super speed, large storage, high performance, high reliability, mobile applicability and integration of sensing, storage and computing.

In 2022, the Division welcomes research proposals with creative ideas and reasonable plans in basic and farsighted areas and interdisciplinary subjects. The Division continues to support collaborations with researchers in areas of mathematics, earth sciences, life sciences, medical sciences, management and economics and social sciences to make joint explorations on new theories, new method and technology in interdisciplinary areas so as to promote the mutual development of computer science and other sciences. The Division especially encourages and supports scientists to focus on strategic national goals and address those basic issues that are well known internationally for their complexity and significance and of strong exploratory nature, so as to increase the level and international impact of computer science research in China.

Artificial Intelligence (F06)

The AI area will focus on key scientific issues and technology in AI research. The Division supports close cooperation between AI researchers and those in other disciplines and humanities and social sciences to explore new concepts, theory, method and technology. The Division especially encourage researches to explore basic issues of great difficulties and great impacts.

Education information Science and Technology (F0701)

For education information science and technology, the Division focuses on knowledge generation, cognition laws and learning mechanism, and original, fundamental, far-sighted and interdisciplinary research, encourages research on basic theory and method of AI driven education, education assessment method and models supported by big-data, online and mobile learning environment and key technology. The Division encourages collaborations with other disciplines including social science to explore new concept, theory, method and technology to solve education problems in China.

In 2022, the Division gives priorities on funding research in software theory and engineering, information security, network and system security, complex science and AI theory, intelligence system and AI security.

Division III of Information Sciences

Automation (F03)

The Division mainly funds basic research and far-sighted research for the national economy and national security in areas of control science and engineering, automation system and application and related interdisciplinary areas. It includes control theory and technology, control system and engineering, automatic checking technology and devices, navigation, guidance and control, biomedical system and technology, robotics and intelligent system, smart manufacturing and automation system theory and technology, AI driven automation and other novel automation theory and systems.

In the light of problems found in recent project proposals in 2022, the Division encourages researchers to 1) select projects with application background of national interests, and provide scientific and technological support to the promotion of the economy and living standard; 2) select interdisciplinary projects and collaborate with scientists in biomedical, mathematics, economics and sociology, so as to promote development of the discipline; 3) select internationally challenging problems or creative issues so as to increase the influences of Chinese scientists in international academic circle.

Division IV of Information Sciences

The funding scope of the Division covers two disciplines, namely, semiconductor science and information devices, and optics and photo-electronics.

Semiconductor Science and Information Devices (F04)

The main scope of funding for semiconductor science and information devices

includes semiconductor electronic and photo electric material and devices, IC design, fabrication, packaging and EDA tools, and micro and nano mechanical and electrical devices and control system.

Optics and Photo Electronics (F05)

The optics and photo electronics mainly support optical information acquisition, display and processing, photoelectric devices and integration, infrared and terahertz physics, nonlinear optics, laser, spectrum technology, applied optics, micro nano mechanical electronic devices and control systems.

The Division gives priority to researches on high performance light source, low power consumption integrated circuit and radio frequency chips, new types of sensor materials and devices and technology, terahertz devices, micro and nano device and technology, new types of optical field control technology and devices, quantum optics and quantum devices, quantum communication and quantum computation, optical information processing and display technology, photon electronic devices and photonic integration, wide gap semiconductor materials and devices, semiconductor integrated circuit system, energy photonics, new types of laser technology and devices, new optical imaging method and technology, advanced optical manufacturing, precision optical measurement and detection, biomedical optics, new spectrum technology, and space and astronomical optics, environment and marine optics, etc. The Division encourages studies on improve device performance, yield and reliability, including scientific issues in device physics, structure and technology development. The Division also encourages interdisciplinary studies with physics, chemistry, materials, life and medical sciences, and promotes creative research on new information devices such as brain-like chips.

Life and Medical Sciences Section

The life and medical section include the Department of Life Sciences and the Department of Medical Sciences. This section focuses on the frontiers of worldwide science, technology and people's life and health. With the continuous understanding of the essence of life, it also emphasizes the basic research on clinical medicine and agricultural sciences, in order to provide strong scientific and technological supports for the benefit of people's life and health as well as national food security.

Department of Life Sciences

Life sciences is one of the most active frontier fields of modern sciences to explore life phenomena and their basic rules. As a guarantee of national population health, food safety and ecological civilization, life sciences is an important support for technological progress and industrial development. Life science research is closely related to national economic and social development, and plays pivotal dual roles in promoting scientific exploration and supporting of national strategic needs.

The Department encourages researchers to carry out original studies with innovative academic ideas, and novel techniques and approaches, particularly for those playing a pivotal role of promoting the development of related disciplines with authentic ideas. Emphasis will be put on proposals with novel theories and novel hypotheses based on previous research over a long period of time. In the future, the Department will continue to pay attention to the cutting-edge frontiers and emerging fields in life sciences, and focus on the scientific researches aimed at addressing major national needs. In line with the principles of "encouraging exploration, highlighting originality; focusing on the frontier, and creating novelty; demand promoted, breaking through bottlenecks; common orientation, cross-disciplines", the Department implements the funding policy depending on the performance of previous funded project, and gives preferential consideration to applicants with good performance in their previous projects under equivalent conditions.

Due to the frequent occurrence of infectious diseases and zoonosis caused by various pathogenic microorganisms in the recent years, which has caused great harm to social and economic development and people's health, it is particularly urgent to strengthen basic research in related fields. Although the Department of Life Sciences has funded many programs related to the origin, evolution, transmission, genetic variation, infection and vaccine research of viruses and other pathogenic micro-organisms, the understanding of viruses and new pathogenic microorganisms is still insufficient, thereby the related researches are needed to be strengthened and

deepened. In the future, the Department of Life Sciences will actively encourage scientific researchers to carry out systematic research in fields related to virology, pathogenic microbiology, immunology, and will also pay close attention and provide stable support to the above encouraged research fields in the funding process.

Since 2021, the application codes of all disciplines in the Department of Life Sciences have been set as a two-level structure with only the first level application code and the second level application code. The number of research directions have been set under the second level application code. Applicants should pay attention to the research direction under the second level application code.

Notes:

(1) In the explanation part of the *Guide to Programs* of the Department of Life Sciences and for every discipline, the funding scope is emphasized and the categories that will not be accepted have been clearly noted. Applicants should read them carefully according to the subject of application.

(2) For applications concerning the operation with highly pathogenic microbe, applicants should abide strictly by relevant national regulations and rules, and perform under proper bio-safety qualified conditions.

(3) Projects involving animal experiments should comply with relevant national regulations and requirements of animal ethics and welfare.

(4) The application code should be specified to the final level. Applications which fail to provide the detailed code will be declined. Please refer to the *Guide* of each discipline for specific requirements on application codes.

In addition, the Department of Life Sciences has made the following requirements for ethics-related research applications in biomedical research:

(1) To carry out research in the field of biomedicine, researchers must abide by the relevant provisions of the state, respect internationally recognized bioethical norms, and abide by the relevant requirements of the state for ethical research.

(2) Biomedical researches involving human tissues, organs, cells, *etc.* must provide the review approvals of ethics committees of supporting units or their superior departments in the application forms.

(3) Applications involving multi-unit participation in ethical researches should be supported by certification documents examined and approved by each participating unit or the ethics committee of the competent department at a higher level.

(4) When overseas institutions or individuals cooperate with domestic medical and health institutions to carry out research involving ethics, they should issue certification documents for examination and approval by ethics committees provided by domestic collaborative units.

(5) For research projects that need to sign informed consent, the process and procedure of signing informed consent should be described in the application forms.

(6) If the ethics-related fund project is approved and the research plan is changed during the implementation period, the review approval of the ethics committee after the change of the research plan should be submitted to the fund committee again in accordance with the above requirements.

Applicants should follow the requirements of the *Guide* and the application syllabus when writing their proposals. Otherwise, the proposals will not be accepted.

Funding for General Program/Young Scientists Fund/the Fund for Less Developed Regions of Department of Life Sciences in 2021

Unit: 10,000 yuan

Divisions		General Program			Young Scientists Fund			Fund for Less Developed Regions		
		Projects	Direct cost	Funding rate* (%)	Projects	Direct cost	Funding rate* (%)	Projects	Direct cost	Funding rate* (%)
Division I of Biology	Microbiology	203	11 774	22.21	163	4860	18.36	45	1 559	17.11
	Botany	211	12 238	23.60	165	4930	19.74	66	2 323	16.84
	Zoology	129	7 490	25.29	83	2470	21.07	27	954	16.77
Division II of Biology	Genetics and bioinformatics	138	8 002	26.04	124	3660	20.77	15	510	17.44
	Cell biology	113	6 554	24.73	96	2850	18.93	16	557	17.02
	Developmental biology and reproductive biology	75	4 348	27.88	60	1770	18.40	8	273	17.39
Division of Biomedicine	Immunology	80	4 640	24.92	66	1970	20.12	9	314	16.98
	Neurosciences and Psychology	147	8 526	23.67	146	4290	17.78	18	628	16.98
	Physiology & integrative biology	86	4 988	23.82	54	1600	20.38	9	325	16.36
Division of Interdisciplinary Research	Biophysics/Biochemistry	118	6 843	27.25	92	2730	21.10	10	356	16.67
	Biomaterials/Imaging/tissue engineering	106	6 148	19.24	114	3410	18.42	9	320	16.67
	Molecular biology/Biotechnology	73	4 241	27.65	70	2090	20.53	6	223	15.79
Division of Environment and Ecology	Ecology	190	11 020	21.28	183	5490	19.49	83	2 898	16.97
	Forestry and grassland science	217	12 586	17.69	192	5760	16.23	94	3 301	16.88
Division of Agriculture and Food Science	Agriculture and crop sciences	243	14 102	14.64	250	7440	15.16	113	3 953	16.94
	Food science	225	13 050	14.10	284	8490	14.91	83	2 922	16.84
Division of Agricultural Environment and Horticulture	Plant protection	153	8 874	15.09	162	4830	16.84	65	2 282	16.88
	Horticulture and plant nutrition	174	10 092	16.29	192	5760	15.27	91	3 170	17.01
Division of	Animal husbandry	118	6 842	15.45	121	3600	15.45	49	1 701	17.01

Agriculture Animal	Veterinary medicine	144	8 354	17.25	135	4040	18.57	43	1 505	16.93
	Aquaculture	84	4 872	14.53	103	3070	17.17	15	516	17.44
Total or Average		3 027	175 584	19.21	2 855	85110	17.45	874	30 590	16.93
Average direct cost (per project)		58.01			—			35.00		

Division I of Biology

The funding scope of Division I of Biology covers three disciplines, namely microbiology, botany and zoology.

Microbiology (C01)

The Microbiology Discipline supports the basic research with microorganisms as the research objects, which has the characteristics of focusing on the cutting-edge fields and meeting the national needs. The Discipline encourages researchers to carry out fundamental and authentic studies on resources, diversity and evolution and biological characteristics in the field of microbial researches.

This Discipline encourages microbiologists to carry out in-depth and systematic research on virology and pathogenic microbiology, and strive to promote the cutting-edge theory and technology of virology and virus immune system interaction research. The Discipline encourages the use of modern technologies such as microbiome and big data in combination with traditional methods to carry out microbial classification research, reveal the systematic evolution and evolution rules of microbial groups with important classification status or application potential, and further strengthen the cultivation of taxonomic talents. The Discipline encourages the proposals aiming at study on mycoplasma, rickettsia, chlamydia, spiroplasma, prion *etc.* The Discipline encourages microbiologists to cooperate with researchers in the fields of mathematics, physics, chemistry and informatics. Moreover, the following research fields are especially encouraged: single cell, co-infection and drug resistance, population and epigenetics of microorganisms; enrichment and isolation of microorganisms which are difficult to culture; basic scientific researches on pathogenic microorganisms, marine and geological microorganisms; frontier researches on the major environmental problems in China; systematic and in-depth researches on basic and frontier scientific questions of life sciences using microorganisms as model materials.

In order to promote the development and application of novel theories, new technologies and methodology of microbiology, gather academic ideas, research methods and techniques, break through the barriers of traditional disciplines, and resolve complicated scientific questions, applicants are encouraged to collaborate with scientists in mathematics, physics, chemistry, electronics, information, engineering and

other backgrounds, devoting together to the basic research of microbiology.

Botany (C02)

Focusing on the world's leading edge issues and national needs, the Discipline of Botany supports basic research projects with plants as the research objects. Research interests include plant taxonomy, plant phylogeny and evolution, plant photosynthesis and nitrogen fixation, transportation and metabolism of water and nutrients, interaction between plant and environment, plant hormones and growth regulators, plant reproduction and development, protection and utilization of plant resources, phytochemistry, new technologies and methods of botany research, etc.

Based on the applications accepted and funded in the recent years, the development of each sub-ranch within the botany discipline is imbalance. There are relatively more applications in the areas including plant phylogeny, plant hormone, growth and development, and environmental adaptation. Whereas there are fewer applications in the fields including paleobotany, biological symbiosis and nitrogen fixation, mineral elements and the metabolism, organic synthesise and transportation, hydrophytes and wetland plants and resources, etc. Applications focused on the above-mentioned subjects will be encouraged. Systematic and creative researches should be further strengthened henceforth.

The Discipline pays attention to natural variation and domestication mechanism of plants, environmental adaptation mechanism of plants, modeling of plant life process and function. Applicants are also encouraged to carry out researches on the fields including phytosystematics, introduction and plant germplasm conservation, the structure and function of plant cells, molecular basis of plant important traits, interaction between plants and other organisms, and plant response to environmental changes.

In 2022 the Discipline will continue to give preferential support to plant taxonomy and floristic geography, especially strengthening the support to young taxonomists. The Discipline encourages applicants to carry out researches on the worldwide species revision of certain families and genus, and plant resources research in key areas and special environments.

The interdisciplinary studies of botany with other related fields will be strongly encouraged, especially with mathematics, chemistry, engineering and material science, and the application of big data and artificial intelligence in plant scientific research. Development of new model plants with important evolutionary nodes is encouraged for exploring the special biological phenomena. In order to achieve better use of local advantages, resources advantages, and talent training, the Discipline will encourage collaborations among applicants who have unique advantages in different institutions or groups.

Special notice for applicants:

(1) Projects accepted under the Plant-enticement Interaction code (C0205) do not include applications for research related to crops and other cash crops.

(2) Under the application code for Phytochemistry (C0209), it is encouraged to conduct in-depth exploration and functional research on important chemical components in plants, but applications with pharmacological research and structural modification or synthesis research will not be accepted.

Zoology (C04)

Zoology studies the life phenomena and principles in animal morphology, taxonomy, physiology, behavior, ecology, evolution and genetics. The effective application of theory and techniques has greatly promoted the development of zoology. Animal evolution and development, animal phylogeny and classification, animal physiology and behavior, animal breeding and population dynamics are still the important basic theoretical researches of this discipline. On this basis, the research of marine zoology, animal resources and protection, wild animal diseases and prevention, development of experimental animals meet the national needs. With the deepening and integration of various directions of zoology, the interdisciplinary and compatible development characteristics of zoology have been formed.

Applications accepted by the Discipline in the recent years demonstrated that researches in some fields have already formed their own features and achieved significant international impact. Not only the formulation of scientific questions and rationality of designs, but also the novelty of academic ideas of the proposals has great improved. However some problems still exist, for example, the excessive pursuit of hotspots but lack of systematism and continuity of researches, the inaccurate understanding of the orientation of four scientific classification properties, the lack of justification for proposed research and feasibility of technical routes, the insufficient experimental accumulation and description of detailed research progress and contents, the lack of definite scientific questions or hypothesis, the overstatement of research objectives, the unpracticality of the budget for research in some proposals, and repeated application still existing on a small scale.

In the future, the identification and description of unknown species of animals, and the classification and revision of known species of animals will still be the key funding areas by the branching field of taxonomy. Taxonomy of marine invertebrates will also be highly encouraged. Key research areas currently focus on the animal phylogeny and zoogeography, as well as the life history around the evolution. The discipline will encourage researches on morphology, physiology and behavior of wild animals. Support will be strengthened for researches on conservation biology for endangered animals, the sustainable utilization of important resource animals, and related biological researches for important alien invasive species and bio-safety. Basic research of zoology for specific species in China and areas with weak foundations will

be continually encouraged. The Discipline attaches great importance to the study of experimental animalization of wild animals and research on experimental animal models. In addition, the Discipline will pay more attention to basic research on zoology; encourage original studies and exploration based on animal resources and regional features in China using new theory and technologies and encourage interdisciplinary research such as animal behavior and neurobiology.

Special notice for applicants: This Discipline does not accept the application of medical research only using model animals as research materials, the application of research using livestock and poultry as research materials, and the application of agricultural pest related research.

Division II of Biology

The funding scope of Division II of Biology covers the following three disciplines: genetics and bioinformatics; cell biology; and developmental biology and reproductive biology.

Genetics and Bioinformatics (C06)

Genetics is to study the inheritance, variation and evolution of organisms on various levels of molecules, cells, individuals and populations. Bioinformatics is an interdisciplinary subject which studies the methods and applications of biological data obtaining, storage, sharing and analysis. The discipline of genetics and bioinformatics encourages the combination of bioinformatics analysis and experimental verification, and trans-disciplinary application of new theories, method ologies and technologies. Moreover, research on the biological basis of human phenotypes, behaviors and diseases will be specially favored.

The genetics discipline will give priority support on the following fields: structure, function and regulation of genetic materials; the research genetic and epigenetic dentific of complicated biological traits; the genetic and epigenetic basis of human diseases; researches on genetic and epigenetic inheritance of economic traits of animals and plants; basic genetic rules and the molecular mechanisms of gene expression and regulation using model organisms; the rules of biological evolution and population genetic; new theories, methods and applications of genetics, etc..

As for bioinformatics, future funding directions and key areas lie in the following fields: developing new theories, algorithms and analytical techniques of bioinformatics and computational biology; methods and applications of integration, standardization and visualization of large biological data; artificial intelligence methods for biological big data and application; analysis and mining of biological multi-omics data; modeling, prediction and design of biological marcromolecular structure; reconstruction and

modeling of biological network as well as dynamic analysis and simulation of computational system biology.

In 2021, the numbers of applications received in areas of plants and microorganisms were relatively few, whereas these fields are pivotal parts in classical genetics research. The Discipline will prioritize proposals with solid previous studies and novel scientific questions in the above branches in 2022. The Discipline will continue to support projects to further explore the basic mechanisms and rules of genetics and epigenetics, and strongly support applicants to carry out research on genetic mechanisms of human hereditary diseases and rare diseases based on clinical resources, as well as studies of genetic mechanisms and evolution of pathogenic and non-pathogenic microorganisms.

Cell Biology (C07)

Cell biology is a fundamental and cutting-edge subject to study the principles and mechanisms of cell life activities, mainly aiming at revealing the structure, function, phenotypes and regulation mechanism at molecular, cellular and individual levels, as well as studies on cytological mechanisms of phenotype and functional abnormal occurrence of organisms.

Studies on structure, function and interaction of cells and organelles have been the major aspects supported by the Discipline. This Discipline encourages applicants to focus on the structural assembly, dynamic changes and functional mechanisms of biological macromolecules in the process of cell life activities, organelle remodeling and organelle interaction, the relationship between abnormal cell function and the development of diseases, and the interactions between cells and the microenvironment. The Discipline also encourage applicants use cell models, model organisms and pathological samples, in combination with techniques and methods from multiple disciplines including genetics, developmental biology, biophysics, biochemistry, chemical biology, and medicine, to carry out systematic and innovative researches at molecule, cell, tissue and individual levels. Applicants in the fields of life and medical research are encouraged to focus on practical needs, carry out multidisciplinary research which takes into account both basic and practical considerations, for understanding the pathogenesis of disease at the molecular and cellular level.

Compared with previous years, the number of accepted applications in this Discipline has increased steadily in 2021. Among the applications accepted in 2021, there were fewer applications in the areas of cell polarity and cell movement, cell variation and dysfunction, and new technologies and methods for cell biology research, whereas these areas are pivotal in cell biology. The Discipline will give prioritize to support above aspects. In 2022, the key areas of this discipline lie in the following fields: dynamic changes and regulation mechanism of molecular basis, structure and function of cell membrane and membrane organelles / non-membrane organelles,

morphology, function and dynamic regulation mechanism of chromatin and non-chromatin structure in nucleus, metabolite induction and maintenance of cell homeostasis, cell tracing and lineage, cell microenvironment and determination of cell fate, cell proliferation, variation, aging and intervention, etc.

Developmental Biology and Reproductive Biology (C12)

Developmental biology and reproductive biology are basic and cutting-edge disciplines that study the basic biological rules of gametogenesis, individual formation, development, growth and aging of multicellular organisms.

The research objects of this Discipline include humans, animals and plants. This Discipline focuses on the basic rules of gametogenesis, fertilization, implantation, pregnancy establishment and maintenance, embryonic development, cell lineage establishment, organogenesis, homeostasis maintenance and regeneration, aging, stem cell identification, establishment, reprogramming, pluripotent stem cell induction and the mechanism of individual phenotype and functional defects caused by abnormal reproductive development.

The developmental biology and reproductive biology currently emphasize on the continuity of development and dynamic process of change, and the use of model organisms to explore the collaborative function and regulation mechanism of multi-cells and multi-genes in the bioprocesses of development and reproduction. The study field of stem cell emphasizes on the in-depth researches on the biological mechanism, including identification and establishment of new stem cells, and revealing the molecular mechanism of stem cell maintenance, development, differentiation and functional regulation. The Discipline encourages translational application research based on stem cells, such as the use of stem cells to construct embryos, organoids for disease model construction, cell replacement therapy and drug screening. In the future, the discipline will continue to encourage applicants to focus on scientific frontiers and carry out basic research with international competitiveness; continue to pay attention to the applied basic research based on the clinical problems caused by disorders of development and reproductive process; continue to focus on common needs and interdisciplinary researches, and encourage the establishment of new models of developmental and reproductive abnormalities and the development of new methods and technologies.

In 2021, the number of applications in this Discipline increased steadily. The number of applications in the fields of early embryonic development, tissue and organ development and regeneration has been keeping at relatively high level. Some of proposals were able to aim at the forefront of science with accurate topics and high starting point. The research in the field of stem cell and reproductive biology were generally closely combined with the important scientific issues in the field of medicine and parts of the applications came from medical practice with scientific questions

covering both basic and practical considerations. The number of applications in developmental reproduction research with plants as objects decreased compared with that of 2020, which is one of the important directions of this Discipline, and the Discipline will give priority to support these topics in 2022.

Division of Biomedicine

The Division of biomedicine covers the following three disciplines: immunology, neurosciences & psychology, and physiology & integrative biology.

Immunology (C08)

Immunology studies the structure and function of immune system. It is a frontier and leading discipline which bridges biology and clinical medicine.

In 2021, the number of applications in innate immunity, tumor immune microenvironment, and vaccine, antibody, and immunity intervention is relatively large. The number of applications in research areas including adaptive immunity, mucosal immunity and regional immunity, autoimmunity and immune tolerance, reproductive immunity and transplantation immunity is relatively few. It is clearly demonstrated from the applications in 2021 that the number of proposals applied to this discipline has increased steadily, and the number of proposals applied in innate immunity, autoimmunity and immune tolerance, and tumor immune microenvironment has increased significantly compared with that in 2020. The number of in the fields of adaptive immunity, vaccines, antibodies and immune intervention, reproductive immunity and transplantation immunity remained unchanged, while the number of applications in infection and non-infectious inflammation decreased compared with 2020.

It is worth noting that some of the applied in 2021 did not pay enough attention to biomedical ethics and fail to provide ethics permission as required. In addition, the applicants had inaccurate understanding of the classification of scientific problems, especially the “encouraging exploration and highlighting originality” category, and the content of “originality” was not correctly reflected in the applications. The writing of a few applications was not rigorous and standardized, especially the relevant information of representative works did not meet the requirements of the *Guidelines*.

In 2022, the Discipline will continue to support applications with creative academic thoughts; encourage interdisciplinary studies; encourage applicants to concentrate scientific questions from their previous research and practice to carry out in-depth exploration of mechanisms targeting at specific scientific target and form novel hypothesis and new theory; encourage the use of systems biology methods to analyze the mechanisms of the interaction between the immune system and commensal

flora, and the regulation of neuro-endocrine-immune interaction; encourage research on basic immunological issues of major diseases and emerging infectious diseases to form original scientific research results and new strategies and new methods for diagnosis and treatment with independent intellectual property rights; encourage the establishment of distinctive research systems, technology platforms and animal models.

Neuroscience and Psychology (09)

The funding scope of this Discipline includes neuroscience, psychology and cognitive science. The core scientific goal of neuroscience research is to analyze the essence of human nervous activity, from primary sensation, activate and instinctive behavior to advanced language, learning, memory, attention, consciousness, thinking and decision-making, etc. Psychology is the science of studying human psychology and behavior, aiming at clarifying rule and mechanism of occurrence, development, expression and function of psychological phenomena including cognition, emotion, motivation, thinking, consciousness, personality. Cognitive science is a science that studies the nature and rule of cognition and intelligence including cognitive and intellectual activities at all levels and aspects including perception, attention, memory, reasoning, choice, consciousness and even emotional motivation.

The number of applications in 2021 clearly indicated that the development of neuroscience and psychology was imbalanced. A large number of the proposals submitted and projects funded were focused on molecular and cellular neurobiology, behavior and emotional neurobiology, cognitive neurobiology, structure and function of nervous system, cognitive psychology, developmental and educational psychology, whereas there were fewer applications in fields of novel technology and paradigm of cognitive simulation, computing and artificial intelligence, neuroscience and psychology.

In 2021, some applicants did not pay enough attention to medical ethics issues, and submitted proposals without ethical approval of the research involving human. Besides, it is also worth noting that some of the proposals applied in 2021 had inaccurate understanding of the classification of scientific problems, especially the “encouraging exploration and highlighting originality” category. The correct classification of scientific question was not selected.

In 2022, the Discipline will continue to encourage the exploration of the neurobiological basis of cognition and behavior, and using the research concept of systems biology to analyze the functions of the nervous system from the molecular, cellular and neural circuits and neural network levels. Interdisciplinary studies will be encouraged to clarify the occurrence, development and mechanism of nervous system diseases. Cross-species neuroscience researches from an evolutionary perspective are encouraged; researches on development of novel technologies and methods to solve

bottleneck problems in neurosciences are encouraged. For the discipline of psychology and cognitive sciences, the dominant areas will be supported continuously, with interdisciplinary integration being encouraged, using modern neuro-imaging, genomics, deep brain stimulation, big data analysis, longitudinal tracking, computational models and other technologies and methods to promote in-depth research on psychological activities and cognitive processes and their material basis, to encourage the development of new theories, technologies and models.

Special reminder to applicants: due to the large number of research areas in this discipline, applicants need to correctly select the secondary code.

Physiology and Integrative Biology (C11)

Physiology and integrative biology is an inter-discipline of biology and basic medicine, which reveals the phenomena, rules, regulation and mechanisms of life activities. The funding scope of this Discipline mainly focus on the morphological structure, physiological function and homeostasis maintenance from body, system, organ/tissue, cell to molecule level. In addition, the Discipline also supports researches on the physiological and pathological mechanism of life activities under the condition of stress, disease, aging and extreme environment.

In 2021, the applications tended to be multi-disciplinary integrative researches, but the growth of each sub-discipline branch is imbalanced. There are more applications in integrative biology, sensory organs and exercise physiology. The applications in circulation and blood physiology, nutrition and metabolism physiology, aging and biological rhythm, endocrinology, urology and reproductive physiology are less than the above sub-discipline branches. There are few applications in respiratory and digestive physiology, extreme environmental physiology and comparative physiology and pathophysiology.

The following common problems, reflected in the applications in 2021 need to be noted: 1) Some applicants did not pay enough attention to medical ethics issues, and a few applications were short of ethical approvals for the researches involving human; 2) Some applications had inaccurate understanding of the classification of scientific problems, especially the “encouraging exploration and highlighting originality” category.

In 2022, the Discipline will continue to encourage the comprehensive and multi-level integrative researches using traditional, cutting-edge and original technologies; encourage interdisciplinary investigations, especially those aiming to further improve and expand frontiers of human physiology and injury adaptability with various novel methods and techniques; and encourage the pathophysiologic researches involving various tissues or physiological states.

Please note that applications concerning researches on plants, algae, traditional Chinese medicine, and wild animals (except comparative physiology)

are not accepted in this Discipline.

Division of Interdisciplinary Research

The Division covers three disciplines as follows: biophysics and biochemistry; bio-materials, imaging and tissue engineering; and molecular biology and biotechnology. The Division encourages applicants to challenge the existing research paradigm, propose new research directions through interdisciplinary and interdisciplinary integration, and generate subversive academic ideas; additionally, the applicants are also encouraged to make innovations and breakthroughs in technology and methods based on multi-disciplinary and multi perspective for resolving the existing important scientific issues in the field of life science.

Biophysics and Biochemistry (C05)

Biophysics and biochemistry is a cross discipline, applying the theory and method of physics and chemistry to investigate mechanisms of biological problems and phenomena, to study chemical composition of living organisms as well as chemical changes during the process of life, and to investigate the life phenomena and activities of life process at the biological molecule level. By exploring the characteristics of bio-molecules and their interactions, this discipline has gradually extended to grasp the whole process of important life activities, showing a distinct progressive feature.

The funding scope of this Discipline mainly includes: structural biology, molecular biophysics, cell sensing and environmental biophysics, physical biology, protein, peptide and enzyme biochemistry, sugar and lipid biochemistry, nucleic acid biochemistry, inorganic biochemistry and environmental monitoring, biological process and metabolism, etc.

Considering the contents of applications received in the recent years, fields with more applications and approved grants includes structural analysis and function of biomolecules and complexes, interaction of biomacromolecule, biochemistry of protein and poly peptide, biochemistry of enzyme, modification of biomacromolecule, etc., whereas the applications and researches in environmental biophysics, physical biology, systems biology, environmental biochemistry, glucose and lipid metabolism and regulation are less funded in terms of the number and quality of applications. The discipline encourages applicants to apply heavy metal pollution, ionization and electromagnetic radiation, etc.

The Discipline encourages cross-disciplinary researches on biophysics and biochemistry, especially the application of new theory, disruptive ideas as well as novel technology to understand life activity from a different angle. In order to further encourage the researches with original scientific significance and respond to the

national needs, this Discipline will give appropriate preference to the proposals within the categories of “encouraging exploration, highlighting originality” and “demand traction, breaking through bottlenecks”.

Special reminder to applicants: Applicants need to correctly select the secondary code; For high-resolution imaging, biomolecular labeling and other instrument investigation projects, please select the corresponding application code of molecular biology and biotechnology. For proposals related to molecular modification of biomaterials, please select the corresponding application code of biomaterials, imaging and tissue engineering.

Biomaterials, Imaging and Tissue Engineering (C10)

This discipline is a branch intercrossing of life science with other research areas, with clear feature which is demand-orientated and cross disciplinary interaction. The funding scope covers biomechanics and biorheology, biomaterials and biological effects, tissue engineering, tissue regeneration and artificial organs, biological imaging, electronics and probe, bionics and artificial intelligence, nano-biology and biomedical engineering and technologies, etc.

The application and approval in 2021 showed that the field of biomaterials increased rapidly, which currently focused on biomaterials and advanced manufacturing, material-body interaction, biomaterials and tissue regeneration, slow-release materials and materials biology; in the field of tissue engineering, most proposals focused on bone, cartilage, cardiovascular and other research directions, but there were few applications on complex tissue and organ bionics construction, and artificial organs; in biomechanics and biorheology field, studies on cell-molecular biomechanics, musculoskeletal tissue and motor system biomechanics, blood circulatory system biomechanics and biorheology, oral and maxillofacial biomechanics and other biomechanics programs were rare; there were few applications in bio-imaging and bioelectronics fields; in the field of nano-biology, nano-carriers and delivery were dominant, while only a few studies were proposed on nano-bio detection, nano-bio safety evaluation or nano- technology; in addition, there were few applications for bionics and artificial intelligence, new technologies and methods of biological and medical engineering.

This Discipline encourages applications to carry out cutting-edge and multidisciplinary research in fields of biomechanics and biorheology, biomaterials, tissue engineering, bio-imaging and bioelectronics, bionics and artificial intelligence, nano-biology, as well as new technologies and methods for biological and medical engineering. Researches should aim at key scientific questions in tissue and organ repair and regeneration, biological imaging and nano-diagnosis and treatment, cross-scale tissue and organ biomechanics, biomaterial and body interaction; the novel methods and new technology of biomedicine, and use the principles and technologies

of tissue engineering to explore the basic research of disease pathogenesis and treatment.

Special notes for applicants: biomaterial and bionic research other than biology/biomedical applications are excluded in this discipline.

Molecular Biology and Biotechnology (C21)

Molecular biology is a discipline to clarify the essence of life phenomena at the molecular level. Biotechnology is a subject aiming at research, development and application of biological technology and methodologies, providing novel powerful techniques and methods for the research and understanding of life sciences. The outstanding feature of molecular biology and biotechnology is the interdisciplinary integration of biology, physics, chemistry and computer science, providing original exploration and source innovation for technology breakthrough and method innovation. The discipline analyzes and processes the existing knowledge, intergradations of the life system for providing potential solutions for breaking through the related technology bottleneck.

In the recent years, most proposals and funding focus on synthetic biology, histology technology, gene editing and biomolecular manipulation and application of biotechnology, while there are short of researches on molecular biology, biomolecular detection technology, protein and vaccine engineering, single molecule and single cell technology, stem cell and tissue engineering, biological imaging, artificial intelligence biology, cutting-edge biotechnology, reagent development and new instrument development.

Funding scope of this discipline includes: basic theories of frontier technology including pilot theories and principles in the field of molecular biology and biotechnology; synthetic biology and biological transformation technology; biometrics technology; generic biotechnology; cross fusion biotechnology; applied biotechnology and disruptive biotechnology, etc.

In 2022, the Discipline will continue to support interdisciplinary and original studies, encourage applicants to carry out new technology, new methods and new application research in the fields of synthetic biology, gene editing, *in situ* and *in vivo* analysis of bio-molecules, single molecule and single cell analysis of complex systems, multi-scale multi-model imaging, experimental automation technology, bio-molecular delivery technology, omics technology and artificial intelligence. It should be noted that sugar related research is the current technical bottleneck of life science. This Discipline will continue to encourage applicants to carry out principle exploration and technology research and development in this field, and give it appropriate preference. Meanwhile the Discipline will focus on the development of reagents and new instruments related to basic research of life science.

Division of Environment and Ecology

The Division supports researches in areas of ecology, and forestry and grassland science.

Ecology (C03)

Ecology studies the interaction between organisms and environment and that among organisms. It plays a pivotal role in solving the national ecological issues which are increasingly important. The scope of funding includes basic and applied basic research in the fields of ecological theory and methods, behavioral ecology, physiological ecology, population ecology, community ecology, ecosystem ecology, landscape and regional ecology, global change ecology, environment and biological evolution, pollution ecology and restoration ecology, soil ecology, conservation biology, and sustainable ecology, etc.

In recent years, significant progress has been achieved in ecological studies in China. Ecology in China has made important progress in the fields of system construction and monitoring of field observation stations and experimental platforms, ecosystem response to global change, protection of important biological groups, etc. From the perspective of applications accepted in 2021, the development of each sub-discipline branch is imbalanced: there were more applications in the fields of ecosystem ecology, soil ecology, global change ecology, pollution ecology and restoration ecology, community ecology etc., while were short of applications in the fields of ecological theories and methods, sustainable ecology and behavioral ecology etc. Some of proposals had inaccurate understanding of the classification of scientific problems (especially the “encouraging exploration and highlighting originality” category).

In 2022, facing the forefront of ecological research, the Discipline will further give priority to support for long-term field observation and research, application of new technologies and interdisciplinary integration, integration and analysis of ecological big data, ecological research based on carbon neutrality goals. It will be encouraged to carry out research in biodiversity and ecosystem functions, ecological security, natural ecosystem protection and restoration, and support the development of ecological research on evolutionary ecology and adaptation, ecological model and ecological prediction, ecological effects and mechanisms of pests and infectious diseases, urban ecology, and regional sustainable development, etc.

In 2022, applications need accurately grasp the connotation of the four categories of scientific issues, provide accurate information of the academic contribution, highlight the research focus and moderate content, pay attention to the scientific feasibility of the technical route, research methods and data processing, and strengthen

the satisfaction of the national needs.

Forestry and Grassland Science (C16)

Forestry and grassland science is to reveal the essence and mechanisms of the biological phenomena by taking forest and grassland as research objects. The scope of funding includes: grass germplasm resources and genetic breeding, grass cultivation, protection and utilization, wood physics, forest product chemistry, tree biology, forest soil science, forest cultivation, forest informatics and forest management, forest protection, forest genetic breeding, economic forestry, landscape architecture, desertification and soil and water conservation, and bamboo science.

In recent years, the fields of landscape architecture, forest product chemistry, grass cultivation, protection and utilization have developed rapidly, whereas the projects of homologous cloning and heterologous function verification in forest genetic breeding mostly belong tracking research. The studies of forest product chemistry and wood physics are lack of novel theories and methodology to promote industrial development. In 2021, the number of proposals submitted to different branches is imbalanced. Landscape architecture, forest genetics and breeding, grass cultivation, protection and utilization, forest product chemistry and wood physics is large in numbers, while there are fewer applications to the sub-disciplines including forest soil science and bamboo science. Some of the proposals had inaccurate understanding of the classification of scientific problems (especially the “encouraging exploration and highlighting originality” category).

In 2022, the Discipline will keep focusing on the national major needs, continue to vigorously promote the development of basic research on forest and grass cultivation, protection and resource utilization; give priority to continuous long-term field research; focus on supporting conventional genetic breeding, formation and maintenance mechanism of mixed forest, relationship between forest management measures and wood properties, grassland utilization and interference mechanism, as well as restoration and function improvement of degraded grassland. The Discipline encourages the researches on the genetic transformation and gene function verification system of model tree species, the mining and innovation of forest and grass germplasm resources, and vigorously supports the economic resources and utilization under the forest, the prevention and control of major forest disease and insect pests, forage cultivation, as well as storage, processing and utilization.

In 2022, applications should accurately grasp the connotation of the four categories of scientific issues, provide accurate information of the academic contribution. This Discipline doesn't accept the researches in the following fields: (1) proposals on pharmaceutical functional verification of effective components using animals as research objects; (2) research and development projects for forestry machinery, wood cutting tools, road and bridge design, forest engineering

machinery and equipment, forest engineering and civil construction in forest areas; (3) projects in the forest product chemistry field without forest biomass research; (4) projects in landscape architecture field should be based on forest and grass resources.

Division of Agriculture and Food Sciences

The Division covers two disciplines: basic agriculture and crop sciences, and food sciences.

Basic Agriculture and Crop Science (C13)

The Discipline mainly supports basic and applied basic research on crops and their growing environment, aiming at the major needs of national agriculture to carry out basic research with prominent features of “oriented demand, breakthrough bottleneck”. To implement the strategy of “storing grain in the ground and technology” and strengthen the basic research of crop seed industry, the research fields, which this Discipline needs to focus on, include: the excavation and innovative utilization of crop germplasm resources, the formation, regulation law and environmental adaptability of excellent traits of crop germplasm, genetic control network of important traits of main crops, crop genome, the theory and method of molecular design breeding, and crop yield potential mining, cultivation physiological mechanism of quality improvement and resource efficiency collaborative improvement, and crop germplasm resources research.

It is reflected from the applications in 2021 that was increasing of numbers of proposals with basic issues on topics meeting the national demand of agriculture, an obvious increase in interdisciplinary studies around basic agricultural issues. However, some major problems remain as the following: (1) In the basic field of agronomy, many proposals were lack the combination of agricultural informatics, agronomy and agricultural machinery, agricultural biological system engineering and agricultural biology, as well as the scientific problems and application objectives are not clear; (2) Following-up work with the international frontier is increasing, but it should be performed without close combination with practical issues of our national agricultural production, so that to provide lack of support from basic research to application; (3) Researches on crop genome and genetic function based on sequencing are generally concerned, but more attention is yet to pay on further exploration of the key genes regulating traits and their natural variation in crop genetics and breeding; (4) Some proposals have weak foundation in the early stage, and the research work is not systematic and sustainable, so they may not carry out in-depth and long-term research on essential scientific issues; (5) Some proposals are not standardized with accurate

information, especially in the part of representative publications.

This Discipline encourages applicants to condense scientific issues from the reality of agricultural production in China; the close combination of current biotechnology, information technology, intelligent equipment technology and crop production to carry out interdisciplinary research; the development of germplasm resources mining and innovative research by using new technologies and methods; focuses on the research of agronomic characters suitable for mechanized production as well as the development of high-yield, light cultivation and resources around crops and industrialized application of biological breeding crop cultivation regulation and tillage system.

Applications in the subdiscipline (basic research of Agronomy: C1301, C1302 and C1303), only studying agricultural materials, agricultural machinery and facilities will not be accepted; Agricultural Biosystems Engineering (C1303) does not accept the application of taking livestock, poultry, aquatic products and other agricultural animals as the research object. In the field of Crop Science Research (C1304~C1312), crops should be taken as the research objects, and applications with horticultural crops, trees, forages and lawn grasses, medicinal plants and traditional Chinese medicine, model plant Arabidopsis, etc. as the research object are not accepted.

Food Sciences (C20)

The Discipline of Food Sciences mainly supports basic research in food biology, food chemistry, food safety and quality with food and its raw materials as the research objects. In recent years, the Discipline focuses on the following research fields: the selection, regulation and fermentation of food microbial strains with independent intellectual property rights; the preparation of food enzyme expression system and food enzyme engineering; the changing and interaction mechanism of food nutrient components and their processing process; the biological basic research of organic food processing and comprehensive utilization; the regulation of food storage and transportation as well as postharvest quality control mechanism; formation mechanism, detection methods and control mechanism of food harmful substances; food authenticity detection and traceability; as well as separation, analysis and formation mechanism of food flavor substances.

In 2021, the number of proposals focusing on the actual scientific problems of food processing and manufacturing in China was increased, and the trend of carrying out interdisciplinary research on food production is obvious. Major problems existing in proposals include: (1) There were lack of proposals to put forward and refine scientific problems according to the bottleneck of food production in China; (2) Some proposals focused on product development, but paid attention not much to the scientific problems behind the industrial bottleneck; (3) Many food inspection

applications focused on detection methods, but ignored the impact of food matrix and practical application goals; (4) Some proposals followed the international research hotspots one-sidedly, especially food nutrition and food detection, but without consideration of the actual needs of food science in China; (5) Some applications in food components and nutrition, food and intestinal microbiota were not closely related to food and beyond the funding scope of food sciences; (6) Some proposals were not standardized with accurate information, especially in the part of representative publications.

In 2022, the Discipline will continue to encourage proposals facing major national strategic needs, close to the scope of funding, with condensed scientific issues from the actual food production, especially the key technical issues that restrict the food processing and manufacturing in China. It is encouraged to adhere to the guidance of scientific issues, and attach importance to traditional Chinese food, special food and food quality and safety. Applicants are encouraged to focus on interdisciplinary research with food science as the main interest, integrate new theories, methods and technologies of other related disciplines, and analyze key scientific issues of food science in China.

This Discipline will not accept the following applications: (1) research on disease treatment and drug development, and clinical trials with human; (2) research on product development of health products and medicines; (3) research on the growth, development and metabolic physiology of animal and plant cultivation and aquaculture.

Division of Agricultural Environment and Horticulture

The funding scope of the Division covers two disciplines: plant protection, horticulture and plant nutrition.

Plant Protection (C14)

Plant protection is a discipline that studies the biological characteristics, occurrence regularity and disaster mechanism of crop diseases, insects, grass and rats, and carries out technological innovation on this basis to establish green control strategies for pests. Research on plant protection should meet the major national needs of agricultural production. The discipline covers basic and applied researches in plant pathology, agricultural entomology, crop immunity and resistance, agricultural weeds, agricultural rats and other pest, plant chemical protection, biological prevention and cure, new techniques of plant protection, crop and biological factor interaction, and ecological regulation etc. Recently, the development trend of plant protection is the use of current biological theory, technology and big data to deeply reveal the rule of pest

disaster and the mechanism of pest's virulence and crop resistance; application of the principles and methods of ecology to establish and improve the capacity of agricultural production, protection the biological diversity, prevention of environmental pollution, and sustainable pest management with high efficiency, low poison, and environment-friendly property, etc.

In 2021, the following problems existed in the applications: (1) Some proposals had inaccurate understanding of the classification of scientific issue;(2) The topics of some proposals failed to focus on the urgent problems on our national agricultural production; (3) Some applications simply followed or imitated researches related previously or abroad, or grafted one research method (or material) to another, without original ideas; (4) In some applications, the research topics were over broadly laid out and lack of concentrated scientific problems, and the research contents were not precise; (5) Some applications had too much research content, but lack of in-depth investigation; (6) The writing of a few applications was not rigorous and standardized.

In 2022, the Discipline will continue to encourage the following research fields: the reciprocity mechanisms of crop-pest-environment (biotic and abiotic) at either microscopic or macroscopic level; mining the molecular markers of disaster of hazardous organisms; resistance of crop pests and sustainable application of biological breeding; the creation and scientific use of green pesticides, and the sustainable prevention and control of harmful organisms. Special attention will be paid to new scientific issues, combining with the factors of the national crop of ecological features of different regions, to study the adjustment of industrial structure, improvement of cultivation measures, and the global climate change, etc. As for the research approaches, emphasis will be on the combination of new theory and new technologies with traditional methods, as well as integration of laboratory work with field experiment. For interdisciplinary studies, the specific aim of solving major scientific questions in the plant protection field will be elaborated.

Application to this Discipline should focus on the research object of crop pests, and taking the prevention and control of pest hazards as the scientific goals, otherwise it will not be accepted. Applications taking woods or model organisms such as Arabidopsis and Drosophila as main research objects will not be accepted.

Horticulture and Plant Nutrition (C15)

The funding scope of this Discipline covers two research subjects, namely horticulture and plant nutrition.

Horticulture studies germplasm resources and genetic breeding, physiology and cultivation of horticultural crops under natural conditions, as well as horticultural facilities and postharvest quality maintenance under artificial control. The funding scope of horticulture covers pomology, olericulture sciences, ornamental horticulture, horticultural facilities, tea science, post-harvest biology of garden crops and food

mycology. In the recent years, there has been a rapid development of genome research in horticulture in China. Great achievement has been made in the study on the basis of trait formation of horticulture crops, regulating measures, gene mining and function identifying, germplasm excavations and innovation, mechanisms and control of quality formation, response mechanisms to adversity, mechanisms of root-stock-scion interaction, the formation and regulation of unfavorable components of horticultural products.

Plant nutrition is to study on the plant nutrition basis and fertilizer and nutrient technology management. The funding scope of plant nutrition covers the basis of plant nutrition, nutrient resources and recycling, manure and fertilizer science, nutrient management, etc. In recent years, plant nutrition has made significant progress in the genetic mechanism of plant nutrition, nitrogen and phosphorus recycling and efficient utilization of soil plant system, and the creation and application of new fertilizers.

In 2021, common problems in both horticulture and plant nutrition lay in the application as following aspects: the short of scientific issues based on national practice and industry development; and a large number of proposals pertaining to copying and following research. Major problems with the discipline of horticulture is that some proposals relied too much on high-throughput technology and molecular biology research methods, not closely related to horticultural biological problems, and lack of biological significance mining for genomic data; Researches of high quality are not comprehensive enough; Research on the interaction between horticultural crops and the environment needs to be strengthened. Major problems with the discipline of plant nutrition lay in the following aspects: Insufficient research on nutrient synergistic optimization; and green new fertilizer; The research on plant nutrition of commercial crops needs to be strengthened; There were few research projects on water fertilizer coupling mechanism. In 2022, the Discipline will continually encourage to concentrate scientific issues based on frontiers of the discipline and the needs of national industry development. Funding priority will be given to original, continuous and systematic and distinctive researches. The Discipline of horticulture will support proposals which aim at green, high-quality and efficient variety creation, cultivation technology innovation and postharvest quality maintenance of horticultural crops; Actively support will the given to the exploration and utilization of excellent germplasm resources with wild and local characteristics; Pay attention to the diversification of quality traits and the interaction between horticultural crops and environment; Encourage basic research on horticulture application that can guide production practice. The researches on crops and cash crops will be encouraged in the field of plant nutrition; Actively supports will be given to proposals in the fields of "fertilizer and fertilization" and "nutrient management"; Encourages will be also given to the development of green new fertilizers, pollution reduction and other applied basic research related to industrial demand, and promotes the balanced and coordinated development of plant nutrition in

all branches.

Applications using forest or model plant like Arabidopsis as research objects will not be accepted in this Discipline. Application of medical health research will not be accepted in this Discipline.

Division of Agriculture Animal

The funding scope of the Division covers three disciplines: animal husbandry, veterinary science and aquatic science.

Animal Husbandry (C17)

Animal husbandry is a discipline which studies the germplasm resources, genetic breeding and reproduction, nutrition and feed of livestock and poultry (including special economic animals), behavior and welfare, breeding environment and facilities.

Applications received and funded in 2021 covered all branches of this discipline, among which, there were more proposals in fields of animal genetics and breeding, animal reproduction, animal nutrition and feed science, whereas fewer in animal husbandry foundation, animal germplasm resources, animal behavior, intelligent breeding, and beekeeping, etc., and imbalance of applications in some secondary codes is more prominent. Peer review and evaluation of proposals indicated that the innovation of academic ideas has been improved overall, and the characteristics and advantages have been formed in animal genetics and breeding and animal nutrition. However there are still some obvious shortcomings, including the inaccurate understanding of the four categories of scientific problems, some proposals blindly following the research hotspots and new technologies, and the refinement of specific scientific problems remained to be improved; not enough attention paid to focus on major national needs and some topics were out of touch with the actual problems of animal husbandry production, failing to aim at solving the basic questions behind the bottleneck of animal husbandry production technology.

In 2022, the applicants are expected to accurately understand the attributes of the four categories of scientific problems and continue to carry out original, systematic and continuous research guided by industrial demand. The Discipline will continue to encourage research on the evaluation and utilization of germplasm resources in livestock, poultry, silkworm and bee resource, the discovery of excellent genes, regulation mechanism and important scientific issues related to breeding of good breeds; encourage the basic research on germplasm resources, genetic breeding, reproduction, nutrition and feed of livestock and poultry, especially large animals. Appropriate support should be given to the research on animal husbandry foundation, environment and health of livestock and poultry, facilities and equipment of livestock

and poultry and bee and silkworm breeding, behavior and welfare, companion animals such as dogs and cats.

Special notes for applicants are the following: research objects should be livestock, poultry, grass, silkworm, bee, etc.; interdisciplinary studies with other subjects are not allowed to depart from the main research interests above; otherwise, the proposals will be not accepted.

Veterinary Science (C18)

Veterinary science is to study the occurrence, development, diagnosis, prevention and cure of animal diseases. The Discipline covers the following fields: animal diseases, zoonoses, public hygiene, laboratory animals, veterinary medicinal industry, etc., and other related novel interdisciplinary research areas. The Discipline supports basic researches taking animal diseases as major objects on animal infectious diseases, zoonoses, most common diseases and comparative medicine.

Proposals received and funded in 2021 covered all subjects of this discipline. Among them, the majority of applications focused on veterinary virology, veterinary immunology, veterinary pharmacy. The number of applications of the newly established subdiscipline on zoonosis, animal and pathogenic microorganism transmission was relatively few. Some applications were able to aim at the international frontiers, highlight the creativeness in the selection of their research themes, and actively promote the international standard of research work. However, problems still existed: Some applications paid much attention on the international hotspot, but were lack of enough concentration of scientific issues; There was not enough attention paid to the research on the major national needs. Veterinary science is based on the national strategic needs of animal health, food safety, public health, human health and environmental and ecological security. The Discipline will continue to encourage studies on the epidemiology, pathogenic biology, pathogenes and cross species transmission mechanism of important animal epidemic diseases and zoonoses, meanwhile strengthen researches on the veterinary pathology, physiology and biochemistry, immunology and the non-infectious disease of animal mass populations.

In 2022, applicants are expected to accurately understand the attributes of the four categories of scientific problems. It is required that the application aiming at preventing and controlling animal diseases and ensuring animal health and public health safety, and interdisciplinary studies should not deviate from the research objects. This Discipline encourages innovative research on new, recurrent and potential animal diseases facing major industrial demands.

Special notes to applicants: For applications involving highly pathogenic microbes, all the operations must strictly abide by the relevant provisions of the state, with the biological safety of the appropriate conditions. Proposals involving animal experiments shall comply with the relevant provisions and requirements

of national animal ethics and welfare.**Aquatic Science (C19)**

Aquatic science is to study basic rules of the development, growth, breeding, genetics, behavior, physiology and immunology of aquatic organisms and their breeding ecology, breeding engineering, nutrition and foodstuff, control of diseases and pests, and the protection and utilization of aquatic resources, etc.

In 2021, most of proposals received and funded were in areas of immunology and disease control of aquatic organisms, basic biology of aquatic organisms, nutrition and feed science of aquatic animals, genetics and breeding of aquatic organisms, etc., whereas there were few applications in aquaculture ecology and engineering. It can be seen from peer review and panel meetings that the creativeness of academic thoughts of proposals were obviously improved. Relatively in-depth studies conducted on important economic traits of aquatic animals, molecular characters of important pathogens and their pathogenesis, etc. However, only a small portion of applications were able to propose original research on the important scientific issues of aquaculture, whereas for most of the studies, concentration of specific scientific questions need to be improved.

In 2022, the applicants are expected to accurately understand the attributes of the four categories of scientific issues and continue to carry out original, systematic and continuous research guided by industrial demands. The Discipline will request applicants to focus their studies on research fields of aquatic science, and aim at the frontiers and important demands of production. The interdisciplinary studies on aquaculture subjectively with other disciplines will be encouraged. It will be strengthened to support proposals with original ideas. Applicants should choose topics based on new development of subjects concerned at home and abroad, and their research background, aiming at scientific questions, focusing on original innovation, and avoiding over emphasis on R&D of technology while lacking of key scientific issues. Research on model organisms should be based on aquaculture sciences. The Discipline will encourage cooperation of applicants with superior units and teams, so as to fully exert regional and resource priority, and enforce cultivation of talents. The Discipline will prioritize applications in the following areas: genetic rules and gene function of economic traits of important breeding organisms; epidemiology and pathogenesis of important aquatic organisms; host immunity and diseases prevention and treatment; molecular basis and regulation mechanisms of breeding and development of important aquatic organisms; regulation mechanisms of the utilization as well as metabolism of nutrient stuffs for aquatic animals. Moderate support will be provided in the following areas: basic research on interaction with eco-environment, conservation of aquatic resource, new models and new techniques of breeding, etc.

Department of Health Sciences

The Department of Health Sciences adheres to target the global science frontiers, serve the main economic battlefield, strive to fulfill the significant needs of the country, and benefit people's lives and health. It mainly supports the basic research that aims at scientific issues in disease prevention, control and treatment, and focuses on the structural, functional, developmental, genetic and immune abnormalities of human body, as well as the occurrence, development, outcome, diagnosis, treatment and prevention of disease. It also supports researchers to conduct innovative research in basic medicine, clinical medicine, preventive medicine, materia medica, pharmacology, Traditional Chinese Medicine, Chinese Materia Medica and interdisciplinary fields of medicine and engineering, so as to improve the levels of medical scientific research in China.

Basic research is the foundation to delineate natural phenomena, reveal natural laws, put forward and resolve scientific issues. The Department encourages research areas as follows: innovative academic questioning and methodological research on the scientific issues emerging from clinical practices; systematic and original research on key scientific issues; translational medical research combining basic medicine with clinical medicine; integrative medical research on the occurrence, development and regression of diseases at multiple levels from molecular, cellular, tissue level to organ, individual and population level by using new multidisciplinary and comprehensive techniques or methods; in-depth research on the basis of existing findings and previous research evidence; interdisciplinary research integrated in other fields; substantive international joint research. The Department will give priority to funding basic research on major diseases that are important to the national economy and people's livelihood, public health emergencies and newly emerging public health problems, and common and frequently occurring diseases that severely endanger people's health. The Department will also highlight research in distinctive fields, support relatively weak research fields, and ensure balanced, coordinated and sustainable development in all fields.

Notes:

1. Specific instructions for applicants

(1) Applicants are encouraged to perform in-depth basic research toward scientific issues, especially the original research. Applications with solid previously accumulated research work are encouraged to carry out further systematic research. Applications tracking others' non-innovative scientific ideas, or those merely pursuing new high-technology, or research hotspots rather than scientific innovation will not be in consideration for grant.

(2) Applicants are expected to elaborate the scientific and potential clinical values of the anticipated research results in detail. Applicants are suggested to propose a defined scientific issue or a specific hypothesis based on analysis of the relevant latest research trends and progress in the field. Furthermore, elucidation of theoretical and applicable value of the research is clearly warranted.

(3) Applicants are expected to elaborate whether the proposed research will possibly solve the specific scientific problems or verify the hypothesis, and the proposed research is supposed to be specific, feasible and logical. Furthermore, applicants are expected to propose adequate research contents, detailed research designs, clear research methods and reasonable budgets.

(4) Applicants are expected to provide detailed information about relevant previous research. In case of extension of previously funded project, the innovative ideas and further scientific issues of research are expected to be elaborated in detail. Besides, all the relevant published papers are expected to be listed, and relevant unpublished results including experimental data, tables or graphics, etc., are suggested to be provided.

(5) Applicants are expected to provide truthful and accurate information in their applications, including resumes of the applicant and major participants, previous grant information and relevant publications. Applicants are expected to write the applications carefully according to the relevant instructions in a scientific and truth-seeking attitude. The published academic papers should be filled in according to the instructions and outlines of the application form. Patents and awards should also be listed according to the format and requirements of the application form.

(6) Applicants are expected to provide a signed institutional certification or approval (the scanning copy should be attached to the electronic proposal) to meet the related ethical or informed consent requirement if applications are involved in special medical research objects such as human tissues. Applications that do not provide certification or approval as required above will not be considered for funding.

(7) Applicants are expected to follow all appropriate guidelines for the use and handling of pathogenic microorganisms, including the guideline “Bio-safety Administrative Rules of Pathogenic Microorganism in Lab” released by the State Council of China and the ethical and bio-safety regulations by other governmental agencies. If applications were involved in human genetic resources, applicants should strictly follow “Regulations on Management of Human Genetic Resources”. Additionally, a commitment letter to guarantee bio-safety should be provided by the research institutions when applications were involved in the study of highly pathogenic microorganisms. Applications that do not provide certification or approval as required above will not be funded.

(8) Further emphasis will be placed on the late-stage management of funded projects, such as performance assessment, continuous funding for systematic and

continuing research projects, etc. Applicants with good scientific reputations in their previous grants will be given priority under equal conditions.

(9) Applicants are expected to notice that: in 2022, the Department will generally give no further funding for General Program to applicants who either have got intensive funding in 2021 from NSFC [such as Key Program, Key International (Regional) Joint Research Program, Major Program, Key Program of Major Research Plan or Programs of Joint Funds, Special Fund for Research on National Major Research Instruments], or are applying for repetitive or similar research to their ongoing national scientific projects funded by other governmental agencies.

(10) Applicants are expected to provide PDF copies of no more than 5 representative publications in their electronic applications (Applicant's publications only).

2. Overview of applications in the Department in recent years and instructions to host institutions

The number of applications has been increasing in the Department ever since its establishment. In 2021, the number of applications was 86,073 from 1071 research institutions, accounting for 30.04% of the total applications (286,508) in NSFC, including 32,889 applications for General Program which account for 29.52% of the total applications (111,423), 40,568 applications for Young Scientists Fund which account for 33.29% of the total applications (121,880), and 8,307 applications for Fund for Less Developed Regions which account for 36.03% of the total applications (23,057). Rapid growth in applications brings great difficulty for peer review and administration of the science funds. To enable the healthy, stable and sustainable development of both science foundation and medical research in China, the research institutions are required to further strengthen their management in the process of NSFC grant applications, and make efforts to further improve the scientific quality of applications (rather than increasing the number of applications) under the guidance of "Requirements of NSFC for Host Institutions to Improve Management of Scientific Projects".

3. Specific explanations on application codes

The application codes of the Department of Health Sciences are composed of 35 primary application codes (H01 to H35) and their corresponding secondary codes. The basic characteristics of the application codes system are as following: ① The primary application codes, which are mainly arranged in the order of organs or systems, addressing scientific issues, integrating basic medicine and clinical medicine, and putting the common scientific issues of each "discipline" and "department" into one application and review system. ② The secondary application codes, which are arranged in the order from basic to clinical research and from structural, functional and developmental abnormalities to diseases, and give considerations to disease related basic research.

The applicants are expected to carefully choose the primary application code and the relevant secondary one. Special instructions for applicants are as follows:

The Department of Health Sciences sets up the oncology discipline separately. Please select the corresponding secondary application code under Oncology (H18) for all kinds of tumor-related medical scientific researches except for hematological tumor, epidemiology of tumor, oncological pharmacology, medical imaging of tumor and Traditional Chinese Medicine oncology.

The proposals on hematological tumor should be submitted to the corresponding secondary application code under Hematological System (H08); The proposals on tumor epidemiology should be submitted to the Epidemiology of Noncommunicable Diseases (H3010); The proposals on oncological pharmacology should be submitted to Anti-tumor Pharmacology (H3505); the proposals on medical imaging and biomedical engineering of tumor should be submitted to the corresponding secondary application code under Medical Imaging/Nuclear Medicine (H27) and Biomedical Engineering/Regeneration Medicine (H28); The proposals on Traditional Chinese Medicine oncology research should be submitted to Traditional Chinese Medicine (H31), Chinese Materia Medica (H32), or Integrated Chinese and Western Medicine (H33).

The field of Radiation Medicine (H29) mainly covers the research of radiology pathology, protection, and non-oncology radiotherapy, and does not fund applications of radio diagnostics and oncology radiotherapy. For the applications of radio diagnostics, please select the appropriate secondary application code under Medical Imaging/Nuclear Medicine (H27). For the applications of tumor radiotherapy, the application code (H1816) should be selected.

The field of Gerontology (H19) only funds research on the pathogenesis and intervention of diseases related to the mechanisms of aging. Applications that focus on aging of single organ or system, and gerontology researches that do not involve pathophysiological mechanisms of aging should be submitted to other proper divisions.

Applications that focus on neonatal diseases should be submitted to Reproductive System/Perinatology/Neonatology (H04). For other scientific issues in pediatrics, application code of the corresponding system should be selected.

Applications that focus on sexually transmitted diseases should be submitted to the application code (H2208) under Human Pathogens and Infections (H22).

4. Funding plan and budget

The applicants are expected to prepare the budget reasonably according to their actual needs and fill in the funding budget table accordingly.

5. Special projects of General Programs: Guidelines and Requirements for “Exploration of Scientific Problems Derived from Clinical Practice”

The aim of the Special projects of General Programs “Exploration of Scientific

Problems Derived from Clinical Practice” is not only targeting major medical scientific issues and original innovations, but also focusing on promoting translational medicine research that applying the achievements of basic research to clinical practice and people's life and health. Based on clinical practice, it is of great value to innovate research methods, carry out research on the occurrence, development, diagnosis, prevention and treatment of diseases, discover and explain new mechanisms, improve the level of medical innovation, promote the translation medicine, and improve the funding pattern of medical research.

The Department of Health Sciences encourages the combination of clinical practice and basic research, the interdisciplinary research and the innovation of clinical research methods. In 2022, the special project of “Exploration of Scientific Problems Derived from Clinical Practice” in General Programs will continue to be programmed, with about 70 projects be funded and an average funding amount of 800,000 Yuan in direct cost.

The following research are to be supported: ① Important scientific issues derived from clinical phenomena or clinical questions, utilizing clinical tissue samples and clinical information and other resources to carry out basic research that has important guiding significance for disease diagnosis, treatment and prevention. ② Clinical translational exploratory research based on the innovative results obtained from previous basic research. ③ Exploring the new paradigm of clinical research, and establishing novel techniques and methods for clinical translational research.

In 2021, a total of 1662 applications were received for this special project. After the peer review and group committee discussion, 72 projects which met the guidelines were funded with 600,000 ~ 800,000 Yuan each. Meanwhile, 78 projects which were relatively excellent but fail to comply with the guidelines properly were only supported as normal General Programs. According to the overall applications accepted in 2021, the common inadequacy of proposals that fail to comply with the guidelines includes: ① Lack of innovation, the scientific issues were merely summarized from publications rather than clinical practices. ② Insufficient value for clinical translation, the results of previous research do not have the potential for translational medicine research. ③ Lack of rigorous clinical study design or high-quality preliminary data.

In 2022, according to the research field, applicants should independently choose the secondary application code under the primary application codes of H01 ~ H35, and indicate “Exploration of Scientific Problems Derived from Clinical Practice” in the annotated column of the application form. The research should be in line with the above-mentioned three directions. Application that does not meet the guidelines and requirements will not be funded. It should be clearly introduced in projects that the new phenomenon of clinical discovery or the new discovery that can be transformed into clinical practice from the previous basic research, the originality and innovation of the research, and the protection of independent intellectual property rights. This special

project does not fund clinical trials being carried out by hospitals and enterprises. For projects involving clinical research, the host institution should be qualified as a drug clinical trial center. The applications for the special projects are limited to the General Program.

Funding in Department of Health Sciences in 2021

Unit: 10,000 Yuan

Divisions		General Program			Young Scientists Fund			Fund for Less Developed Regions		
		Projects	Direct cost	Success rate (%)	Projects	Direct cost	Success rate (%)	Projects	Direct cost	Success rate (%)
I	Respiratory system, circulatory system, hematological system	524	28,940	15.67	531	15,890	13.07	103	3,500	13.61
II	Digestive system, urinary system, endocrine system, metabolism, and nutrition support, ophthalmology, otorhinolaryngology head and neck science, oral and craniomaxillo-facial science	639	35,167	14.77	708	21,200	12.45	114	3,877	11.61
III	Nervous system, mental health and psychological health, gerontology	422	23,345	14.63	426	12,750	12.70	62	2,118	9.35
IV	Reproductive system/perinatal medicine/neonatology, medical immunology, medical genetics	271	14,995	14.91	298	8,880	12.08	42	1,424	10.61
V	Special medicine, forensic medicine, medical imaging/nuclear medicine, biomedical engineering/regenerative medicine	261	14,429	13.41	273	8,090	10.60	36	1,226	9.16
VI	Locomotor System, emergency and intensive care medicine, trauma/burns/plastic surgery, rehabilitation medicine, medical virology and virus infection, Human Pathogens and Infections, laboratory medicine	437	24,127	12.63	445	13,320	10.91	85	2,880	10.83
VII	Oncology (hematological system not included)	840	46,170	13.02	1016	30,390	12.50	152	5,175	9.52
VIII	Dermatology, radiation medicine, preventive medicine	255	13,987	16.98	269	8,070	15.70	56	1,932	15.77
IX	Materia medica, pharmacology	264	14,473	16.13	353	10,550	16.73	62	2,121	13.66
X	Traditional Chinese medicine, Chinese materia medica, integrated Chinese and western medicine	621	34,135	11.26	736	22,050	11.51	246	8,367	12.77
Total or average		4,534	249,768	13.79	5,055	151,190	12.46	958	32,620	11.53
Direct cost per project (10,000 Yuan/project)		55.09			—			34.05		

Division I of Health Sciences

The Division mainly supports basic researches on diseases of respiratory, circulatory, and hematological systems.

Respiratory System (H01)

The Discipline mainly supports basic research focusing on the diseases of lung, airway, pulmonary circulation, mediastinum, pleura, thorax, diaphragm, as well as other related diseases. The funding areas include: respiratory system structure, function and developmental disorders; respiratory system infections, inflammation and immunity; environmental factors and airway diseases; bronchial asthma; chronic obstructive pulmonary diseases; bronchiectasis; pulmonary circulation and pulmonary vascular diseases; interstitial lung diseases; acute lung injury and acute respiratory distress syndrome; sleep disordered breathing and breathing regulation; respiratory failure and respiratory support; pleura, mediastinum, thoracic and diaphragm related diseases; respiratory intervention, tracheal reconstruction and lung transplantation, etc. The research on new methods and strategies related to respiratory diseases also falls into the funding scope.

Respiratory system diseases are a group of common diseases that severely affect human health. The Discipline of Respiratory System constantly supports the cause, mechanism, diagnosis and intervention of respiratory diseases, including their occurrence, development and prognosis, including researches on the immune function imbalance of the respiratory system, the pathological and physiological changes of the airway and lung, the lung microenvironments, alveoli and air-blood barrier, the occurrence and development of pulmonary nodules, lung stem cells and lung regeneration; supports research on pulmonary hypertension and other pulmonary vascular diseases; supports research on new methods, potential molecular markers and intervention targets for precise diagnosis and treatment of diseases. The discipline also supports studies on the environmental factors (such as air fine particles, harmful gases, smoke and allergens) induced pathophysiological changes of the airway and lung, as well as the interaction between microbiota and respiratory diseases.

Respiratory infection has currently drawn more and more attention. The Discipline also encourages applicants to study on the interaction between pathogens and hosts, and their pathogenic roles to improve clinical outcomes.

The utilization of new technology and methods plays an important role in promoting the basic and clinical research of respiratory system. The Discipline encourages applicants to focus on the use of new technology and methods, such as multi-omics analysis, mass data, animal disease models, etc., to solve the basic and clinical research questions in respiratory system.

Based on the statistical data obtained from applications received in respiratory discipline in 2021, research areas mainly focus on respiratory infections, inflammation and immunity, bronchial asthma, chronic obstructive pulmonary diseases, pulmonary circulation and pulmonary vascular diseases, interstitial lung disease, acute lung injury and acute respiratory distress syndrome, etc. The number of applications focusing on sleep-disordered breathing and breathing regulation is growing steadily, while the number of applications in other fields of respiratory system is relatively small. It should be noted that the Discipline does not accept applications related with lung cancer.

Circulatory System (H02)

The Discipline mainly supports basic researches in the growth and development, physiology, pathophysiology, and diseases of cardiovascular and lymphatic system. In recent years, the largest number of applications was in the field of cardiac/vascular injury and protection, followed by atherosclerosis, coronary heart diseases, arrhythmia and heart failure. In addition, there were numerous applications related to non-coding RNA, but the creativity and unique characteristics of those projects were insufficient. Applicants are encouraged to carry out original basic research, cooperating with clinicians, developmental and genetic biologists, regenerative medicine specialists and other related disciplines to study on the mechanisms in the development and therapeutic strategy of cardiovascular diseases. In the cutting-edge fields of cardiovascular diseases, researchers are encouraged to establish international collaborations, to propose innovational hypothesis based on their own research data, and eventually gain achievements with independent intellectual properties. Researches on the regulatory and damage mechanisms of the biological active substances on the heart and vessels are encouraged to identify the potential biomarkers for diagnosis, therapeutic targets and innovative treatment technologies. Studies on the molecular etiology, regulatory network and intervention targets of the metabolic disorder related cardiovascular diseases are encouraged, and studies as to the effects of other systemic diseases on the cardiovascular system are also encouraged. Infectious cardiovascular diseases, immune-related circulatory system diseases, microcirculatory diseases, lymphatic circulatory diseases, and tumor-related cardiovascular diseases are still the comparatively weak fields, and the relevant researches are encouraged. Studies on cardiovascular diseases in children and sex-related cardiovascular diseases need to be strengthened as well. Researches and applications of new techniques, new methods and new materials in the cardiovascular field are endorsed. The basic researches for important clinical issues in the circulatory device implantation and perioperative period of cardiovascular surgery are encouraged.

Hematological System (H08)

The Discipline mainly supports original basic and clinical based basic research of

hematopoietic tissues/organs, blood and its related diseases including hematopoiesis, hematopoiesis regulation and hematopoietic microenvironment; erythrocyte and its related diseases; leukocyte and its related diseases; megakaryocyte, platelet and their related diseases; bleeding, coagulation, fibrinolysis and thrombosis; aplastic anemia and bone marrow failure; myelodysplastic syndromes; myeloproliferative diseases; leukemia; lymphoma and lymphocytic diseases; myeloma and plasma cell diseases; infection associated with blood system diseases and its treatment; hematopoietic stem cell transplantation and its complications; immunotherapy and cell therapy for hematologic diseases; blood transfusion, blood regeneration and blood products; new technologies and methods for hematological disease research.

Hematopoiesis and its regulation, hematopoietic cell development and its abnormalities have always been the fundamental areas for hematology studies. Thus, the hematological discipline will continue to support basic and applied studies in fields of hematopoietic stem/progenitor cells, hematopoietic microenvironment, blood cell heterogeneity, abnormal hematopoietic cell development and dysregulated function, or studies that related to hematopoietic tissues and organs.

Diseases in hematological system are a type of diseases that severely affect the health of human beings. The etiology, pathogenesis, diagnosis and treatment have always been the main supportive area in hematologic research fields. The Discipline will therefore continue to encourage applicants to carry out studies of genetic and epigenetic mechanisms of the etiology of blood system diseases; hematopoietic microenvironment and the development of hematologic malignancies; cellular metabolism of hematological malignancies; precision subtyping, diagnosis and treatment, drug resistance, disease reoccurrence etc. With the new and rapid development of immunotherapies and their related mechanisms, therapeutic effectiveness and side effects, the hematological discipline will support applications in such fields. A new application code: “Immunotherapies and cell therapies for blood diseases” is added (H0814). Any basic or clinical based basic researches in this area may apply under this code. The Discipline will also support studies on HSC transplantation, basic and applied basic research using gene editing and other technologies.

Hematological ecology is a new concept proposed recently by scientists in China. It mainly refers to a balance of homeostasis in blood system under physiological condition after internal and external exchange of materials and energy. The formation of this homeostasis, maintaining mechanisms, and the prediction of major diseases when such balance is broken are the major focuses of the area. The Discipline encourages related applications in this field.

The applications about new technologies and methods have greatly advanced the width and depth of hematological researches. Thus the hematological discipline strongly recommends applicants to propose researches that use new biotechnologies

and methods to study normal or abnormal blood cells.

In view of 2021 applications in hematologic field, grants were mainly focused in three areas: leukemia, lymphoma and lymphocytic diseases, and myeloma and plasma cell diseases. The applications in other areas are relatively less. Although infection in blood system is very common under clinical setting, the application is rare. The hematological discipline encourages applicants to propose studies in these two areas: infection in blood system and its related diseases, and blood system diseases treatment and associated infection complications.

There are excellent and solid achievements of basic and clinical based basic researches in the hematological field in China. Applicants are thus encouraged to make full use of rich clinical resources in the field, to propose scientific questions derived from clinical resources, to carry out researches, including translational medical research.

For proposals involving research contents of pulmonary circulation and pulmonary vascular diseases, the applicant shall choose the appropriate application code from the respiratory system (H01) and the circulatory system (H02) according to their specific scientific fields. The Division will not support the applications of non-hematological malignancy proposals. For details, please refer to the general introduction of the Department.

Division II of Health Sciences

The Division mainly supports basic researches on digestive system, urinary system, endocrine system/metabolism and nutrition support, ophthalmology, otorhinolaryngology, head and neck science, as well as oral and craniomaxillofacial science.

Digestive System (H03)

This Discipline mainly supports researches of scientific issues related to non-neoplastic diseases of the digestive system. Supported areas include the abnormal structure, function and development of the digestive system; immune related diseases of the digestive system; dynamic anomaly of the digestive tract; gastrointestinal homeostasis disorders, mucosal barrier dysfunction and related diseases; acid-related diseases and dysregulation of neuroendocrine in the digestive system; gastrointestinal and celiac infectious diseases; hepatic metabolic disorders and related diseases; digestive system diseases caused by drugs, toxins and alcohol; inflammatory and infectious liver disease; liver injury, repair and regeneration; liver protection and artificial extracorporeal liver support; cholelithiasis and biliary tract inflammation; pancreas exocrine dysfunction and pancreatitis; organ

transplantation of the digestive system; novel technologies and methods for digestive disease research.

In 2021, the proposals in the digestive system are relatively concentrated on liver diseases related project. Liver injury, repair, and regeneration remain the most dominant research areas in this division, followed by hepatic metabolic dysfunction and related diseases, and liver inflammatory and infectious diseases. The most applied projects for gastrointestinal related diseases are inflammatory bowel disease, gastrointestinal homeostasis disorder, mucosal barrier disorder, and gastrointestinal dynamic abnormalities. The number of proposals in abnormal pancreatic exocrine function and pancreatitis continues to increase. Meanwhile, less attention has been paid on the area of acid-related diseases and abnormal neuroendocrine regulation, cholelithiasis and biliary tract inflammation, gastrointestinal and abdominal infectious diseases. Hence, the basic and clinical researches on those above-mentioned key scientific issues are suggested. The interactions between digestive system and various other organs, and the crosstalk among inside digestive system tissues, in the pathogenesis of digestive diseases are hot research areas to investigate. Moreover, the translational researches resulting into clinical applications about major digestive diseases occurring in China are also strongly encouraged.

Urinary System (H05)

This Discipline mainly supports non-tumor researches in relation of the structural and functional disorders, injury repairs, etiologies, urolithiasis and urinary tract infections of the kidney, ureter, bladder, prostate and urethra. Supported areas include the structural, functional and development disorders of urinary system, injuries and repairs of urinary system, primary kidney diseases, secondary kidney diseases, chronic kidney diseases and its related complications, hemodialyses and renal replacement therapies, kidney transplantations, urolithiasis and urinary tract infections, benign diseases of prostate and bladder, voiding dysfunction, new techniques and methods for the study of urological diseases.

The majority of the proposals are still concentrated on areas of the prevention and treatment of acute kidney injuries and chronic kidney diseases. The most applied research areas are injuries and repairs of the urinary system, followed by secondary kidney diseases, chronic kidney diseases and its related complications and primary kidney diseases. In 2021, the number of proposals related to secondary kidney diseases is markedly increased compared to 2020, while the number of proposals related to kidney transplantations, urolithiasis and urinary tract infections is similar to that in 2020. The number of applications in voiding dysfunction, the structural, functional and development disorders of urinary system, new techniques and methods for the study of urological diseases is increased slightly in contrast to

2020. However, the overall number of the above proposals is still small. More extensive and in-depth researches to these fewer application areas will be encouraged. Meanwhile, the sustainable and innovative researches in urinary system will be continuously supported in the future.

Endocrine System/Metabolic Abnormalities and Nutritional Support (H07)

This Discipline mainly supports researches on abnormalities of endocrine organ structure and/or function and relative non-neoplastic diseases. Supported areas include endocrine system immune-related diseases, pineal gland, hypothalamus, pituitary and related diseases, thyroid, parathyroid and related diseases, adrenal gland associated diseases, gonads and related diseases, physiological regulation and dysfunction of islets, imbalance of glucose homeostasis and insulin resistance in target organs, diabetes mellitus, abnormal regulation of energy metabolism and obesity, abnormal lipid metabolism, physiological regulation and dysfunction of adipose tissue, bone turnover, abnormal bone metabolism and abnormal calcium and phosphorus metabolism, amino acids and nucleic acid metabolic abnormalities, abnormal metabolism of water, electrolyte, trace elements and vitamins, acid-base imbalance, malnutrition and nutritional support, new technologies and methods in the field of endocrine system diseases/metabolic abnormalities and nutritional support.

The majority of the proposals are still centered on diabetes mellitus and its related complications, imbalance of glucose homeostasis and insulin resistance in target organs, bone turnover, abnormal bone metabolism and abnormal calcium and phosphorus metabolism, abnormal regulation of energy metabolism and obesity and abnormal lipid metabolism. The number of proposals related to autophagy, exosomes, noncoding RNA, mesenchymal stem cell and intestinal microecology is dramatically increased. However, the originality of research is still absent. There are few applications on gonads and related diseases, malnutrition and nutritional support, abnormal water metabolism, electrolyte, trace elements and vitamins, acid-base imbalance. These areas with minor applications but significant clinical research value will continue to be emphasized and supported in the future. Researches around the discovery of new phenomena, new questions in the clinic and innovative approaches/designs will be encouraged. The fields involving important clinical studies will continue to be emphasized and considered preferentially for funding in the future.

Ophthalmology (H13)

Ophthalmology supports the structure, function and visual formation of the eye and its accessory organs, as well as the occurrence, development, diagnosis and prevention of diseases in related fields. The scope includes corneal and ocular surface diseases, lens and cataract, sclera, uvea, eye immunity, glaucoma, optic

nerve and visual pathway diseases, retinal/choroidal and vitreous related diseases, vision, optometry and myopia, amblyopia and ocular muscle diseases, ocular manifestations of systemic diseases, orbital diseases, eye tissue transplantation, new technologies and methods in ophthalmology.

Among the applications in 2021, retinal/choroidal and vitreous related diseases are still the focus of research, followed by corneal and ocular surface diseases, glaucoma, optic nerve and visual pathway diseases, vision, optometry and myopia, amblyopia and ocular muscle diseases. Diabetic retinopathy, age-related macular degeneration, ametropia remain the research area of concern. We encourage interdisciplinary research focusing on clinical bottlenecks such as disease prevention, prediction, diagnosis and treatment, combined with new theories and technologies of brain science, molecular biology, information science and material science, to clarify the occurrence and development mechanism of diseases, obtain original results, promote basic research and guide clinical diagnosis and treatment.

Otorhinolaryngology Head and Neck Science (H14)

Otorhinolaryngology head and neck science supports basic researches in related fields such as morphology, physiology and pathology etc., as well as innovative technology researches on disease pathogenesis, prevention, treatment and rehabilitation. The scope includes olfactory, nasal and anterior skull base diseases, throat and neck diseases, ear and lateral skull base diseases, auditory abnormalities and balance disorders, otorhinolaryngology head and neck development related diseases, new technologies and methods of otorhinolaryngology head and neck scientific research.

Among the applications in 2021, the auditory abnormalities and balance disorders, olfactory, nasal and anterior skull base diseases, throat and neck diseases are still the focus of research. The mechanisms of hearing impairment as well as the strategies for hearing restoration are the key issues of otology, including the genetics and molecular pathogenesis of various types of deafness, and the related research of hearing impairment, remodeling and intervention. In the field of rhinology, researches mainly focus on the pathogenesis and development of rhinosinusitis and the pathogenesis and immunotherapy of allergic rhinitis. Researches on laryngopharyngeal diseases focus on respiratory disorders, phonetic disorders, and functional reconstruction. The mechanisms and interventions of auditory development and degeneration, deafness, tinnitus, hyperacusis, vertigo and olfactory disorder are the important research directions, and the interdisciplinary studies with artificial intelligence, new imaging technology, biomaterials, biomechanics, simulation technology and other fields have attracted more and more attention, and will be funded continuously. The related nerve damage, olfactory disorder, sleep breathing disorder, phonation disorder and swallowing disorder still

need to be concerned.

Oral and Craniofacial Sciences (H15)

The Oral and Craniofacial Sciences (OCS) mainly supports researches on diseases of oral organs, craniomaxillofacial soft and hard tissues, temporomandibular joint, salivary glands and other oral craniomaxillofacial related non-neoplastic tissues. Supported areas include diseases related to the development of oral craniomaxillofacial tissues and organs; the defect restoration and regeneration of oral craniomaxillofacial tissues and organs; dental pulp and periapical tissue diseases; periodontal and oral mucosal diseases; saliva, salivary glands, oral and maxillofacial, nerves and jaw benign diseases; taste, oral and maxillofacial pain, occlusion and temporomandibular joint diseases; restoration of tooth defects or missing and correction of dentognathic deformities; biomechanics and biomaterials of oral craniomaxillofacial tissues. New technologies or methods of oral craniomaxillofacial scientific research are also within the scope of funding.

The majority of the proposals are still concentrated in periodontal and oral mucosal diseases, followed by the defect repair and regeneration of oral cranio-maxillofacial tissues and organs. Restoration of tooth defects or missing and correction of dentognathic deformities, biomechanics and biomaterials of oral cranio-maxillofacial tissues, and dental pulp and periapical tissue diseases are also attracting attentions and the number of applications in each field is similar. The number of applications in saliva, salivary glands, oral and maxillofacial vessels and nerves and jaw benign diseases and new technologies or methods of oral craniomaxillo-facial scientific research is relatively small. The field of osteogenesis still receives more attention, especially the stem cell-induced osteogenesis mechanism and the material modification and osseointegration of oral implants. Oral microecology, digitization and artificial intelligence, bionic materials and 3D printing are also involved. We encourage long term and systematic Basic-research or applied-basic-research that already has a good foundation or new investigation direction. The interdisciplinary researches between different directions of stomatology or with other related research fields will be encouraged in the future.

The Division does not support cancer research. Please refer to the general introduction of proposal guidance from Department of Health Science in detail. The Division does not support the research on drug design and pharmacology as well. Please submit the related proposals to Division IX of Health Sciences (H34, H35). Proposals on the male reproductive system and male sexual dysfunction are not included in code H05. Please submit related proposals to Division IV (H04).

Division III of Health Sciences

The Division mainly supports basic research in the fields of nervous system, mental health, and geriatrics.

Nervous System (H09)

The Discipline mainly provides funding support for researches on the etiology, pathogenesis, diagnosis, treatment, and prevention of various non-neoplastic neurological diseases, including common neurological diseases, e.g., cerebrovascular diseases, cognitive dysfunction, neurodevelopmental disabilities, injury and rehabilitation of nervous system, neurodegenerative disorders, epilepsy, pain and analgesia. The Division also supports projects on neurobiological mechanism and intervention of anesthesia and sedation, and comorbidity of neurological diseases and psychiatric disorders.

In recent years, funded projects in the field of nervous system predominantly have focused on cerebrovascular diseases, cognitive dysfunction, injury and rehabilitation of nervous system, pain and analgesia, in which there is a significant increase in applied projects from the perspectives of glia, non-coding RNA, neural cell-fate, exosomes, and microecology. However, most of the applied projects were follow-up studies and/or lack of novelty. The Division prioritizes the innovative basic research on important scientific issues originated from clinical phenomena and clinical problems, interdisciplinary studies using non-human primates, drosophila, zebrafish animal models and/or mankind organoid models, and the critical techniques and mechanisms of strengthening neural modulation to promote the recovery of nerve function after injury. Investigations on cerebrovascular diseases around clinical concerns are encouraged, especially on key mechanisms, early intervention, functional reconstruction and precise diagnosis and treatment of neurovascular injury. Basic and clinical collaborations need to be strengthened in researches on pain biology, especially on the mechanisms and intervention of chronic pain, the transition from acute to chronic pain and neuropsychiatric comorbidity of pain. It is encouraged to strengthen the basic research on the mechanisms of general anesthesia and anesthesia-related complications. Investigations on related diseases of the nervous system in children are encouraged. In addition, substantial collaborative researches in clinical/basic medicine and materials, bioinformatics or artificial intelligence are also encouraged.

Mental Health and Psychological Health (H10)

The Discipline mainly provides funding support for related investigations on the etiology, pathogenesis, diagnosis, treatment, and prevention of psycho behavioral disorder, including common psychiatric diseases (e.g., anxiety disorder, depressive

disorder, schizophrenia), as well as sleep disorders, drug dependence and other addictive disorders, stress-related disorders, neurodevelopmental disorders, psychological assessment and intervention of psychiatric disorders, and new technique/method used for the research of psychiatric diseases and psychological health.

In recent years, the prevalence of psychological and psycho behavioral disorders increased rapidly. Projects funded in the field of mental health predominantly focused on depressive disorder, anxiety disorder, and schizophrenia, less in related diseases of biological rhythm disorders and psychological assessment/intervention for psycho behavioral disorders. The research foundation in the field of mental diseases in children and adolescents is relatively weak. It's encouraged to investigate the role of genetic, environmental and other multiple factors in the occurrence and development of psycho behavioral disorders, to identify potential etiologies and interventional targets, to establish biological markers that can monitor the occurrence, development and prognosis of psychological disorders and mental diseases, to optimize psychological and behavioral examination techniques, and to achieve the early detection and diagnosis of psychological disorders and mental diseases. It will be strengthened for researches on the comorbidity of mental diseases and its impact on physical health. The interdisciplinary collaboration between psychiatry and other disciplines are also encouraged, aiming at improve the diagnosis and treatment of psychological disorders and mental diseases through early intervention and treatment utilizing pharmacological or non-pharmacological strategies in China.

Gerontology (H19)

The Discipline mainly provides funding support for investigations on the pathophysiological mechanism of aging and aging-related diseases, the pathophysiological changes, mechanisms and biomarkers of aging at organ, tissue, cells, subcellular and molecular levels for elucidating the relationship between aging of tissues/organs, occurrence of aging related diseases and other factors (e.g., genetic, metabolic, injury, stress and inflammation). It is encouraged to utilize new techniques, methods and models to carry out researches on aging and aging-related diseases, and cross-research with other disciplines, as well as investigations on the molecular mechanisms of delaying tissue and organ aging with calorie restriction, exercise and small molecule chemicals, to provide theoretical basis for the prevention, early warning, diagnosis, treatment and prognosis of aging related diseases.

The Division does not provide funding support for tumor related projects, for which please refer to the general introduction of the Department of Health Science. The field of gerontology does not fund project applications for geriatric diseases of various organs or systems unrelated to the aging mechanism, for which please select other corresponding applicant codes.

Division IV of Health Sciences

The Division mainly supports basic and translational research in the areas of reproductive system/perinatal medicine/neonatology, medical immunology and medical genetics.

Reproductive System/Perinatal Medicine/Neonatology (H04)

Funding mainly supports basic and translational research on structure/function/development abnormalities, injury and repair, inflammation and infection, endocrine abnormalities and related diseases of the reproductive system, the mammary structure/function/development abnormalities, sexual dysfunction, gametogenesis and fertilization, embryo implantation, maternal-fetus interaction, reproductive immunity and related diseases, placental structure/function and development abnormalities, pregnancy related diseases, assisted reproduction, fetal development and fetal diseases, neonatal diseases, and development of novel techniques on diagnosis and treatment for diseases of reproductive system and neonatus.

Novel multidisciplinary technology platform is encouraged to study the development of human germ cells and reproductive organs, damage, remodeling and fertility protection of human reproductive organs, the principle and abnormalities of human sperm-ovum recognition, fertilization and early embryonic development, regulation of pregnancy establishment and maintenance and the pathogenesis of related diseases; the effects of maternal, intrauterine and extrauterine environment on the pregnancy outcome and descendant health; the novel mechanisms, diagnosis and treatment strategy of neonatal diseases; assisted reproduction and related safety evaluations based on the advances in regenerative medicine, organoid and artificial intelligence. It is encouraged to condense the scientific questions from clinical practice and to carry out original and translational research by means of the abundant clinical resources in China. The novel research paradigm is needed to be established in the study of reproductive medicine, perinatal medicine and neonatology by interdisciplinary cooperation.

In 2021, the Discipline received a total of 2,867 proposals for General Program, Young Scientists Fund, and Fund for Less Developed Regions, among which application codes concentrated as following: Pregnancy Related Diseases (H0417), Neonatal Diseases (H0421), Female Reproductive Endocrine Abnormalities and Related Diseases (H0411), Spermatogenic Abnormalities and Male Infertility (H0405), Damage and Repair of Female Reproductive System (H0409), etc. The following research areas are suggested to be concerned: pubertal initiation, pathogenesis of perimenopause related diseases, inflammation and infection of reproductive system,

mammary development abnormalities and perinatal breast disorders; the effect of maternal nutrition, environmental and genetic factors on pregnancy outcomes and descendant health; physiology of parturition and abnormal labor, early diagnosis and treatment of congenital defects; the neonatal acute diseases, critical care, chronic organ damages and neonatal nutrition, etc. The following deficiencies existed in the proposal application: the proposals' scientific hypothesis cannot be supported by the weak preliminary experimental basis or is just derived from literatures; the research contents of some projects lack in-depth mechanism research; a few of projects are descriptive, imitative and programmatically designed without novelty.

The field of Reproductive System/Perinatal Medicine/Neonatology (H04) does not support the research related to tumor.

Medical Immunology (H11)

Funding mainly supports basic and translational researches on the structure, function, dysplasia of immune system including immune organs, tissues and cells, and researches on the immunological mechanisms of diseases, as well as immunodiagnosis, immunotherapy and immunoprophylaxis strategies.

The Discipline encourages innovative researches on important immunological scientific issues of human immune-related diseases, including the development, differentiation, residence, senescence and death of immune cells; the identification and function of novel immune cell subtypes; the immunological functions of non-immune cells; the structural basis and activation of immune recognition; the dynamic balance of immune protection and immune injury in immune response; the mechanism of immune tolerance and evasion; the formation and maintenance of immune memory; the epigenetic/metabolic regulation in immune response; microbiota and immune system; the interaction among neural, endocrine and immune system; the crosstalk of trauma, stress and immunity; the mechanism and novel targets of immunotherapy; and the new vaccines and adjuvants. It is advised to investigate the immunological mechanism, diagnosis and intervention strategies in infectious diseases, autoimmune diseases, cancer, organ transplantation and other systemic diseases using immunology theory and technology. The Discipline also encourages interdisciplinary researches between immunology and synthetic biology, biomechanics, nanoscience, bioinformatics, etc., and the in-depth studies of immune homeostasis and immune response by using new technologies such as imaging and single-cell sequencing, etc. It also encourages the summary of immunological scientific assumptions from previous research and clinical practice, the exploration of the immunological spectrum of severe human diseases, and the innovative researches based on clinical practice.

In 2021, the Discipline received 1375 applications for General Program, Young Scientists Fund, and Fund for Less Developed Regions, among which application codes concentrated as following: Autoimmune Diseases (H1107), Inflammation,

Infection and Immunity (H1104), Immunotherapy and its Mechanisms (H1112), Organ Transplantation and Transplantation Immunity (H1105), Vaccines and Immunoprophylaxis (H1111), etc. The following deficiencies existed in the proposal application: the experimental basis of some research projects was weak and insufficient to support their scientific assumptions; the research contents of some proposals were limited to the description of the phenomenon and lack in-depth investigation of underlying mechanism.

Medical Genetics (H23)

The Discipline mainly supports research on the pathogenesis, diagnosis, prevention and treatment of human genetic diseases and rare diseases, as well as development of new technologies and methods in medical genetics.

It is encouraged to identify new pathogenic genes, study the pathogenic mechanisms of gene structure, function and mutations, clarify the epigenetic mechanisms of genetic diseases, explore new genetic diseases and their genetic principles. It is advised to excavate and make full use of the resources of rare diseases in China, and to carry out basic research in depth in the fields of resource protection, pathogenic mechanisms, diagnosis, treatment and prevention for rare diseases. The Discipline encourages the research on the etiology, pathogenic mechanism, and diagnosis and treatment methods of undiagnosed diseases. It is encouraged to employ multidisciplinary techniques including bioinformatics, computational and structural biology to perform cross-research on human genetic and rare diseases.

In 2021, the Discipline received 439 proposals in total for General Program, Young Scientists Fund, and Fund for Less Developed Regions. The following deficiencies existed in the proposal application: the proposals' scientific hypothesis cannot be supported by the weak preliminary experimental basis or preliminary analysis of clinic data; the research contents of some proposals only screen pathogenic gene or mutation without in-depth mechanism research.

Division V of Health Sciences

The Division mainly supports basic research and basic clinical research in the fields of special medicine, forensic medicine, medical imaging/nuclear medicine and biomedical engineering/regenerative medicine.

Special Medicine (H24)

Special Medicine is aimed at the unique medical support needs under special environments (aviation, aerospace, navigation, deep diving, plateaus, polar regions, etc.), studies and solves various special medical problems, and provides theoretical and technical support for major national strategic needs. These studies will aim at

understanding the physiological and pathological changes and related mechanisms on the molecular, cellular, tissue, organ and organism levels, and revealing the regulatory mechanism of the body's adaptive changes and pathological damage under the special environment, as well as the key factors of the body's tolerance to extreme environments. On this basis, the research on risk prediction, body damage assessment under special environments and novel protection technology are carried out. Special medicine mainly supports researches on pathophysiological changes and prevention methods of related disease in special or extreme environments such as weightlessness, hyper gravity, radiation, hypoxia, high pressure, high temperature, high humidity, high cold, and small confined space. It is encouraged to apply physics, chemistry, biology and biomedical engineering in the above-mentioned fields, to carry out in-depth and systematic research on specific medical problems under extreme environments, and to explore new theories and techniques for maintaining and enhancing body functions and physical fitness under special environmental conditions. Integration of different directions within special medicine and interdisciplinary research are also encouraged.

Forensic Medicine (H25)

The Discipline mainly funds technical and theoretical researches aiming at solving the medical problems in the judicial practice, using human body and other related forensic biological samples/materials as research object. The funding fields mainly include identification of complex cause of death; estimation of postmortem interval; mechanisms and forensic biomarkers of stress injury and death; novel methods for evaluation of head injury by deep learning technology; mechanism and assessment of personal injury caused by environmental pollution; toxicant (drug) abuse and dependence; toxicant metabolism and analysis; automatic identification of damage mechanism and damage area by artificial intelligence; multi-omics combined with artificial intelligence to estimate dating of wound; objective evaluation of mentally disabled people's capacity and responsibility; individual identification of difficult samples, complex parentage testing, tissue source identification and ethnic origin inference; multi-omics identification of identical twins, single-cell sequencing and identification of mixed stain; and basic theory and application research on forensic epigenomics. Applications of theories and technologies in other disciplines such as medicine, biology, genetics, physics, chemistry, law, psychology, and information science are encouraged in the aforementioned fields to conduct in-depth and systematic research on forensic science issues. Interdisciplinary studies between forensic medicine and other disciplines such as medical imaging and biomedical engineering are strongly encouraged.

Medical Imaging/Nuclear Medicine (H27)

The Discipline mainly funds the researches on medical imaging and the ones on using imaging methods to solve medical-related problems. The scope of funding

includes: diagnostic radiology (such as conventional X-ray imaging, computed tomography and magnetic resonance imaging), ultrasound medicine, nuclear medicine, interventional medicine and other disciplines. The Discipline encourages multidisciplinary exploratory research in the fields of multimodal cross-scale imaging, molecular imaging, functional imaging, intelligent imaging, precise intervention, integration of diagnosis and treatment, and related frontier sciences of translational medicine. The Discipline supports the development and application of new imaging technologies in the researches on pathogenesis, early diagnosis, treatment planning and monitoring, efficacy and prognosis evaluation and drug screening of various diseases. The Discipline encourages the basic exploration and per-clinical application researches on optical imaging and biological electromagnetic imaging, and focuses on the translational application potential of various imaging probes.

Biomedical Engineering/Regenerative Medicine (H28)

Biomedical engineering is the application of engineering principles and design concepts to biology and medicine for the purpose of improving diagnosis and treatment of clinical diseases. This field mainly involves cross-disciplinary activities that integrate knowledge from electronic information, instrument science, material science and biomedicine. The Discipline mainly funds basic research related to medical electronic engineering, regenerative medicine, and nanomedicine for the prevention and early warning, detection and diagnosis, treatment and rehabilitation of clinical diseases. The funded programs are expected to target directions in biomedical signals and images, biomedical sensing, biomedical photonics, micro-nano systems, biomedical system modeling and simulation, medical information systems, brain-computer interaction, neural engineering, rehabilitation engineering, and treatment planning and navigation, medical robots, biomedical instruments and medical devices, gene and drug carriers and delivery systems, medical biological materials, tissue engineering and regenerative medicine, artificial organs, etc. Top-notch interdisciplinary research for the development of novel methods, systems and mechanisms in biomedical materials and nanoparticles with the potential to translate into real-life healthcare settings is encouraged.

In 2021, the total number of the applied programs including General Programs, Young Scientists Fund and Fund for Less Developed Regions reaches 4916 in special medicine, forensic medicine, medical imaging/nuclear medicine, and biomedical engineering/regenerative medicine. To promote the development of special medicine, forensic medicine, medical imaging/nuclear medicine, and biomedical engineering/regenerative medicine, the Discipline encourages collaboration of interdisciplinary researchers to conduct cross-sectional studies to advance medical optical imaging, bioelectromagnetics imaging and physical therapy. The Discipline also emphasizes clinical application and the transformation of clinical outcomes of

imaging probes, nanomedicine and biomedicine materials. Special support would be given to young scholars who conduct research with high originality in the above-mentioned fields.

Regarding medical imaging/nuclear medicine and biomedical engineering/regenerative medicine, this Division does not accept applications on radiation oncology or radiation prevention, which should be submitted to related codes in Division VII (H18) or Division VIII (H29). This Division does not support applications in pharmacology and drug administration, which instead should go to related codes in Division IX (H34, H35).

Division VI of Health Sciences

The Division mainly supports basic research in the fields of locomotor system, emergency and critical care medicine, trauma, burns, plastic surgery, rehabilitation medicine, medical virology and viral infection, medical pathogen and infection, and laboratory medicine.

Locomotor System (H06)

The field of locomotor system mainly supports the research on the abnormalities in structure, function and development of the bone, joint, muscle, ligament, and related nerve, blood vessel and other tissues, and the research in the etiology, pathogenesis, diagnosis, prevention and cure of the musculoskeletal diseases including the immune-related diseases, inflammation and infection, injury and repair, grafting and reconstruction, fatigue and recuperation, degenerative disorders, sport injury, deformity and correction. Meanwhile, the researches on the emerging scientific issues such as medical biomaterials and artificial intelligence in musculoskeletal fields are highly encouraged. In 2021, applications were mainly focused on the research fields in the musculoskeletal damage and repair, and the degenerative diseases of bone, joint and soft tissue, among which, arthritis, intervertebral disc degeneration, fracture, and bone healing are the hot topics of locomotor system. In contrast, applications in musculoskeletal fatigue and recuperation, and the infection-related diseases were found low in quantity. This field encourages the innovative and translational research based on clinical needs, the systematic and original research on major scientific issues in locomotor system, the interdisciplinary research using new techniques and methods, the cross-talk research between locomotor system and other organs and tissues, and the mechanism research of aging and pain in locomotor system.

Emergency and Critical Care Medicine (H16)

This field mainly supports researches on new theories, technologies and methods in the field of emergency and critical care medicine including sepsis, organ function

failure and support, cardiac-pulmonary resuscitation, poisoning, and heat stroke. The pathogenesis, accurate diagnosis and treatment and scientific prevention in the field of emergency and critical care medicine are highly focused. Meanwhile, researches on pathophysiological changes, systems biological changes and immune dysfunction in this field are also encouraged.

Trauma/Burns/Plastic Surgery (H17)

This field mainly supports researches on trauma, burns and chimatlon, wound healing and scar management, surface tissues and organs malformation, injury and repair, regeneration, transplantation and reconstruction of surface tissues and organs, craniomaxillo-facial deformity and its correction, new technologies and methods in the field of trauma/burns/plastic surgery. The pathogenesis, accurate diagnosis and treatment and scientific prevention in the field of trauma, burns, chimatlon and malformation should be paid more attention. Meanwhile, researches on the following aspects including injury mechanisms, prevention and treatment of complications of trauma, burns and chimatlon, tissue repair and function reconstruction, wound healing, scar prevention and treatment, repair of body surface tissue and organ deformity and defect, reconstruction and reengineering are highly encouraged.

Rehabilitation Medicine (H20)

The field of rehabilitation medicine mainly supports the research on the rehabilitation mechanism of structural abnormalities, dysfunction, activity and participation limitations caused by common disorders of neural, musculoskeletal, circulatory, and respiratory systems, and the researches on the basic scientific issues related to the evaluation and treatment of rehabilitation. At the same time, the effects and mechanisms of kinesiotherapy, physical factors, occupational therapy and speech therapy should be paid more attention. This field also encourages interdisciplinary and original basic research surrounding the rehabilitation of dysfunction to meet rehabilitation needs and the exploration of new techniques and methods in the treatment and evaluation of rehabilitation.

Medical Virology and Viral Infection (H21)

This field mainly supports researches on diseases caused by medical viruses and their infections, including respiratory viruses and infections, digestive tract viruses, picorna viruses and infections, hepatitis viruses and infections, retroviruses and infections, herpes viruses and infections, arboviruses and infections, hemorrhagic fever viruses and infections, human papilloma virus, rabies virus, parvovirus, prion and other viruses and infections, and the new technologies and new methods of medical virology and viral infection. The main focus is on etiology, pathogenic feature, virus-host interaction, and pathogenesis. With the guarantee of ethics and biosafety, it is encouraged to related researches on highly pathogenic infectious diseases, highly

transmissible virus infections and other rare viral infections.

Medical Pathogens and Infection (H22)

This field mainly supports researches on diseases caused by non-viral pathogens and their infections, including pathogenic bacteria and infections, pathogens fungi and infections, parasites and infections, mycoplasma, chlamydia, rickettsia, spirochetes and infections, infectious diseases and vectors, mutation and drug resistance of pathogens, hospital-acquired infections, sexually transmitted diseases, and the development of new technologies and methods for the study of infectious diseases. It is focused on genetic variation and evolution of pathogens, and molecular mechanisms of drug resistance and pathogen-host interactions mechanisms. With the guarantee of ethics and biosafety, it is encouraged to related research on emerging infectious diseases, tropical diseases and other rare infectious diseases.

Laboratory Medicine (H26)

This field mainly supports researches on biochemical test, microbiological analysis, cytological examination, hematological examination, immunological test, molecular biology test, and new technologies and methods in the field of laboratory medicine. Researches on new theories, new technologies and applications of rapid and accurate inspection, and discoveries and identification of new biomarkers of diseases should be paid more attention. The laboratory medicine researches on interdisciplinary researches coupled with chemistry, physics, material science, biosensing and artificial intelligence are highly encouraged.

In the fields of Medical Virology and Viral Infection (H21) and Medical Pathogens and Infections (H22), the Department of Medical Science can provide one high-intensity General Program funding per field which supports researches on highly pathogenic microorganisms mainly up to the biosafety level-3 laboratories or higher level.

The fields of **Locomotor System (H06)**, **Emergency and Critical Care Medicine (H16)**, and **Trauma/Burns/Plastic Surgery (H17)** do not support the oncology-related research, please select the appropriate secondary application code under Oncology (H18). **The field of Rehabilitation Medicine (H20)** neither supports research that is not directly related to rehabilitation mechanism, evaluation and treatment, nor funds the projects of rehabilitation engineering and rehabilitation of traditional Chinese medicine. For research only involved in the pathological mechanism occurrence and development of diseases, please select application codes of the corresponding systems. For applications related to rehabilitation engineering and rehabilitation of traditional Chinese medicine, please select the corresponding secondary application codes under Biomedical Engineering/Regenerative Medicine (H28) and Traditional Chinese Medicine (H31). **The field of Laboratory Medicine (H26)** does not support research on pathogenesis and regulation pathways of diseases,

or clinical laboratory reference system and standardization. In addition, for the applications **related to genetic resources, ethics, and highly pathogenic microorganisms**, please refer to the general introduction of the Department of Health Sciences.

Division VII of Health Sciences

The Division mainly supports oncology research.

Oncology (H18)

Oncology research seeks to understand the mechanisms of tumorigenesis, development and outcome and the science and technology for tumor prevention, diagnosis and treatment. It emphasizes to decipher cancer etiology and molecular mechanisms governing tumorigenesis and development and investigate the strategies for tumor prevention, diagnosis and treatment.

Oncology research encompasses basic, translational, and clinical research. For proposals related to basic scientific questions including mechanisms of tumor development, progression and outcome, applicants should select corresponding application codes for Tumor Etiology, Tumorigenesis, Tumor Cell Fate, Tumor Genetics/Evolution, Tumor Epigenetics, Tumor Immunology, Tumor Metabolism, Tumor Microenvironment, Tumor Recurrence/Metastasis, Cancer Stem Cells, and Interdisciplinary Research of Cancer (H1801 ~ H1811). For proposals related to translational research and clinical applications, including tumor prevention, diagnosis, and treatment, applicants should choose corresponding application codes for Tumor Prevention, Diagnosis, Chemotherapy, Targeted Therapy, Radiotherapy, Physical Therapy, Immune Therapy, Biological Therapy, Comprehensive Treatment, Treatment Resistance, and Rehabilitation and Oncology study focusing on Distinct Clinical Characteristics, Big Data and Artificial Intelligence, Clinical Translation of Oncology Research and New Technology and Methods in Oncology Research (H1812~H1826).

Oncology research is one of the most active fields in medical science. With the constant deepening understanding of tumor, there are some emerging features and trends in this field. (1) The paradigm of cancer research switches from a micro and local view to a macro and systemic view. Thus, instead of focusing on molecular and cell levels alone, oncology research is extending to tumor microenvironment, macroenvironment and emphasizes to study the interactions between tumors and the whole human body by comprehensive investigation layer by layer at molecular, cellular, tissue, organ and systematic levels. (2) Due to the biological nature and complexity in the law of development for tumor, multidisciplinary integration becomes increasingly important in cancer research. Advanced techniques from other frontier

fields have been increasingly introduced in tumor diagnosis and treatment. Thus, paradigm of oncology research switches from a model mainly based on medicine and life science toward a new one which is featured by cross-integration and coordinated development of multi-disciplines. The new paradigm emphasizes the employment of interdisciplinary methods, including life science such as molecular structure, signal pathways, animal models, bioinformatics, as well as clinical medicine, preventive medicine, radiology, materials science, big data and artificial intelligence technology, mathematics, physics, chemistry, etc., to promote the systematic advances in oncology research. (3) Advance in oncology research increasingly depends on close cooperation of basic research and clinical practice. On one hand, due to insufficient understanding of the nature of tumor, there is a lack of effective prevention, diagnosis and treatment methods in clinic. On the other hand, the diversity and complexity of tumor clinical features, as well as treatment responses, continue to raise new scientific questions for basic research. A high degree of integration of clinical and basic research activities should be strengthened to foster innovation in the development and clinical application of basic research. (4) Additionally, the exploration of cancer research continues to integrate the concepts, models, and practical experiences of traditional medicine in the world to evoke a comprehensive and complementary model of modern medicine and traditional medicine. Thus, clarifying the effectiveness, safety and mechanism of traditional medicine in tumor prevention, diagnosis and treatment become one of the important directions of oncology research.

The genesis and progression of tumor is a complex multi-level, trans-scale and intertwined process. It requires close cooperation of multidisciplinary investigators, as well as integration of basic research and clinical practice, to unveil the so-called mesoscopic structure and law of evolution and regulatory mechanisms of tumor that between the unit scale and the system scale from different points and multiple layers, and to define the interactions and boundary conditions inside and outside the system, as well as the connections between multiple layers. A new paradigm of oncology research helps to change the understanding of mechanisms governing tumorigenesis and progression, prompting the development of more effective approaches for tumor prevention, diagnosis and treatment.

Applicants are encouraged to discover and refine scientific questions from preliminary research and clinical practice, to deeply and systemically investigate the mechanisms of malignant tumors, and to launch basic research intending to improve the clinical diagnosis and treatment and to translate for clinical practice, as well as to develop multidisciplinary techniques and new methods for oncology research. It is also encouraged to take advantage of the clinical resources in China to launch basic research organically combined with clinical practice and studies focusing on common and frequently-occurring tumors or rare cancers in Chinese population. In order to realize the early diagnosis and treatment of tumor, applicants are also encouraged to

integrate resources and methods to innovate the research for the strategies of tumor prevention, diagnosis and treatment.

Notice:

(1) For biomedical studies related to human and animals, applicants must provide ethic approval from medical and animal ethic committees from their institution or supervisor department (PDF version should be attached). Application without above-mentioned proof will not be supported.

(2) For proposals focusing on rare tumors, special population tumors including children, elders, pregnant women etc., common tumors with special clinicopathological characteristics and other special tumor types, applicants should select research fields under the corresponding application codes for Research of Tumor with Special Clinical Characteristics (H1823). For endocrine treatment research, applicants should select corresponding research fields under the Tumor Chemotherapy code (H1814).

Applicants should note that the proposals on tumor epidemiology should be submitted to Division VIII (H30), and proposals on hematologic and lymphatic system tumors should be submitted to Division I (H08).

Division VIII of Health Sciences

The Division mainly supports the basic research in fields of dermatology, radiation medicine and preventive medicine.

Dermatology (H12)

The funding scope of the Discipline includes: basic research on the abnormal structure, function, and development of skin and its appendages, as well as immune-mediated, infectious, hereditary, metabolic, traumatic, and physicochemical skin diseases. In recent years, the results of the project application show that the level of basic research on skin-related diseases has improved rapidly, especially on skin and its appendages. The basic research on epidemiological, diagnostic and therapeutic techniques and methods as well as the relationships between the skin and systemic diseases should be strengthened. Interdisciplinary and integrated research involving life science, physics, chemistry, computer science, and other disciplines should be encouraged.

In the field of dermatology, oncology-related research is not funded, which should be applied to Division VII (H18).

Radiation Medicine (H29)

The funding scope of the Discipline includes: basic research on radiation injury

and intervention, radiation toxicology and radiopathology, radiological hygiene and protection. In recent years, the number and quality of funded projects indicate a great progress made in scientific research and some studies have reached the international advanced levels, although the volume of the researchers engaged in radiation medicine is small. While the funded projects mainly focus on radiological injury and intervention, basic research on early diagnosis and prevention of radiation damage should be further strengthened. The Discipline attaches importance to the biological effects of low-dose radiation and radiation-induced bystander effects, encourages the fundamental research of medical radiobiology, promotes the establishment and development of a completed discipline system.

In the field of radiation medicine, the proposals on cancer radiotherapy are not funded and may refer to categories under Division VII (H18), while those on medical imaging and radiological diagnosis are also not supported, which should refer to categories under Division V (H27).

Preventive Medicine (H30)

The funding scope of the Discipline includes: basic research on environmental hygiene, occupational health and diseases, food hygiene, human nutrition, children and adolescent health, maternal and child health care, hygienic toxicology, hygienic analytical chemistry, infectious disease epidemiology, epidemiology of non-communicable diseases, epidemiological methods and health statistics, behavior/psychological factors and health, endemiology, and new technologies and methods of preventive medicine research. In recent years, the number and quality of funded projects indicate that the level of basic research related to preventive medicine is in a steady upward trend. Expanding disciplinary fields and research directions is an inevitable requirement for the development of preventive medicine. Interdisciplinary and integrated research needs to be further strengthened, and the combination of laboratory mechanism research and population research is encouraged.

Food Hygiene (H3004) does not support the study on food processing, which should be submitted to relevant divisions of Life Science (C20).

Proposals about gynecologic diseases and pediatric diseases are not accepted in the field of Maternal and Child Health Care (H3005), or Children and Adolescent Health (H3006). The former may refer to categories under Division IV (H04), and the latter depends on the classification of diseases.

Proposals on drug toxicology are not supported by Hygienic Toxicology (H3007), which may refer to categories under Division IX (H35).

Research on clinical tests is not included in the category of Hygienic Analytical Chemistry (H3008), which may refer to categories under Division VI (H26). Pharmaceutical analyses excluded from H3008 may refer to Division IX (H34).

The category of Epidemiology (H3009, H3010) does not fund purely laboratory research projects that are non-population-based. Proposals about health economics and policy, hospital administration, and other health management-related proposals are not accepted in Epidemiology of non-communicable disease (H3010), which may refer to related categories under the Department of Management Science. Proposals on non-population-based studies of pure etiology, treatment, and prognosis will not be accepted in Epidemiology of Infectious Diseases (H3009), which should refer to other relevant codes of the Department.

Non-population-based studies of clinical and experimental research on psychosocial diseases will not be accepted in Behavioral/Psychological Factors and Health (H3012), which should refer to the relevant application code of other divisions.

Disease proposals without geographical features are not accepted under the category of Endemiology (H3013). For related applications, please select the application code of the relevant disease system.

Division IX of Health Sciences

The Division IX of Health Sciences mainly supports basic researches in the discipline of materia medica and pharmacology targeting human diseases.

Materia Medica (H34)

The funding scope of Materia Medica in the Division covers research areas or sub-disciplines including synthetic medicinal chemistry, medicinal chemistry of natural products, microbial drugs, biotechnological drugs, marine drugs, special drugs and rare disease drugs, drug design and informatics, pharmaceuticals, pharmaceutical materials, pharmaceutical analysis, drug resources, etc.

The discipline of materia medica puts emphasis on interdisciplinary researches, basic researches of innovative drugs and druggability. Funding in synthetic medicinal chemistry focuses on the research of active molecules based on new targets, new mechanisms or new structures, and generally does not support the simple optimization research of active compounds for known targets. Funding in medicinal chemistry of natural products and microbial drugs mainly supports innovative theories, technologies and approaches for drug discovery from plants, animals and microorganisms. Funding in biotechnological drugs mainly supports researches on innovative biotechnologies or approaches to obtain biotechnological drugs including therapeutic antibodies, vaccines, proteins, nucleic acids, carbohydrates and cells etc; meanwhile, exploratory researches on new types of expression systems and large scale culture techniques will also be

supported. Funding in marine drugs mainly supports chemical, pharmaceutical and ecological researches of rare marine creatures and marine microorganisms from deep sea. Funding in special drugs and rare disease drugs supports drug researches involving special environments and rare diseases. Funding in drug design and informatics mainly supports researches on innovative theories, approaches, or software systems for drug design and drug ability prediction, and meanwhile, on the discovery and structural optimization of completely new chemical structures of hit molecules. Funding in Pharmaceutics mainly supports researches on innovative theories, technologies and methods, in physical pharmacy, biopharmaceutics, molecular pharmaceutics, industrial pharmacy, novel drug pharmaceutical dosage forms and delivery systems. Funding in pharmaceutical materials mainly supports basic researches on the establishment and safety evaluation of new pharmaceutical excipients and carriers, focusing on special pharmaceutical functions and structures distinguished from researches in the area of pharmaceutics. Funding in pharmaceutical analysis mainly supports basic researches on the establishment and development of innovative approaches and techniques for analysis of the pharmaceutical molecules, drug targets, the *in vivo* effector molecules, and the interaction between drug molecules and target molecules or effector molecules to solve key scientific questions in the fields of materia medica and pharmacology, and supports integrated investigations on the novel techniques for multi-omics with the important scientific problems of drug targets and biomarkers. Funding in drug resources mainly supports researches on key scientific problems associated with discovery, exploration, sustainable utilization and protection of new pharmaceutical resources.

Pharmacology (H35)

Funding in the Discipline of pharmacology supports researches on target discovery and validation, drug action mechanism or drug resistance mechanism, drug metabolism and pharmacokinetics, clinical pharmacology and drug toxicology etc. The involved drugs should be therapeutic drugs, drug candidates or bioactive substances with some advantages in treatment of diseases.

The Discipline of pharmacology puts emphasis on in-depth study of action mechanism of drugs or bioactive products and their targets, exploring the basic rule of life and the pathologic mechanism of disease by using drug molecules as probes. In-depth and systematic studies should be strengthened in proposals related with research fields as below: discovery and validation of new targets, disease-specific and sensitive biomarkers, discovery of new pharmacological actions of drugs or bioactive compounds and elucidation of their action mechanisms, strategies and methods to effectively overcome multi-drug resistance, new targets, novel drugs and new strategies of drug combination based on pharmacogenomics, epigenetics, systematic biology, etc. Basic research should be strengthened in proposals as below: molecular

regulatory network of complex diseases or emerging infectious diseases and mechanisms of drug intervention, individualized drug therapy and new treatment approaches, translational medicine, innovative pharmacological models, techniques and approaches. In the sub-discipline of drug metabolism and pharmacokinetics, new approaches and new models should be constructed and developed to strengthen the integrated researches on the drug target, pharmacodynamics, toxicology, clinical medication and drug intervention, and the regulation mechanism researches on the drug-metabolizing enzymes and transporters. In the sub-discipline of clinical pharmacology, the researches should focus on the exploratory research of individualized medication and the interaction between drugs and human body, and lay more emphasis on rational administration of special community such as children, pregnant women and the highest-risk population, etc. In the sub-discipline of drug toxicology, researches should be strengthened in the fields as below: molecular mechanism, intervention strategy to drug toxicity, mechanism on metabolite toxicity, novel models and approaches for drug safety evaluation, and systematic toxicology. In view of translational pharmacology, the research should focus on the new mechanisms and new applications of commercial available drugs.

Innovative fundamental research and continuous in-depth projects will be supported with priority. Because translational medicine is of far reaching significance in improving clinical application value of basic research, laboratory basic research on discoveries of new drugs, clinical therapeutics and diagnostics will be strengthened to identify new targets for drug therapy, new biomarkers for disease diagnostic in the course of exploring the mechanisms on occurrence and development of diseases, furthermore, to lay theoretical and experimental foundation for developing innovative drugs and diagnostic reagents with independent intellectual property.

To the innovative basic research with a great prospect for new drug development, the entire chemical structures or backbone of compounds should usually be provided in application, but the applicants should pay special attention to the protection of intellectual property and carefully handle the relationships between application and secrecy. Confidential core contents or techniques, which are not suitable to illustrate or describe in proposals such as chemical structures, should be sent directly to the office of Division IX by confidential letters and explained in proposals. The young scholar should ask for the consent of the supervisor and attach the authorization letter signed by the supervisor with the proposal, if the research proposal is closely related to the supervisor's research work.

Division X of Health Sciences

The Division aims to highlight the advantages of Traditional Chinese Medicine and develop the theory of TCN.

Chinese Medicine (H31)

The funding scope mainly include: ① Basic theory of TCN: zang-fu organs, qi, blood and body fluids, constitution, etiology and pathogenesis, basis of syndromes, treatment principles and methods, traditional Chinese medicine prescriptions, traditional Chinese medicine diagnostics; ② traditional Chinese medicine clinical basis: traditional Chinese medicine internal medicine, traditional Chinese medicine surgery, traditional Chinese medicine orthopedics, traditional Chinese medicine gynecology, traditional Chinese medicine pediatrics, traditional Chinese medicine ophthalmology, traditional Chinese medicine otolaryngology, traditional Chinese medicine oral science, traditional Chinese medicine oncology, traditional Chinese medicine geriatrics, traditional Chinese medicine health and rehabilitation; ③ Acupuncture and tuina: Acupoints and Meridians, traditional Chinese medicine acupuncture, tuina massage; ④ Ethnic medicine; ⑤ New technologies and methods of traditional Chinese medicine research.

Chinese Materia Medica (H32)(CMM)

Funding areas: (1) CMM: resources, identification, substances in pharmacodynamics, quality evaluation, processing, pharmaceuticals and theories in the properties of Chinese herbs; (2) pharmacology of TCM: neuropsychopharmacology, cardiovascular and cerebrovascular pharmacology, anti-tumor pharmacology, endocrinological and metabolic pharmacology, anti-inflammatory pharmacology, immunopharmacology, antiviral and anti-infective pharmacology, respiratory pharmacology, digestive pharmacology, urinary and reproductive pharmacology, metabolism of CMM, pharmacokinetics and toxicology in CMM; (3) ethnopharmacy of minority; (4) novel techniques and methods in CMM research.

Integrative Medicine (H33)

The funding scope mainly include: ① Basic theory of integrated traditional Chinese and Western medicine; ② The clinical basis of integrated traditional Chinese and Western medicine; ③ Research new technologies and methods of integrated traditional Chinese and Western medicine.

In recent years, the characteristics of funded projects in the fields of Chinese medicine, Chinese pharmacy and integrative medicine are: ① Funded projects are guided by the theory of traditional Chinese medicine, based on the clinical efficacy, combined with the macroscopic and microscopic, to explore the overall law of human

life activities and the integration and regulation of traditional Chinese medicine; ② Theories, methods and technologies are introduced in the frontier fields of medical science and other sciences, to constantly innovate research ideas and research methods, basic research of traditional Chinese medicine with the theories and research ideas of related emerging disciplines are organically combined to promote the development of traditional Chinese medicine; ③ Attention is paid to the basic clinical research of traditional Chinese medicine and minority medicine in the treatment of certain functional diseases, metabolic diseases, senile diseases, immune diseases, viral infectious diseases, etc., in order to explore the clinical efficacy mechanism.

Under the guidance of the basic theory of traditional Chinese medicine, the Discipline supports the research on the key scientific issues in the field of traditional Chinese medicine, and deeply explores its modern scientific connotation and the essence of inheritance and innovation. The Discipline focuses on supporting research in the following areas: the theory of Zangxiang (organ function), the theory of disease prevention and the biological basis of syndromes, animal models for the combination of diseases and syndromes, the law of compatibility of classical prescriptions and the material basis of drug effects, and the combination of macroscopic and microscopic syndrome differentiation, study of the basis of the dominant diseases and their key links for which TCM treatment is indeed effective, the methodology of efficacy evaluation in line with the clinical characteristics of TCM, the specificity of meridians, the rules of acupoint compatibility and acupuncture manipulations, and non-drugs such as acupuncture, massage, and rehabilitation; The basis for the prevention and treatment of diseases by therapy; the methodological research of data mining based on ancient documents and clinical big data; the basic theory, diagnosis and treatment law and mechanism of action of integrated traditional Chinese and Western medicine in the prevention and treatment of major, refractory, rare diseases and emerging infectious diseases, Chinese and Western medicine, the interaction of combined use; ecological planting, wild tending and bionic cultivation of Chinese herbal medicines and substitutes for rare and endangered Chinese herbal medicines, principles and methods of Chinese medicine identification, Chinese medicine quality evaluation methods and their principles, Chinese medicine processing principles, Chinese medicine preparation principles and methods that reflect overall efficacy; new drug delivery system, medicinal properties of traditional Chinese medicine, efficacy substances of traditional Chinese medicine, internal process of traditional Chinese medicine and its regulation mechanism, pharmacological action and mechanism of traditional Chinese medicine, correlation between toxicity, toxicology and toxicity-effect of traditional Chinese medicine; ethnic medicine; innovative technologies and methods of traditional Chinese medicine research etc.

The Discipline does not fund projects without Chinese medicine research content. For simple modern medical research proposals, please apply in medical related

disciplines (H01~H30); for natural medicine research proposals, please apply in Pharmacology (H34) or Pharmacology (H35); The research on traditional Chinese medicine resources should reflect the unique attributes of traditional Chinese medicinal materials, such as the yield and quality-related characteristics of the traditional Chinese medicinal materials production process, and carry out research on the protection, production and new resources of traditional Chinese medicine resources. Chinese medicine pharmacological substances and Chinese medicine pharmacology research must indicate the correlation with the efficacy of Chinese medicine or the academic value to the development of Chinese medicine discipline; minority pharmacy research should indicate the relationship with the ethnic minority medical theory or traditional drug use principles nature. The Discipline does not fund traditional Chinese medicine research proposals that are not of natural science attributes. For the research proposals of traditional Chinese medicine compound or acupuncture points, the prescription composition or related acupuncture points, which is not able to be provided in the case, you may send it directly to NSFC by confidential post should be introduced in the application form. Applications that do not meet the above requirements will not be funded.

Interdisciplinary and Integration Section

The Interdisciplinary and integration section is composed of the Department of Management Sciences and the Department of Interdisciplinary Sciences. It is guided by major interdisciplinary scientific issues, explores new scientific research paradigms and new mechanisms to support interdisciplinary research, cultivates major original breakthroughs in emerging interdisciplinary fields, and solves practical problems. At the same time, expand common knowledge and principles; coordinate the development of disciplines and serve social and economic development, pay attention to the major needs of the modernization of the national governance system and governance capacity, promote the application of natural science knowledge, and form the characteristics of discipline development.

Department of Management Sciences

The Department of Management Sciences supports fundamental scientific research on the objective law of management and economic activities in various complex social and economic organizations. The research findings can provide theory and method to optimize the utilization of limited resources. The Department of Management Sciences consists of three divisions, handling proposals of four disciplines, which are management science and engineering, business administration, economic sciences, and macro-management and policy.

The Department will be more active to encourage scientists to confront the frontier of management and economic science, as well as the needs of the nation's economic growth and social development, so that to propose their research topics, promote the innovation on theory and methodology, and enhance the capability for serving to the national strategy and economic and management practices. Meanwhile, it also encourages integrated development and innovation based on multidisciplinary, including mathematical sciences, information sciences and etc, driving the emergency and development of new fields in science. It also encourages the international cooperation and exchanges.

The Department emphasizes applying “scientific methods” to explore the objective laws of management and economic activities, and encourages the revolution of research paradigm. The Department supports research that observes and describes the management phenomena based on data obtained from experiments, observations, investigation, measurements and etc. The Department also supports research that aims at addressing management issues by analyzing and explaining management phenomena through modeling, computation, induction, and deduction, etc.

The Department encourages interdisciplinary research, and supports scientists from diverse academic backgrounds to take an active part in management science research and contribute to the development of management sciences from basic law and theoretical method. However, applications focusing on social science and humanities, as well as those within the funding scope of other scientific departments of NSFC, will not be handled by the Department.

In 2021, the Department has adjusted the application code for the four disciplines according to the arrangements of the NSFC. Therefore, the aims and the orientation are more clear for the four different disciplines. The applicants should choose the appropriate code in the disciplines.

Funding for Projects of General Program, Young Scientist Fund and Fund for Less Developed Regions in Department of Management Sciences in 2021

Unit: 10,000 yuan

Divisions		General Program			Young Scientist Fund			Fund for Less Developed Regions		
		Projects	Direct expenses	Funding rate (%)	Projects	Direct expenses	Funding rate (%)	Projects	Direct expenses	Funding rate (%)
Division I	Management science and engineering	240	11 527	18.18	281	8410	18.04	35	980	15.02
Division II	Business administration	170	8 165	16.98	251	7500	16.26	35	980	14.40
Division III	Economic Sciences	145	6 951	14.37	221	6610	13.91	35	980	12.87
	Macro-management and policy	220	10 564	15.26	262	7810	14.40	40	1 120	13.61
Total		775	37 207	16.24	1 015	30330	15.59	145	4 060	13.92
Direct cost per project		48.01			—			28.00		

General requirements for applications are as follows:

1. No repetitive funding with the National Social Science Fund of China

To optimize the allocation of the National Natural Science Fund and to ensure that principal investigators invest adequate time and energy in their on-going national projects, the Department will decline proposals by the following applicants in 2022 (except for the applications of Excellent Young Scientists Fund and National Science Fund for Distinguished Young Scholars), except for the particulars in the NSFC *Guide to Programs 2022*:

(1) Applicants who were supported by the (1) National Social Science Fund of China as a principal investigator within the past 5 years (from Jan. 1, 2017), and have not yet got the project completion certificate awarded by the National Planning Office of Philosophy and Social Science until the deadline of this year's fund application.

Notes:

If an applicant has gained the project completion certificate from the National

Planning Office of Philosophy and Social Science, and is applying for an NSFC project with the application code starting with G in 2022, he/she must provide a copy of the certificate with an official signature and seal of his/her home institution, and submit the electronic version of this certificate online.

If the applicant has already submitted the project completion certificate at before, he/she will be not requested to submit it this time.

(2) Applications who apply for National Social Science Fund as a principal investigator in the year of 2022.

2. Accuracy and integrity of information

Applicants are responsible for the accuracy, integrity, and reliability of the contents of their applications, and their home institutions are obligated to undertake serious check on the relevant information. The following requirements should be complied with when applicants prepare and submit the project proposals:

(1) Applicants are required to give a detailed description on their previous research work related to the proposed work, as well as the publications published in previous work. The five representative works should be papers and books that have already been published (including the one published online). When the applicant fills out the information of the representative works, he/she should carefully read the requirements of application form and must comply with it.

(2) The Department treats it unacceptable that applicants submit the same proposals to more than one science funding agency. Applicants who propose new research topics based on their previous NSFC projects are required to describe the progress of the previous NSFC project and clarify the relations and differences between the newly submitted proposals and the previous ones. For applicants who are undertaking projects funded by other agencies, such as MOST, NSSF or local science funding organizations, they are required to clarify the similarities and differences between their on-going projects and the new proposals submitted to NSFC.

3. Special requirements for principal investigator starting NSFC projects in recent years

To ensure that principal investigators invest adequate time and energy in their on-going projects, the applicants in 2022 who has been approved any kind of NSFC projects as a principal investigator in 2020 or 2021(especially for the year of 2021) will be reviewed and assessed through stricter procedures.

4. Consideration of the performance of accomplished projects

The Department conducts performance evaluation for all General Program projects, Young Scientists Fund projects, and Fund for Less Developed Regions projects one year after these projects were complete. Researchers with good performance evaluation results will be given priority for funding when they apply for

new projects. By contrast, researchers with poor performance evaluation results will undergo stricter review procedures when they apply for new projects.

These requirements could be used for all kinds of project applications in the Department of Management Sciences.

Division I of Management Sciences

Management Science and Engineering (G01)

The Division mainly supports basic research on management theory and method, including complex systems management, operations management, decision-making theory and game theory, evaluation and forecasting theory and method, management statistics theory and method, management psychology and behaviors, management system engineering, industrial engineering and quality management, logistics and supply chain management, service science and engineering, data science and management, information system and management, risk management, financial engineering, engineering management and project management, transportation management, digital platform management theory, intelligent management and artificial intelligence, new technology-driven management theory and method, etc.

The orientation of this Division is more focused on basic theoretical research, emphasizing innovative research on management theory and method integrated with China's management practices. The Division encourages interdisciplinary research and theoretical research on international frontier.

During the last few years, this discipline has experienced rapid development in China. Its performance and reputation in the international scientific society has been unceasingly raised up in many research areas. However, the number of applications varied significantly across different research areas. The application amount in some fields was relatively large, including of operations management, logistics and supply chain management, information system and management, transportation management, financial engineering and so on. Meanwhile, the number of applications in the field of basic theory and method on management science was relatively small, like management statistics theory and method, etc.

In 2022, the Division will continue to encourage and support basic theoretical research on management science, method on frontier as well as original studies based on China's management practices, which includes as follows: to explore the frontiers of management science and innovative research findings with international influence; to link the frontier theory and method with problems within China for solving the common and important issues from management practices in China and proposing the general management theory and method; confronting the important national demand,

to pay more attention to the scientific management problems in the new field like intelligent manufacturing, artificial intelligence, digital economics and etc., and issues behind the technical problems of "neck-lock". It is encouraged the integration of management science with mathematics, economic sciences, behavior sciences, and information sciences, as well as other disciplines, and the inter disciplinary frontier research facing to the complex social systems and complex engineering systems for seeking breakthroughs of theory, methods and techniques.

Division II of Management Sciences

Business Administration (G02)

The Division mainly supports basic research and applied basic research on management theories and new management techniques and methodologies by taking micro-level organizations (all types of industries, enterprises, institutions, and nonprofit organizations) as research objects. The funding areas of the Division include strategic management, theory of firm, enterprise technology management and innovation management, human resource management, financial management, accounting and auditing, marketing, organization theory and organization behaviors, business intelligence and digital business, corporate finance, enterprise operation management, corporate governance, entrepreneurship, international business management, tourism management and so on.

In recent years, all fields of business administration have been well developed. The number of applications in some of fields was relatively large, which includes marketing, financial management, accounting and auditing, enterprise technology management and innovation management, enterprise operating management, organization theory and organization behaviors, and etc. Correspondingly, the number of funded projects in these fields was also much larger than the one in other fields. On the other hand, the number of applications in the fields of international business management and theory of firm was much smaller, and the number of funded projects in these fields was relatively small. In general, it has shown certain innovativeness for the proposals on basic research expanding the frontier theory and exploring new techniques and methods. Meanwhile, it has steadily increased for the basic applied research focused on the national strategic demands and Chinese firms' practical needs.

In 2022, the Division will continue to support the innovative basic research aiming at the national strategy demands and scientific frontier. The Division will give priority to the proposals that will bring out new theory and discovery, to the pioneering research employed various methods from different disciplines, verified by different sources of data, and being backed by multidisciplinary studies. It also encourages the

team with international cooperation. The Division advocates scientific spirits, encourages original exploration, and supports original research that focused on the management theory and paradigm revolution based on practices of Chinese enterprises, as well as the one is beneficial to the high-quality development of Chinese firms.

In order to promote the balance among the disciplines, the Division will focus on all the 15 codes in the discipline of business administration and give priorities to basic research that pushing the cutting edge of this discipline. The Division will pay more attention to the new areas, like corporate finance, corporate governance, tourism management, etc. Meanwhile, the Division encourages the research focused on topic of management process and activities under the background of dual circulation, digital economics and artificial intelligence, which includes the firms' organization, production, operation, service and business.

Division III of Management Sciences

The Division III of Management Sciences supports 2 basic research areas: economic sciences and macro-management and policy.

Economic Sciences (G03)

The economic sciences discipline mainly supports the basic research on unveiling rules of economic activities, explaining economic phenomena, and deriving economic theories through scientific research methods, such as empirical study, quantitative study, and behavior study and etc. The funding areas covers 14 different disciplines, including econometrics and economic statistics, behavior economics and experimental economics, mathematical economics and computational economics, microeconomics, macroeconomic management, international economics and trade, financial economics, public finance and public economics, industrial economics, economic development and economic institution, agricultural and forestry economics and management, regional economics, population, labor and health economics, resources and environment economics, etc.

In 2021, there have been a large number of applications in the fields of agricultural and forestry economics and management, financial economics, resources and environment economics, industrial economics, international economics and trade, and the number of funded projects was correspondingly large. There were fewer applications and fewer funded projects in the fields of mathematical economics and computational economics, microeconomics, behavior economics and experimental economics, economic development and economic institution, public finance and public economics. Due to the adjustment of discipline application code in 2021, applications in some new disciplines were much fewer. On the whole, the research on exploring

new methods and technologies is growing rapidly, and the research on paying attention to new problems and practical problems in China is increasing steadily.

In 2022, this Division will be oriented the main field of national social economy, stress support basic research which is innovative and aimed at cutting-edge science of this discipline, pay attention to theoretical innovation, method innovation and research on new knowledge discovery and creation, and give priority to supporting quantitative research, such as mathematical modeling and empirical analysis, interdisciplinary perspective, scientific discovery and accumulation research highlighted China's background. Priority will be given to support researches on scientific issues with potential application value from Chinese economic practices, as well as the one with substantive international cooperation. NSFC advocates the spirit of science, encourages free exploration and gives priority to the original theoretical exploration based on Chinese economic practices.

In order to promote the balanced development of the discipline, the Division will give preferential support to new fields such as mathematical economics and computational economics, microeconomics, public finance and public economics, economic development and economic institution, as well as small fields such as digital economics, green finance, and social medical insurance actuarial science, etc.

Macro-Management and Policy (G04)

The macro-management and policy discipline is a group of sub-disciplines that study the behavior of government and related public sectors in formulating macro policies and implementing comprehensive governance, in order to achieve the social and economic development goals. It covers 15 basic research sub-disciplines on public administration and public policy, theories and methods of policy science, governance and policy of science and technology, governance and policy of innovation, governance and policy of health, governance and policy of medicine, governance and policy of education, governance and policy of culture, public safety and emergency management, social governance and social security, governance of environment and ecology, governance and policy of resource, regional development and urban governance, digital governance and information resource management, global governance and sustainable development, etc.

In recent years, there have been a large number of applications in the fields of governance and policy of health, governance and policy of resource, governance and policy of medicine, public safety and emergency management. Among them, the number of applications for governance and policy of health are the largest, accounting for about 30%. There are fewer applications and fewer funded projects in the fields of governance and policy of culture, theories and methods of policy science, global governance and sustainable development.

This Division aims to facilitate discipline development, promote academic

innovation, and support talent scientists and research teams. In particular, the Division encourages researchers to provide scientific support and evidences for macro policy makers while developing theories and methods. The applications should take China's practical governance issues as the main research objects, and bring up scientific theoretical issues from the research objects accurately. Special attention should be paid to the scientific and normative nature of the research methods. Applicants are advised to differentiate between management science research and practical management work, differentiate between an NSFC project and a humanity and social science project in terms of research methods. The scope of the research topic needs to be appropriate. The research goal should be concentrated. The research content should be specific and concrete. The research method and technology roadmap, as well as how to address the key scientific issues, need to be clearly clarified in the proposal.

Department of Interdisciplinary Sciences

Interdisciplinary sciences refer to the group of disciplines at various levels that stem from deep interactions and inter-penetrations involving multiple academic disciplines. It is composed of trans-disciplinary structures of knowledge, logics of thoughts, frames of theories, system of methodology, and reconstructs these components based on certain principle. Distinguished from the original academic disciplines, interdisciplinary sciences are featured with comprehensiveness, extensiveness, uniqueness, and novelty. It is the outcome of evolutionary process of science, from the initial stage of general knowledge about nature to the intermediate stage of highly classified disciplines, and to the stage of recombination of knowledge. It also represents an additional novel stereotype for human beings to explore the nature. Interdisciplinary science is the milestone for the development of scientific studies. It aims to generate and provide revolutionary viewpoints, stereotype, and tools to search for solutions to important and sophisticated issues that human beings are contemporarily facing.

Motivated by solving important and sophisticated issues and aiming at interdisciplinary research, the Department of Interdisciplinary Sciences (DIS) organizes and deploys research activities on interdisciplinary science in order to meet important national strategic needs and to push the frontier of science forwards. The responsibility of DIS includes: 1. To develop a complete and sound system to support interdisciplinary research in all disciplines; 2. To promote collaborations from multiple disciplines to solve sophisticated issues of science and technology; 3. To facilitate the development of new academic disciplines and scientific breakthroughs; 4. To probe for revolutionary stereo type of scientific research; 5. To cultivate scholars of interdisciplinary science and to create culture of interdisciplinary research.

Funding for Projects of all kinds in Department of Interdisciplinary Sciences in 2021

Unit: 10,000 yuan

Divisions	Excellent Young Scientists Fund			National Science Fund for Distinguished Young Scholars			Science Fund for Creative Research Groups			Basic Science Center Program		
	Projects	Direct cost	Funding rate (%)	Projects	Direct cost	Funding rate (%)	Projects	Direct cost	Funding rate (%)	Projects	Direct cost	Funding rate (%)
Division I	8	1 600	8.42	7	2 800	7.07	1	1 000	14.29	2	12 000	40.00
Division II	2	400	4.76	2	800	3.33	2	2 000	50.00	0	0	0
Division III	9	1 800	6.43	4	1 600	3.10	1	1 000	7.69	0	0	0
Division IV	5	1 000	6.25	1	400	2.08	0	0	0	0	0	0
Total	24	4 800	6.72	14	5 600	4.17	4	4 000	13.33	2	12 000	8.70

In 2021, the Department received 357 applications for Excellent Young Scientists Fund, and funded 24 projects with a funding rate of 6.72%, and a total direct cost funding of 48 million yuan with 2 million of per project.

In 2021, the Department received 336 applications for National Science Fund for Distinguished Young Scholars, and funded 14 projects with a funding rate of 4.17%, and a total direct cost funding of 56 million yuan with 4 million of per project.

In 2021, the Department received 30 applications for Science Fund for Creative Research Groups, and funded 4 projects with a funding rate of 13.33%, and a total direct cost funding of 40 million yuan with 10 million of per project.

In 2021, the Department received 23 applications for Basic Science Center Program, and funded 2 projects with a funding rate of 8.70%, and a total direct cost funding of 120 million yuan with 60 million of per project.

Notes:

I. Types of projects accepted by the Interdisciplinary Science Department in 2022

(1) During the centralized acceptance period of project applications in 2022, the types of programs will be accepted by the Department of Interdisciplinary Science include: Excellent Young Scientists Fund, National Science Fund for Distinguished Young Scholars, Science Fund for Creative Research Group, Basic Science Center program and Research Fund for International Scientists.

(2) Out of the centralized acceptance period of 2022 program applications, the types of programs will be accepted by the Department of Interdisciplinary Science include: the Special Fund for Research on National Major Research Instruments (recommended by departments), Major Program, Major Research Plan and Key International (Regional) Joint Research Program, as well as other special funds. Among of the above mentioned Programs, the guideline of the Special Fund for Research on National Major Research Instruments (recommended by departments) has been published in this *Guide*, guidelines for other Projects programs will be published in due time in NSFC's website.

II. Application Requirements. In addition to meeting the application conditions specified in this *Guide*, the program application of the Interdisciplinary Science Division shall also meet the following conditions:

(1) The proposed research work must have obvious characteristics of interdisciplinary scientific research and be necessary to carry out interdisciplinary scientific research;

(2) The applicant has an educational background in at least two different first-level disciplines (including undergraduate, master, doctoral) or experience in conducting interdisciplinary scientific research in which he or she has played a key role.

III. Application Documents

In addition to meeting the requirements of the application materials in this *Guide*, the program application documents of the Division shall also meet the following requirements:

i The special application form of the Cross-science Division shall be used for all program applications of the Cross-Science Division.

ii When applying for the program of Interdisciplinary Science Department, the applicant shall first select the acceptance code and then the application code.

1. The Interdisciplinary Science Department shall set up acceptance codes for four fields, which are T01 (Material Science), T02(Intelligence and Manufacturing science), T03(Life and Health Science) and T04(Integrated Science). The applicant shall select one of the acceptance codes according to the applied research field.

2. There is no separate application code for the Interdisciplinary Science Department. The application code can be found in the section "NSFC Application Code" in this *Guide*. Applicants should accurately select no more than 5 application codes, paying particular attention to:

(1) When selecting the application code, try to select the secondary application code (4 digits).

(2) Please fill in the "Research direction" and "Key words" accurately when filling in the short form of application.

IV Additional Notes

1 When filling in the application form, please read carefully the instructions and outline of each type of program.

2 Basic Science Center program and Major Program may be applied by one applicant alone or two applicants together:

(1). For joint application, the two applicants shall be the first applicant and the second applicant respectively.

(2). If the second applicant and the first applicant are not in the same unit, the domestic unit to which the second applicant belongs shall be regarded as the cooperative research unit.

(3). In the case of joint application, the online filling and submission of the application form in the information system shall be completed by the first applicant and the supporting institution.

Division I, DIS (T01)

The funding scope of the Division includes: interdisciplinary researches based on fundamental natural sciences such as mathematics, physics, chemistry, etc, aiming to promote research at the global frontier of science and meet important national needs, to solve fundamental scientific problems associated with information science, life science, material science, energy and environmental science, and to achieve significant breakthrough or to develop new academic discipline and research fields.

Division II, DIS (T02)

The funding scope of the Division includes: interdisciplinary researches based on advanced materials, contemporary engineering, information technologies, etc., aiming to promote research at the global frontier of science and meet important national and economical needs, to solve problems during the development of Chinese society, including key scientific and technological problems of engineering, control and advanced manufacturing, etc.

Division III, DIS (T03)

The funding scope of the Division includes: interdisciplinary researches associated with life and health, and based on science, engineering, medical science etc., aiming to develop advanced technology and methodology in life and medical science, to clarify the regulatory mechanism in sophisticated life system from the aspect of multi-layer and trans-scale, to unveil the scientific law and principles governing biological phenomena, and probe for novel mode of research in life science to face major challenges of human health and disease prevention and control.

Division IV, DIS (T04)

The funding scope of the Division includes: interdisciplinary researches based on theory and methodologies of natural science and convergence of knowledge and tools

from multiple disciplines, aiming to study the sophisticated system of resource development and utilization, globalization, evolution of human culture, and to solve major problems associated with sustainable development of human beings.

General Program

General Program supports scientists engaged in basic research on self-selected topics within the funding scope of NSFC to conduct innovative research and promote a balanced, coordinated and sustained development of all disciplines.

An applicant must meet the following qualifications:

(1) Have the experience of undertaking basic research projects or conducting other basic research;

(2) Hold a senior professional position (title) or doctoral degree, or be recommended by two professionals with senior academic positions (titles) in the same research field.

Full time post graduate students are not eligible to apply for the General Program, but on-the-job graduate students may apply through their employer institutions with the consent of their supervisors.

Applicants should be familiar with the current situation of relevant research in China and the world, capable of leading a group to conduct research. Applicants should prepare proposals in accordance with the guideline. The proposed research should be of scientific significance and research merits, and have sufficient thematic basis, novel academic ideas, clear-cut objectives, reasonable and detailed research contents and feasible research schemes. The number of collaborative institutions for General Program projects should not exceed 2, and the duration is 4 years (PIs as in-site post-doctoral researchers, whose duration of the project should be determined based on the written commitment from their host institutions, and not more than 4 years they cannot change the host institution after the project is awarded).

In 2021, NSFC funded 19,420 General Program projects, with direct cost of 11.1 billion yuan. The average funding was 570,900 yuan per project. The success rate was 17.43%. The funding of the General Program projects in 2021 is shown in the table below.

In 2022, the pilot review based on four natures of science topics will be implemented for the General Program. When preparing the application for General Program, the applicant should select the nature of science topic based on the key scientific issues to be solved and the research content, and clarify the reasons for choosing the science feature concerned. In the case of multiple science features, the applicant should choose the science feature that best matches, and is most focused and characteristic. NSFC shall organize respective review by experts based on the science feature the applicant chooses.

The average funding intensity for direct cost in 2022 for General Program is basically the same as that in 2021. Please refer to the funding areas and announcements of departments for detailed funding scope and situation in recent years and other relevant requirements about General Program. Applicants are advised to prepare their research proposals in line with the funding intensity and the instructions by respective science departments.

Funding of the General Program Projects in 2021

Unit: 10,000 yuan

Departments	No. of applications	Awards				Success rate (%)
		No. of awards	Funding for direct costs	Average funding for direct costs	Share of NSFC total funding for direct costs (%)	
Mathematical and Physical Sciences	7 839	1 778	103 090	57.98	9.30	22.68
Chemical Sciences	8 812	1 897	113 941	60.06	10.28	21.53
Life Sciences	15 760	3 027	175 584	58.01	15.84	19.21
Earth Sciences	9 099	2 030	116 615	57.45	10.52	22.31
Engineering and Materials Sciences	20 600	3 309	192 318	58.12	17.35	16.06
Information Sciences	11 652	2 070	120 180	58.06	10.84	17.77
Management Sciences	4 772	775	37 207	48.01	3.36	16.24
Health Sciences	32 889	4 534	249 768	55.09	22.53	13.79
Total or average	111 423	19 420	1 108 703	57.09	100.00	17.43

Young Scientists Fund

The Young Scientists Fund supports young scientists to freely select their research topics within the funding scope of NSFC to conduct basic research, particularly focus on fostering the ability of young scientists to independently undertake research projects and conduct creative research, stimulates their creative thinking and trains backup talents for basic research.

1. An applicant must meet the following qualifications:

- (1) Have the experience of conducting basic research;
- (2) Hold a senior professional position (title) or doctoral degree, or be recommended by two professionals with senior academic positions (titles) in the same research field.
- (3) By January 1 of the year of application, male applicants must be younger than 35 (born on or after January 1, 1987) and female applicants must be younger than 40 (born on or after January 1, 1982).

On-the-job doctoral students who satisfy the above criteria may apply through their employer institutions with the consent of their supervisors. Those who are studying for a graduate degree are not allowed to apply for the Young Science Fund.

2. In 2022, scientific and technical personnel from supporting institutions in Hong Kong and Macao can apply for the Youth Science Fund. In addition to meeting the basic requirements, the applicants shall also meet the following qualifications:

- (1) Abide by the Basic Law of the Hong Kong Special Administrative Region of the People's Republic of China, the Basic Law of the Macao Special Administrative Region of the People's Republic of China, and the provisions on the management of science funds;

- (2) Formally employed in supporting units in Hong Kong and Macao. Those who are engaged in postdoctoral research or studying for postgraduate degrees shall not apply for the Youth Science Fund through the supporting units in Hong Kong and Macao.

3. Special reminders to the applicants:

- (1) Those who are the PIs of ongoing project of Young Scientists Fund or have undertaken it, including one-year Small Fund for Exploratory Studies, and terminated or withdrawn projects, cannot apply again.

- (2) For Young Scientists Fund, the creative potential of the applicant is mainly evaluated.

- (3) Applicants should compose proposals in accordance with the outlines of

application for Young Scientists Fund. The project duration is 3 years. (PIs as in-site post-doctoral researchers, whose duration of the project should be determined based on the letter of commitment from their host institutions, and not more than 4 years, however they cannot change the host institution after the project is awarded).

(4) In 2022, the funding system of the Youth Science Foundation will be implemented, and the funding will no longer distinguish between direct and indirect costs. The funding for each project is 300,000 yuan (100,000 yuan if the funding period is one year; If the funding term is 2 years, the funding shall be 200,000 Yuan)

(3) In 2022, the pilot review based on four natures of science topics will be implemented for the Young Scientists Fund. When preparing the application for Young Scientists Fund, the applicant should select the mature of science topic based on the key scientific issues to be solved and the research content, and clarify the reasons for choosing the science feature concerned. In the case of multiple science features, the applicant should choose the science feature that best matches, and is most focused and characteristic. NSFC shall organize respective review by experts based on the science feature the applicant chooses.

In 2021, a total of 21,072 Young Scientist Fund projects were funded. The direct cost was 6282.5 million yuan. The success rate was 17.29% (please refer to the table below for the funding situation).

Funding of the Young Scientists Fund Projects in 2021

Unit: 10,000 yuan

Departments	No. of applications	Awards			Success rate (%)
		No. of awards	Funding for direct costs	Share of NSFC total funding for direct costs (%)	
Mathematical and Physical Sciences	8036	2123	63 120	10.05	26.42
Chemical Sciences	9920	1842	54 740	8.71	18.57
Life Sciences	16 363	2855	85 110	13.55	17.45
Earth Sciences	9 387	2 019	60 020	9.55	21.51
Engineering and Materials Sciences	20 730	3 648	108 930	17.34	17.60
Information Sciences	10 366	2515	74 810	11.91	24.26
Management Sciences	6510	1 015	30 330	4.83	15.59
Health Sciences	40 568	5 055	151 190	24.07	12.46
Total or average	121 880	21 072	628 250	100.00	17.29

Fund for Less Developed Regions

The Fund for Less Developed Regions supports scientists of some host institutions in specified regions of China to conduct innovative research within the funding scope of NSFC, so as to foster and support researchers in the regions, to stabilize and gather outstanding talents to facilitate the construction of the regional innovation system as well as the social and economic development of the regions.

An applicant must meet the following qualifications:

(1) Have the experience of undertaking basic research projects or conducting other basic research;

(2) Hold a senior academic position (title) or doctoral degree, or be recommended by two professionals with senior academic positions (titles) in the same research field.

Full-time researchers meeting the above qualifications and working in Inner Mongolia Autonomous Region, Ningxia Hui Autonomous Region, Qinghai Province, Xinjiang Uyghur Autonomous Region, Xinjiang Production and Construction Corps, Tibet Autonomous Region, Guangxi Zhuang Autonomous Region, Hainan Province, Guizhou Province, Jiangxi Province, Yunnan Province, Gansu Province, Yanbian Korean Prefecture of Jilin Province, Enshi Tujia and Miao Prefecture in Hubei Province, Xiangxi Tujia and Miao Prefecture in Hunan Province, Liangshan Yi Prefecture in Sichuan Province, Ganzi Tibetan Prefecture in Sichuan Province, Aba Tibetan and Qiang Prefecture in Sichuan Province, Yan'an City and Yulin City in Shaanxi Province, may apply for the Fund. Researchers seconded by the Organization Department of the Central Committee of the CPC to Xinjiang Uyghur Autonomous Region and Tibet Autonomous Region for 3 or more years are also eligible to apply for this Fund during their tenure, on the condition that they provide the scanning copy of certificate documents issued by the organization departments or personnel department of their host institutions to prove their identity of aid scientists when applying for this Fund. If the host institution that an aid scientist is working in Xinjiang or Tibet is not a registered host institution at NSFC, they are allowed to apply for the Fund for Less Developed Regions through the eligible host institutions in the aided autonomous regions.

Researchers from the affiliated institutions to the central government or the PLA, and part-time researchers working in the eligible host institutions in the above regions and provinces cannot apply, but may join the application as main participants. Graduate students cannot apply, but on-job students may apply through their employer institutions with the consent of their supervisors. Researchers without an institution or

whose host institutions have not been registered at NSFC cannot apply for the Fund for Less Developed Regions.

In order to provide balanced support for qualified applicants for the Fund for Less Developed Regions and encourage them to apply for projects of General Program and other competitive programs of NSFC, so as to improve basic research in less developed regions, researchers who have been granted 3 or more projects under the Fund for Less Developed Regions are not allowed to apply for this Fund again since the year 2016, but the Fund for Less Developed Regions grants approved in 2015 and earlier will not be counted in.

Applicants should prepare proposals in accordance with the outline of application. The number of collaborative institutions for Fund for Less Developed Regions should not exceed 2, and the duration is 4 years (Pls as in-site post-doctoral researchers, whose duration of the project should be determined based on the written commitment from their host institutions, and not more than 4 years. However, they cannot change the host institution after the project is awarded).

In 2021, the Fund supported 3,337 projects with a total funding for direct cost of 1150.4 million yuan. The average funding was 344,700 yuan per project, and the success rate was 14.47% (please refer to the table below for the funding situation).

Funding of the Fund for Less Developed Regions in 2021

Unit: 10,000 yuan

Departments	No. of applications	Awards				Success rate (%)
		No. of awards	Funding for direct costs	Average funding for direct costs	Share of NSFC total funding for direct costs (%)	
Mathematical and Physical Sciences	1 091	209	7 310	34.98	6.35	19.16
Chemical Sciences	1 603	279	9795	35.11	8.51	17.40
Life Sciences	5 162	874	30 590	35.00	26.59	16.93
Earth Sciences	1 358	213	7535	35.38	6.55	15.68
Engineering and Materials Sciences	2853	411	14 370	34.96	12.49	14.41
Information Sciences	1 641	248	8760	35.32	7.61	15.11
Management Sciences	1 042	145	4 060	28.00	3.53	13.92
Health Sciences	8 307	958	32 620	34.05	28.36	11.53
Total or average	23 057	3 337	115 040	34.47	100.00	14.47

In 2022, the average funding for direct costs is expected to be consistent with that of 2021. Please refer to the funding intensity of direct cost of relevant departments and make budget request in a realistic manner.

Key Program

The Key Program supports scientific and technical personnel engaged in basic research to carry out in-depth, systematic and innovative research on well-founded research directions or disciplinary growth points, promote disciplinary development, and promote breakthroughs in several important fields or scientific frontiers.

Key Program should reflect the principles of limited goals, limited scale, and prominent priorities, attach importance to interdisciplinary and infiltration, make effective use of the existing important scientific research bases of the state and departments, and actively carry out substantial international cooperation and exchanges.

Applicants for Key Programs should meet the following qualifications:

- (1) Have experience in undertaking basic research project;
- (2) Hold a senior professional and technical position (title).

Postdoctoral researchers in the station, those who are studying for a postgraduate degree, and those who do not have a work unit or whose unit is not a supporting unit are not allowed to apply as applicants.

Each year, Key Programs determine the research fields or research directions for which applications are accepted, and issue guidelines to guide applications. Applicants should write applications in accordance with the requirements of this *Guide* and the outline of Key Program application writing, condense scientific issues within the research field or research direction, determine the project name according to the research content, and avoid the project name covering the entire field or direction. .

Key Programs are generally undertaken by one unit, and if it is really necessary to conduct cooperative research, the number of cooperative research units shall not exceed two. The funding period is 5 years.

Special reminder to applicants:

In 2022, the Natural Science Foundation of China will continue to select Key Program proposals to carry out classification reviews based on the attributes of four types of scientific problems. The applicant should select the attribute of the scientific problem according to the key scientific problem to be solved and the research content, and explain the reasons for selecting the attribute of the scientific problem. If the application proposals has multiple scientific problem attributes, the applicant should select the one type of scientific problem attribute that is most consistent, focused, and best reflects the characteristics of the application proposals. The Natural Science Foundation of China organizes review experts to conduct classified review according to the attributes of the scientific

problem selected by the applicant.

In 2021, a total of 740 Key Programs projects were funded, with a direct cost of 2,152.13 million yuan and an average direct cost of about 2.9 million yuan per project (the funding of the Key Program in 2021 is shown in the table below).

Funding of Key Program Projects in 2021

Unit: 10,000 yuan

Departments	No. of applications	Awards				Success rate (%)
		No. of awards	Funding for direct costs	Average funding for direct costs	Share of NSFC total funding for direct costs (%)	
Mathematical and Physical Sciences	402	91	27,300	300.00	12.69	22.64
Chemical Sciences	306	69	20,986	304.14	9.75	22.55
Life Sciences	625	110	31,510	286.45	14.64	17.60
Earth Sciences	612	112	32,500	290.18	15.10	18.30
Engineering and Materials Sciences	697	108	32,400	300.00	15.05	15.49
Information Sciences	374	92	27,684	300.91	12.86	24.60
Management Sciences	143	35	7,113	203.23	3.31	24.48
Health Sciences	758	123	35,720	290.41	16.60	16.23
Total or average	3,917	740	215,213	290.83	100.00	18.89

For the research fields or research directions funded by Key Program and related requirements, please refer to the introduction of each science department in this part.

Basic Technological Science Section

Department of Mathematical and Physical Sciences

In 2021, the Department announced 127 areas for Key Programs, and received 402 applications. 91 projects were funded with direct cost funding of 273.00 million yuan and the success rate is 22.64%.

In 2022, the Department plans to fund about 90 Key Program projects. The average direct cost funding will be about 2.6 million yuan per project for mathematics, and 3.2 million yuan for Mechanics, Astronomy, Physics I and Physics II. The funding will be 5 years. Please provide with the proper application code when applying.

Please give the proposed research directions in the note section of the application form, otherwise the application will be not accepted.

In 2022, the main research directions are as follows:

- 1. Key problems in arithmetic algebraic geometry (A01)**
- 2. Analytical method in number theory (A01)**
- 3. Algebraic structure and representation (A01)**
- 4. Geometry and homology method in algebra (A01)**
- 5. Algebraic and transcendental method for algebraic clusters (A01)**
- 6. Sub manifold geometry and topology (A01)**
- 7. Geometry analysis and applications (A01)**
- 8. Geometric method in topological quantum field theory (A01)**
- 9. Low dimension topology (A01)**
- 10. Complex analysis and complex geometry (A01、 A02)**
- 11. Fractal geometry and fractal analysis (A02)**
- 12. Theory and application of harmonic analysis (A02、 A03)**
- 13. Variation method and applications (A02、 A03)**
- 14. Non exchange analysis, geometry (A02)**
- 15. Statistic analysis in disordered system (A02、 A06)**
- 16. Theory and application of random equation (A02、 A03、 A06)**
- 17. Geometric structure and complexity of dynamical system (A02、 A03)**
- 18. Geometric theory for infinite dimensional system (A02、 A03)**
- 19. Invariant and asymptotic properties of differential equation (A02、 A03)**
- 20. Theory of nonlinear partial differential equations (A02、 A03)**
- 21. Modeling and analysis of applied partial differential equation (A03)**
- 22. Theory and method of integrable system (A01、 A03)**

23. **Statistic analysis of complex data (A04)**
24. **Statistical basis and method of big data (A04)**
25. **Optimization theory and method (A04)**
26. **Problem driven optimization modeling and efficient algorithm (A04)**
27. **Theory and application of combination mathematics (A04)**
28. **key problem, algorithm and application of graph theory (A04)**
29. **Basic computational methods and theoretical analysis (A05)**
30. **Computable modeling and simulation (A05)**
31. **Problem driven science and engineering computation (A05)**
32. **Mathematical model and computation method for industrial software (A05)**
33. **Mathematical method in modern control theory (A06)**
34. **Mathematical theory and algorithm for quantum computation and quantum information processing (A04、 A05、 A06)**
35. **Mathematical theory and algorithm in new generation of information technology (A04、 A05、 A06)**
36. **Theoretical computer science and uncertainty mathematical theory (A04 、 A05、 A06)**
37. **Key mathematical problems in economy and finance (A06)**
38. **Mathematical theory and application in biology and medicin (A06)**
39. **Mathematical theory and method of AI and data science (A01~A06)**
40. **Basic mathematics in modern cryptography (A01、 A06)**
41. **Modeling, analysis and control of complex system dynamics (A07)**
42. **Nonlinear dynamic theory and experiment for high dimensional system (A07)**
43. **Nonlinear dynamics of rotor system (A07)**
44. **Vibration characteristics and control of complex structures and system (A07)**
45. **Solid deformation and constitutive relations (A08)**
46. **Strength, failure and damage of materials and structure (A08)**
47. **Mechanical behavior of new materials and structures in multi-field environment (A08)**
48. **Soft matter mechanics and flexible structure design method (A08)**
49. **Structural optimization theory and design method**
50. **Integrated design theory and method for multi functional materials and structures design (A08)**
51. **Unsteady complex flow mechanism and control (A09)**
52. **Aerodynamics and thermodynamics of aircraft (A09)**
53. **hypersonic and reaction gas dynamics (A09)**
54. **Hydro dynamics of marine vessels and structures (A09)**
55. **Theory and method of complex fluid and multi phase and interface flow (A09)**
56. **Bio mechanical problems in human health and medicine (A10)**
57. **Mechanics and biological problems of cells and tissues (A10)**

58. Theory and method of bionic mechanics (A10)
59. Theory and method of physical mechanics (A11)
60. Mechanism of energy release and damage in energy containing material explosion (A12)
61. Mechanical behavior of material and structure in dynamics loading (A12)
62. Rock mechanics in high temperature and high pressure conditions (A13)
63. Key mechanical problems in environmental evolution and catastrophe (A13)
64. New methods and technology in experimental mechanics (A07~A13)
65. New method of computation mechanics and high performance software (A07~A13)
66. Theory and method of fluid solid coupled mechanics (A07~A13)
67. Mechanical behavior of media and structure in extreme conditions (A07~A13)
68. Key mechanical problems in high end equipment and advanced manufacturing (A07~A13)
69. Key mechanical problems in energy and environment areas (A07~A13)
70. Key mechanical problems in aerospace (A07~A13)
71. Origin of the cosmos and nature of dark matter and dark energy (A1401)
72. Formation and evolution of large cosmos structure and galaxies (A1402、A1403)
73. Activities of super large mass black holes and active galaxies (A1404)
74. History, structure, and evolution of the Galaxy (A1405)
75. Formation of stars, internal structure and evolution of stars (A1501、A1502)
76. Star catastrophic eruption, dense celestial body formation and evolution (A1503)
77. Fine structure of the sun and mechanism of corona heating (A1601)
78. Generation, storage and release of energy of the Solar magnetic field (A1602)
79. Formation, detection and dynamics of planetary system (A1701、A1702、A1703)
80. Spatial and temporal standard, orbital dynamics and its applications (A1801、A1802、A1803、A1804)
81. Key technology of earth based optical instrument/infrared telescope (A1901)
82. Radio/millimeter wave/sub millimeter wave telescope and detection technology (A1902)
83. Multi band high energy space detection technology (A1903)
84. Strong correlated system and superconductivity (A20)
85. Topological matter state and quantum self spin liquid (A20)
86. Physics of confined quantum systems (A20)
87. Surface and interface and membrane physics (A20)
88. Physics of semiconductor materials and devices (A20)
89. Magneto electro coupling and multi field regulation (A20)

90. Solid magnetism and device physics (A20)
91. Physics of soft matter and bio systems (A20)
92. Method and software of computational solid state physics (A20)
93. New physics in energy transformation process (A20、 A22)
94. New matter state and effect in extreme conditions (A20)
95. Basics and application of photonic quantum information physics (A22、 A24)
96. Atomic, molecular and cluster structures and dynamics (A21)
97. Atomic and molecular physical studies in extreme conditions (A21)
98. Quantum effect of cold atoms and molecules (A21)
99. Precision spectroscopy and applications (A22、 A24)
100. Nonlinear optics and ultra strong optical physics (A22)
101. Ultra shot laser interference regulation and synthesis (A22)
102. Super high spatial temporal resolution measurement and optical control (A22、 A24)
103. Optical field control based on micro nano structures (A22)
104. Generation and application of novel optical field (A22)
105. Acoustic propagation and control in complex structure (A23)
106. Optical field information processing in ocean (A23)
107. Acoustic sensing and application of multi physical field (A23)
108. Frontier problems in mathematical physics (A25)
109. Basic theory of statistical physics and its application in complex systems (A25)
110. Frontier problems in theory of gravitation and cosmology (A25)
111. Higgs physics and new physics (A26)
112. New method in quantum field, flavour physics and high precision measurement of standard models (A26)
113. Strong interaction and hadron physics (A26、 A27)
114. Dark matter, particle celestial physics and nuclear celestial physics (A26、 A27)
115. Quark gluon plasma and quantum chromo dynamics (A27)
116. Novel structure and reaction mechanism (A27)
117. Heavy ion nuclear physics and laser nuclear physics (A27)
118. Accelerator physics and its advanced technology (A28)
119. Material, mechanism, method and technology of radiation detection (A28)
120. Particle detection mechanism and method (A28)
121. Technology and method of nuclear electronics (A28)
122. Reactor physics and neutron technology (A28、 A30)
123. Inertia confined fusion and plasma physics and technology (A29)
124. Magnetic confined fusion plasma physics and technology (A29)
125. Low temperature plasma physics, diagnosis and applications (A29)

126. **Basic research on nuclear technology applications in new materials and energy areas (A30)**
127. **Basic research on nuclear technology applications in biomedical and agriculture and environmental areas (A30)**
128. **Key problems related to radiation physics and radiation protection (A30)**
129. **Studies on advanced technologies and experimental methods of synchrotron radiation and free electron laser (A30)**

Department of Chemical Science

In 2021, the Department funded 69 Key Program projects with 210 million yuan and 3 million yuan of average funding intensity per project (direct cost). The duration of each project is 5 years.

In 2022, the Department releases the guidelines for Key Program projects and accepts proposals in 98 research areas, and the average direct funding intensity will vary from 2.5 to 3.5 million yuan for each project. In principle, no more than 2 projects will be funded in each research area expect for the Key Program projects group. In order to further improve the horizon and quality of projects, proposals from those groups and teams with excellent research basis and a certain scale are preferred, and proposals for interdisciplinary cooperative research carried out by teams which have strong background are encouraged.

The applicants must indicate the selected research area in “the column of note” in the application form; otherwise, the application will be declined.

In 2022, the main research directions are as follows:

1. **New methodologies and/or mechanisms of inorganic synthesis (B01)**
2. **Synthesis, structure and property of organometallic/organo-elementary compounds (B01)**
3. **Novel synthetic strategies for natural products and complex drug molecules (B01)**
4. **Novel elements, strategies and systems for supramolecular assembly (B01)**
5. **Precise synthesis and structure-function relationship of solid materials (B01)**
6. **New reagents for organic synthesis (B01)**
7. **New methodologies and/or reactions of organic synthesis (B01)**
8. **Organometallic catalysis (B01)**
9. **New synthetic methodologies and mechanisms for polymers (B01)**
10. **Synthesis of polymers with controlled sequence and topological structures (B01)**
11. **Synthesis of functional molecules, structures and materials (B01)**
12. **Synthesis and reaction mechanism under extreme conditions or external**

- fields (B01)
13. **Characterization and reactivity of reactive intermediates in synthetic chemistry (B01)**
 14. **Chemistry-driven biological and biomimetic synthesis (B01)**
 15. **Big data and artificial intelligence-assisted synthesis (B01)**
 16. **Operando characterization and theoretical simulation of catalytic process (B02)**
 17. **Fundamentals for efficient catalytic reaction (B02)**
 18. **Design and construction of high performance catalyst (B02)**
 19. **Fundamentals of physical chemistry for surface/interface reaction (B02)**
 20. **Electrocatalytic conversion of substances (B02)**
 21. **Scientific fundamentals and application of colloid and interface chemistry (B02)**
 22. **Characterization of working conditions for electrochemical energy system (B02)**
 23. **Nanostructures of functional molecules at surfaces/interfaces (B02)**
 24. **Fundamentals of surface/interface chemistry for optoelectronic functional systems (B02)**
 25. **Interfacial function regulation in electrochemical energy conversion and storage (B02)**
 26. **Assembly and functionalization of colloids and interfaces (B02)**
 27. **New characterization methodologies of colloid and interface chemistry (B02)**
 28. **Quantum theory and methodology in chemistry (B03)**
 29. **Chemical kinetics and dynamics of complex molecular systems (B03)**
 30. **Structure and evolution mechanism of polymer aggregation state (B03)**
 31. **Theory and simulation of multiscale systems (B03)**
 32. **Design and mechanism of optical function materials (B03)**
 33. **New methodologies and applications of spectroscopy (B03)**
 34. **Fundamentals and frontiers of structural chemistry (B03)**
 35. **High-precision computation of protein interactions (B03)**
 36. **Molecular-scale transport properties and spin manipulation (B03)**
 37. **Chemical thermodynamics of complex systems (B03)**
 38. **New methodologies for chemical imaging (B04)**
 39. **Measurement and analysis for single molecule, particle and cell (B04)**
 40. **Micro-nano analysis method and devices (B04)**
 41. **Separation and analysis of complex systems (B04)**
 42. **New theory and principle of chemical measurement (B04)**
 43. **New analytical techniques for diagnosis of major diseases (B04)**
 44. **Chemical measurement based on *in vivo* methods (B04)**
 45. **New methodology and technology of *in situ* and operando analysis (B04)**

46. **Intelligent sensing and measurement (B04)**
47. **Chemical measurement for public security (B04)**
48. **Inorganic opto-electromagnetic materials chemistry (B05)**
49. **Composite/hybrid materials chemistry (B05)**
50. **Chemical basis of organic optoelectronic materials (B05)**
51. **Molecular aggregation and materials chemistry (B05)**
52. **Energetic materials chemistry (B05)**
53. **Biomimetic materials chemistry (B05)**
54. **Biomedical materials chemistry (B05)**
55. **Materials chemistry of recyclable and degradable polymers (B05)**
56. **New technologies and methods for the detection of pollutants and intermediates in complex environmental medium (B06)**
57. **Fundamental chemistry and applied research on new environmental functional materials (B06)**
58. **Fundamental study of environmental catalysis in pollution control (B06)**
59. **Environmental chemistry in the treatment and reuse of pollutants (B06)**
60. **Interfacial behaviors, migration and chemical transformation mechanisms of typical pollutants in multimedia environment (B06)**
61. **Environmental exposure and toxicological study of pollutants (B06)**
62. **Process and remediation mechanism of soil/groundwater pollution (B06)**
63. **Computational chemistry and environmental big data (B06)**
64. **Response, risk prevention and control of microorganisms to polluted environment (B06)**
65. **Environmental chemistry targeted at carbon neutrality goals (B06)**
66. **Recognition mechanism and molecular intervention of biomacromolecules (B07)**
67. **Synthesis and function of saccharolipids (B07)**
68. **Molecular mechanism and chemical intervention of immune recognition (B07)**
69. **Mechanism and function of small molecule intervention in pathogenic bacteria signal transduction (B07)**
70. **Discovery and biological functions of novel active natural products (B07)**
71. **Biosynthetic of active natural products (B07)**
72. **Discovery of new drug targets based on chemical biology (B07)**
73. **Biomimetic catalytic system design and biological application of nanozymes (B07)**
74. ***In situ* probes and life mechanism analysis (B07)**
75. **Controllable assembly and functional regulation of bioactive molecules (B07)**
76. **Preparation and purification of key basic chemicals (B08)**
77. **Preparation of high-end specialty chemicals and specialty gases (B08)**

78. **Preliminary data and theoretical methods of chemical engineering (B08)**
79. **Interface phenomenon and regulation in chemical engineering processes (B08)**
80. **Engineering basics of industrial catalysts (B08)**
81. **New materials and methods for separation processes (B08)**
82. **New chemical industrial equipment and intellectualization (B08)**
83. **Systems engineering and chemical safety (B08)**
84. **New green chemical processes for carbon emission reduction (B08)**
85. **Advanced chemical manufacturing of medicines and functional foods (B08)**
86. **Key materials and processes of new energy (B08)**
87. **Chemical engineering fundamentals for comprehensive utilization of biomass (B08)**
88. **Biomanufacturing and biosynthesis of important chemicals (B08)**
89. **Chemical engineering fundamentals for efficient conversion and reclamation of fossil energy (B08)**
90. **Chemical engineering fundamentals for environmental improvement and waste recycling (B08)**
91. **Chemical basis of carbon resource conversion (B09)**
92. **Photo/electro-chemistry for high-efficiency overall water splitting (B09)**
93. **Chemistry of high-efficiency fuel cells (B09)**
94. **Performance degradation mechanisms of secondary batteries (B09)**
95. **Key materials chemistry for solid-state batteries (B09)**
96. **New energy storage chemistry and new concept devices (B09)**
97. **Chemical basis of new thin-film photovoltaic cells (B09)**
98. **Research of non-traditional aromaticity (B0X)**

Note that the 98th area listed above is the Key Program project/group driven by the disciplinary frontier. Applicants can organize a collaborative research team to apply, according to the international development trend of this field, and their research basis and interests, for which corresponding code should be selected (for code B0X, please select from B01 to B08). The Division of General Affairs and Strategic Planning of the Department will accept and handle the proposals.

Department of Earth Sciences

Earth sciences are to understand the planetary earth system, including science of geography, geology, geochemistry, geophysics and space physics, atmospheric science, marine science, environmental geoscience, and the related interdisciplinary disciplines. It mainly explores diverse kinds of phenomena and processes occurred in the planetary

earth system as well as interactions, changes and causality among these processes, and provides scientific and technical supports for solving key issues such as resource supply, environmental protection, and disaster prevention and mitigation. Innovative studies of geosciences will continuously improve the new understanding of the planetary earth system, updating the knowledge hierarchy about the origin and evolution of Earth and planets. Scientists, not only from different disciplines of geosciences, but also from mathematics, physics, chemistry, biology, medicine, material sciences and engineering, informatics and management sciences, are encouraged to jointly apply key programs of the Department of Earth Sciences, and specify the application codes for interdisciplinary studies in the application form.

The relevance and academic contributions to the specific priority themes must be stated in the proposals. To avoid repetitive funding, applicants should clarify clearly the relations and differences between the current application and the related projects funded by other national agencies.

Each priority field of the Department of Earth Sciences emphasizes the integration of different traditional disciplines. The topic of Key Program is not restricted within traditional disciplines. The application code for a Key Program proposal should be selected by the applicant according to the research theme.

In 2021, the Department of Earth Sciences received 612 Key Program proposals, and 112 were approved with direct cost fund of 325 million yuan in total and 2.9018 million yuan per project in average. In 2022, 115 projects will be funded with an expectation of 3.00 million yuan per project and a research period of 5 years.

In 2022, 8 Key Program priority fields in the Department of Earth Sciences are listed as follows:

- (1) New techniques and methods of Earth and planet research;
- (2) Earth and planetary habitability and evolution;
- (3) Deep Earth processes and dynamics;
- (4) Ocean processes and polar environment;
- (5) Earth system processes and global change;
- (6) Weather, climate, and associated sustainable development;
- (7) Human activities and environment;
- (8) Formation mechanism and supply potential of resources and energy.

In the “Annotations” item of the proposal, applicant must select one appropriate field from the above eight fields in the pull-down menu. Proposals with incorrect “Annotations” or without “Annotations” will not be accepted.

The applicants may determine the title, content, and research plan for their own proposals according to the key themes listed in the 8 fields based on the previous research work, clearly-identified new breakthrough points, and approaches of how to break through. The application text should explain the relationship between the project and the selected field, as well as the research

direction.

1. New techniques and methods of the Earth and planet research

Scientific objectives: oriented to scientific frontiers of technological breakthroughs in the observation of key processes or key components of the earth and planetary exploration, the novel techniques, which related with the basic theory, experimental methods, simulation and prediction, observation and information extraction, should be developed; and the innovation of remote sensing, in-situ detection, simulation and prediction of physical and chemical properties on the earth or other planets should be promoted, as well as the integrated application of new technologies from microscopic processes to macroscopic features. Stimulate the establishment of a scientific research system driven by data-model, and lead the comprehensive innovation of multi-spheres, multi-scales, quantitative, and integrated research methods in the earth system.

Preferred research themes:

(1) New theory, technique and method of the earth observation, lunar and planetary exploration, and interplanetary space exploration;

(2) New observation methods and detection techniques oriented by deep space, deep earth, deep time, deep ocean, and habitable Earth strategy;

(3) New techniques and methods for the analysis of the material composition and structure of the earth, planet, and interplanetary space;

(4) Methods of assimilation, fusion, analysis, and integration techniques for spatio-temporal big data;

(5) Establishment and key techniques of the earth observation system and multi-sources data fusion platform.

2. Earth and planetary habitability and evolution

Scientific objectives: studying the transportation, transformation and integrated evolutionary processes of the material and energy during the Earth and planetary formation and multi-layer interaction, and further exploring the origin and evolution of the early life and the habitable environments of the Earth and other planets. The evolution of life on the Earth is closely related to the environment; and the human activities are closely related to the habitability of the Earth and its multi-layer interaction. The key point is to understand the reciprocal feed-back processes between the Earth habitability and the evolution of the life and environment, with multidisciplinary studies.

Preferred research themes:

(1) Origin and evolution of the sun and solar system;

(2) Sun-Earth space physics and space weather;

(3) Planets and planetary space environment and variation;

(4) Evolution of the Earth and planetary magnetic fields, atmosphere, and their

effects on habitability;

(5) Key geological processes and the habitability evolution of the Earth and other planets;

(6) Environmental and life evolution of the Earth and other planets;

(7) Impacts of human activities on the habitability of the Earth;

(8) Evolution of groundwater system and water security.

3. Deep Earth processes and dynamics

Scientific objectives: adhering to Earth planetary science concept, obtaining the information of Earth interior material, structure and dynamics by applying multidisciplinary means of geological, geophysical and geochemical; Deciphering the interactions among the internal spheres of the Earth by studying the multiscale running laws of the solid-Earth; Exploring the coupling between the deep Earth and surficial processes to promote development and innovation in the solid Earth science.

Preferred research themes:

(1) Deep architectures and dynamics of typical regions and global scale;

(2) Coupling of deep and surficial Earth processes and its environmental and disaster effects;

(3) Early Earth evolution and the formation, growth and reconstruction of continents;

(4) Processes and dynamics of continental integration and breakup;

(5) Deep process and material cycling and their effects on resource and environment;

(6) Plate subduction, mantle plume and the interactions among Earth's multiple spheres;

(7) Multiple-scale geodynamic experiment and simulation;

(8) Activities of volcanos and geotherms and their deep mechanisms.

4. Ocean processes and polar environment

Scientific objectives: constructing a theoretical framework for multi-scale motion in the ocean, revealing the mechanisms of material-energy cycle in multi-layers of the ocean, clarifying the interaction mechanism of marine dynamic processes with biological and chemical processes, and the dynamic ocean floor evolution, and exploring the regulation mechanism relating to the variation of the earth system in the deep sea, polar regions, and land-sea interaction zone, revealing the formation and evolution mechanism of the oceanic lithosphere from nascent to extinction, and providing scientific and technological support for national coordination of land and marine development, blue economy, marine sustainable development, and deep sea and polar national strategies .

Preferred research themes:

(1) Ocean dynamics and its coupling with biogeochemical and ecological

processes including the study of observation, mechanism and simulation prediction;

- (2) Rapid changes in polar environment and multi-layer interaction;
- (3) Deep sea fluid-solid coupling, material energy cycle and environmental resource effects;
- (4) High and low latitude ocean processes, sea-land-atmosphere interactions and their driving and responses to global change;
- (5) Multi-interface coupling process and sustainable development in offshore and coastal zones;
- (6) Formation and maintenance mechanism of marine biodiversity;
- (7) Linkage effect of high-latitude and alpine ecosystem changes.

5. Earth system processes and global change

Scientific objectives: the evolution and operation laws of the different spheres need to be explored associated with Earth surface system at diverse spatio-temporal scales, to understand the co-evolution and coupling relationship among the biosphere, hydrosphere, cryosphere, atmosphere, lithosphere and anthroposphere of Earth surface, thereby, to reveal the impacts of Earth system evolution on the resources and environment; and to comprehend the interactions of Earth surface processes and climate change with the development of Earth's life and human society, thus providing key scientific evidence and theoretical support for the future prediction of Earth surface processes, biodiversity, resources and environment, and environmental change trends.

Preferred research themes:

- (1) Earth surface processes and mechanisms based on interactions among diverse spheres;
- (2) Mode, mechanism, and strategy of sustainable development in the context of global change;
- (3) Multiscale spatiotemporal coupling law and regulation of human-nature system;
- (4) Changes law of natural synthesis of Earth surface and human adaptation;
- (5) Key processes of carbon, nitrogen, and hydrologic cycles under the context of global change;
- (6) Typical alpine wetland groups, biodiversity evolution of Qinghai-Tibet Plateau driven by climate change and corresponding ecological security countermeasures;
- (7) Intelligent cognition and simulation prediction of the new generation Earth system model.

6. Weather, climate, and associated sustainable development

Scientific objectives: to investigate the physical and chemical processes in the atmosphere and their interactions with other spheres, this direction aims to reveal the principles and mechanisms of the evolution of and variations in weather, climate, and

the atmospheric environment; to develop high-resolution numerical models and observational techniques; and to improve the theories and technologies for forecasting and predicting weather, climate, atmospheric environment, and especially the extreme disastrous events; to elucidate the impact, mitigation and adaptation of extreme weather events and climate change by focusing on national needs of people's livelihood and sustainable development, thus enhancing our capabilities in disaster prevention and adaptation to global climate changes and providing the scientific basis for the sustainable development of social economy.

Preferred research themes:

- (1) Mechanisms, forecasting, and prediction theories and technologies for weather, climate, and atmospheric environmental variations;
- (2) Physical and chemical processes in the atmosphere and the mechanisms underlying their interactions;
- (3) Biogeochemical processes and weather/climate;
- (4) Multi-spheres coupling and evolution mechanism of the earth's climate system;
- (5) Research and development of atmospheric models and Earth system models;
- (6) Atmospheric environment, weather, climate change, and its health effects;
- (7) Impacts, mitigation and adaptation of extreme weather and climate change.

7. Human activities and environment

Scientific objectives: revealing the evolution processes and the affecting factors of environmental geosciences, clarifying the effects of human activities on water, soil, air, and surface rock interference and transformation based on the complex human-earth systems, and providing theoretical support for understanding the formation mechanism of the earth surface environmental habitability and relationship of features.

Preferred research themes:

- (1) Regional environmental pollution process, health effects and regulation;
- (2) Mechanism of soil degradation and restoration;
- (3) Disaster-causing mechanism and risk prevention and control of major engineering geological disasters;
- (4) Interaction mechanisms, coupling processes and environmental effects of the human-earth system.

8. Formation mechanism and supply potential of resources and energy

Scientific objectives: to aim at realizing the secure supplies of resources and energy and supporting the high-quality development of China. Centering around the basic and cutting-edge scientific issues on the resource and energy strategic succession base, secure supplies and supporting chain, theoretical and experimental studies will be conducted on the efficient exploration of conventional oil and gas, the finding of

unconventional oil and gas, and the enrichment of strategic and scarce mineral resources, through which to consolidate the foundation for independent scientific and technological innovation in the resource and energy fields in China.

Preferred research themes:

- (1) Interaction between different spheres and its effects on resources and energy;
- (2) Organic-inorganic interactions in Earth's interior and their resource effects;
- (3) Formation mechanism and exploration technology of solid mineral resources;
- (4) Accumulation mechanism of oil and gas and their exploration theories and techniques;
- (5) Evolution of the Qiangtang Basin and its effects on energy;
- (6) Mineralization and hydrocarbon accumulation mechanism and exploration and development technology of submarine energy and resources;
- (7) Formation and distribution of new energy and its exploration and development technologies;
- (8) Polar and space resources.

Technological Science Section

Department of Engineering and Materials Sciences

In 2022, the Department of Engineering and Materials Sciences plans to prioritize 14 key project funding areas in engineering, materials and the integration of engineering and materials.

In 2021, the Department received 697 proposals for the Key Program. Among them, 108 were supported with a total direct cost of 324 million yuan, with a direct cost of 3 million yuan per project. In 2022, about 110 projects in the following 14 fields will be supported, with an average direct cost of 3 million yuan per project and a implementation duration of five years.

Attentions:

The 14 designated areas of the Department in 2022 are as follows:

- (1) Common software support platform in engineering and materials field;
- (2) Design, preparation, processing and application of metallic materials;
- (3) Design, preparation and application of inorganic nonmetallic materials;
- (4) Design, preparation and application of organic polymer materials;
- (5) Efficient exploitation and utilization of resources;
- (6) Scientific problems in mechanical design, manufacturing and service;
- (7) Engineering Thermophysics and energy utilization;
- (8) Scientific basis and key technology of electrical engineering;
- (9) High performance civil engineering structure and green building design;
- (10) Water safety and engineering support;
- (11) Regional environmental compound pollution control and ecological restoration;
- (12) New green intelligent marine structure;
- (13) Intelligent transportation and transportation engineering;
- (14) New concept materials, material commonness and interdisciplinary with engineering.

Applications should label the corresponding field name of the Key Program in the Annotation area of the front cover. Applications without an Annotation or with a wrongly selected Annotation will be rejected.

The applicants have the option to determine the project name, research content and research scheme independently according to the research direction of the Key Program funding fields, and select an appropriate application code of the Department in the column of “application code 1”, with the supplement information by selecting “application code 2”.

1. Common software support platform in engineering and materials fields (please select the relevant first-class application code of the Department according to the appropriate software application fields)

The platform aims at the bottleneck technologies of software in the field of engineering and materials, solves the basic scientific problems and common basic theories in the field of general-purpose software and industrial software in engineering and materials sciences, and provides basic support for the development of independent and controllable key tool software.

Key research areas to be supported include:

(1) Research on multi-physical coupling modeling, simulation and optimization design of engineering system;

(2) Research on basic theory and digital simulation of multi-space-time / multi-scale engineering and materials systems;

(3) Research on theoretical modeling and simulation method of discrete-continuous mixed system in the field of engineering and materials;

(4) Research on unifying modeling theory and simulation method by model-driven in the field of engineering and materials;

(5) Research on AI enabling technologies for industrial software theory and algorithm.

Applications failed to meet the requirements of this *Guide*, or failed to reflect the features of engineering and materials sciences will be rejected. Applications of mere information software are not supported.

2. Basics in the design, preparation, processing and application of metallic materials (E01)

Key research areas to be supported include:

(1) Key issues in the design, manufacture, processing and application of ferrous and nonferrous metals;

(2) High temperature alloys, intermetallic compounds and metal matrix composite materials;

(3) Key issues in improving the performance of metallic structural materials;

(4) Metastable and nano metallic materials;

(5) Metallic functional materials;

(6) Biomedical, intelligent and biomimetic metallic materials;

(7) Characterization of structure, surface and interface of metallic materials;

(8) Exploration of new theories, new technologies and new effects of metallic materials.

3. Design, preparation and application fundamentals of Inorganic non-metallic materials (E02)

Key research areas to be supported include:

(1) Research on frontier scientific issues of inorganic non-metallic materials;

(2) Research on basic issues in bottleneck technologies of inorganic non-metallic materials;

(3) Research on multi-scale structure effects of high-performance inorganic non-metallic materials;

(4) Exploration of new theories, new techniques, new systems and new effects of inorganic non-metallic materials;

(5) Research on basic issues of inorganic non-metallic materials under extreme environment;

(6) Basic research on inorganic non-metallic new materials towards the strategy of carbon peaking and carbon neutrality;

(7) Basic research on multifunctional integration and intelligent application of inorganic non-metallic materials;

(8) Basic research on the design, low-cost fabrication and engineering application of high-performance inorganic non-metallic materials.

4. Design, preparation, and application of organic polymer materials (E03)

Key research areas to be supported include:

(1) New synthetic methods and principles of polymeric materials;

(2) Manipulation of the aggregation structure of polymeric materials and its influence on properties;

(3) New theories, methods, and technologies for the processing (including micro-nano processing and additive manufacturing) of polymeric materials;

(4) Biomedical polymeric materials;

(5) Optoelectronic organic polymeric materials and devices with high performance;

(6) Flexible and intelligent polymeric materials;

(7) Eco-environmental polymeric materials;

(8) Basic research on the major problems & challenges existing in the fields of polymeric materials those fulfill the requirements for the national strategical objective.

5. Safety and high efficiency mining and resource green processing and utilization (E04)

Key research areas to be supported include:

(1) Basic scientific issues for the high-efficient drilling and extraction for deep formation, deep sea and unconventional oil and natural gas resources;

(2) Key scientific issues for the safety and reliability of oil and gas storage and transportation;

(3) Safe, efficient and intelligent exploitation theory and key technology of deep strategic mineral resources;

(4) Theory and key technology for the restoration of abandoned mines and low-carbon treatment and efficient utilization of solid waste;

(5) Theory and method for the accurate pre-control of industrial production safety

and public safety;

(6) Low-carbon separation and extraction theory for key strategic minerals and the regulatory mechanism of process intensification;

(7) New process and technology for low-carbon iron and steel metallurgy and the relevant basic environmental issues;

(8) Theory and technology for the low-carbon metallurgy, production and cyclic utilization of difficult-treatment complex metallic resources;

(9) New technology for high-purity smelting, solidification control and shaping control of metals and alloys;

(10) Basic research on the processing technology of short process, composite forming and intelligent processing for high-performance metallic materials.

6. Scientific problems in mechanical design, manufacturing and service (E05)

Key research areas to be supported include:

(1) New design theories and methods driven by synthetic performance for high-end equipment;

(2) New principles and configurations for energy-efficient reliable drive and transmission;

(3) Dynamic characteristic design and intelligent operation of high-end equipment;

(4) Strength design and life assessment for mechanical structures under extreme environment;

(5) Mechanism, test and control of complex mechanical surface/interface mechanics and tribological behavior;

(6) Bionic design and biomanufacturing;

(7) Foundation and equipment of precision forming manufacturing for high-performance complex components;

(8) Theory, method and technology of ultra-precision, ultrahigh-speed and superstrong-power-field machining;

(9) New principles, equipment, systems and modes for intelligent manufacturing;

(10) Precision measurement for high-end precise equipment and micro-nano manufacturing.

7. Engineering thermos physics and energy utilization (E06)

Key research areas to be supported include:

This discipline will support the following research areas:

(1) Analysis, control and optimization of low carbon energy system;

(2) Internal flow mechanism and flow control of fluid machinery;

(3) Fundamental of mass and heat transfer in energy conversion and utilization;

(4) Fuel combustion theory, the mechanism of pollution and emission mitigation, and new combustion technique;

(5) Fundamental of multi-phase flow in energy and power systems;

- (6) Measurement principles and methods for complex thermophysical fields;
- (7) New and renewable energy utilization.

8. Scientific fundamentals and key technologies of electrical engineering (E07)

Key research areas to be supported include:

(1) Common fundamentals and new technologies of electrical engineering, such as electromagnetism and plasma (including sensing and testing, multi-field coupling, digital twinning, new type of power generation, power transmission, discharge plasma and its applications);

- (2) Electrical materials, devices and equipment;
- (3) Smart grid and integrated energy system;
- (4) Electromechanical energy conversion and electric drive;
- (5) Electric energy conversion and control;
- (6) Electric energy storage and its application;
- (7) Bio-electromagnetic technology.

9. High-performance civil engineering structures and green architecture design (E08)

Key research areas to be supported include:

- (1) High-performance civil engineering materials and structures;
- (2) Civil engineering design and construction in complex and severe environments;
- (3) Basic theory and key technology for intelligent construction and maintenance;
- (4) Service safety and performance enhancement of civil engineering infrastructure;
- (5) Basic theory of geotechnical engineering in extreme environment;
- (6) Life-cycle design and disaster prevention of underground and tunnel engineering;
- (7) Multi-hazard effect, disaster-preventing resilience theory, and technology in civil engineering;
- (8) Design theory and method of sustainable and intelligent architecture;
- (9) Theory and method for urban space development;
- (10) Theory and method for habitable urban-rural landscape ecology planning.

10. Key scientific research issues for hydro-science and hydraulic engineering under climatic and environmental changes and extreme weather impacts (E09)

Key research areas to be supported include:

The main research directions to be funded in this field are as follows:

- (1) Sustainable and efficient utilization of watershed water resources;
- (2) Causes and prevention of watershed and river catastrophic floods ;
- (3) Watershed drought monitoring and disaster prevention;
- (4) Agricultural high-efficiency water-saving irrigation;

(5) Evolution mechanisms of river bed and channel under climatic and environmental changes;

(6) Estuarine ecosystem modelling and health regulation;

(7) Hydraulic-mechanical-electrical system regulation and safe operation mechanism;

(8) Intelligent construction and health monitoring of hydraulic and hydropower engineering;

(9) Disaster risk prevention and control in hydraulic geotechnical engineering;

(10) Key basic scientific issues in watershed water network;

(11) Intelligent planning and integrated regulation and control in inter-basin water transfer.

11. Regional environmental compound pollution control and ecological restoration. (E10)

Key research areas to be supported include:

(1) Low-carbon regeneration of urban wastewater and water quality security;

(2) Industrial wastewater reclamation and ultra-low waste discharging;

(3) Fast air purification and disinfection in indoor public places and health risk control;

(4) Synergistic reduction of pollution and carbon emission for industrial gas fume;

(5) Recycling and safe disposal of emerging wastes;

(6) Establishment of sustainable urban water system and water quality security;

(7) Ecological remediation of compound-contaminated sites;

(8) Process simulation of urban/rural and regional substance and energy cycles and ecological risk control;

(9) Multi-medium and safe pollutant conversion and accurate regulation.

12. New offshore structures and marine equipment (E11)

Key research areas to be supported include:

(1) Deep sea mining technology and its frontier scientific issues;

(2) Fundamental research on exploration equipment of marine renewable energy;

(3) Scientific and technical bottleneck on green ship;

(4) Autonomous positioning, navigation, and control of unmanned marine vehicles;

(5) Fundamental scientific issues and key technologies of ocean observation and exploration;

(6) Key technologies of intelligent maritime supervision and smart shipping;

(7) New theories, materials, technologies, and equipment for sustainable development and utilization of marine resource.

13. Intelligent transportation system and intelligentization of vehicles (E12)

Key research areas to be supported include:

(1) Online testing methodology and key generic technology test and assessment

of autonomous driving;

(2) Key methodology and technology of autonomous driving in specific areas and spaces;

(3) Design and control of suborbital aerospace system for intercontinental transportation;

(4) Design and dynamic control of a high mobility multi-mode specialized vehicle;

(5) Risk evolution, mechanism, prevention and control of traffic crash in vehicle-road collaborative system;

(6) Key theory and technology of the high speed Maglev vehicle-guideway system;

(7) Coordinated development theory and key technology of resilient integrated transportation system.

14. Discipline of new conceptual materials and common science of materials (E13)

Key research areas to be supported include:

(1) Research on key common science issues of new conceptual materials design, preparation and characterization;

(2) New conceptual materials and new properties;

(3) New composite and hybrid materials;

(4) Multi-functional integration of materials and devices for intelligence, informatization and miniaturization;

(5) Key new materials for high-end manufacturing and national major projects;

(6) Key new materials for major national needs, including energy, environment, life and health.

Department of Information Sciences

In 2021, the Department announced 72 areas and several non-specified areas meeting the major national demands for the application of Key Programs, and received 347 applications, of which, 92 projects were funded with direct cost funding of 276.84 million yuan in total, and average direct cost funding intensity of 3.91 million yuan per project.

In 2022, the Department will announce 6 groups of Key Program projects in 32 priority directions, and 74 areas for Key Program projects. 100 Key Program projects are planned to be funded with average direct cost funding of about 3 million yuan per project for 5 years. Applicant should follow the guidelines for research directions in relevant areas, in accordance with the trend of development in the research area and

basis of their research team and the actual research object or process, propose key scientific problems and conduct systematic and in-depth theoretical studies or experimental verification. Apart from high level papers, research results should be verified in experimental system or in practical applications.

In order to apply for a group of Key Program projects and Key Program in the field of information science, application code 1 priority funding areas shall be selected to the science department or key project domain names behind the application code, funding category select "Key Program", "note" should choose corresponding research direction or domain name, selection or incorrect application will not be accepted. The applicant is required to submit five representative works related to the project in PDF format (only the representative works of the applicant) as attachments to the electronic application form.

The deadline for proposing areas of Key Program for 2023 is April 30, 2022; please see the department website for relevant details.
(<http://www.nsf.gov.cn/publish/portal0/xx/>).

Priority areas (Key Program project groups) for 2022

1. High performance electromagnetic computer software

To address the problems in developing electromagnetic computer software in China, it is proposed to support research in the integration of self adaptive grid and method of electromagnetic computing and method of efficient electromagnetic computing, high quality grid division, models and method with controllable error, integration of high frequency technique and numerical method, theory and method based on AI technology, so as to provide theoretical basis and technical support for domestic software development. The applicants should have good research background in electromagnetic computing areas and the research results should be verified in typical electromagnetic computations. 5 projects are planned to be funded in the following 5 research directions.

- 1) Integration of self adaptive grid and method of electromagnetic computing
- 2) Credible electromagnetic computing and method of verification
- 3) Efficient electromagnetic computing method and parallel computing
- 4) Integration of novel numerical method and high frequency algorithm
- 5) Smart electromagnetic computing method and its applications

2. Novel software theory, model and platform for complex application scenarios

Complex scenarios involving the merging of man machine things, cloud edge collaboration, big data and the use of AI have broken the assumption of closed system in traditional software design. New architecture, open and undetermined scenarios and legal restriction also give new requirement in novel software development. In this group, 5 projects are planned to be funded in the following 5 research directions.

- 1) Computation theory and software method in open and undetermined scenarios

- 2) Virtual technology and system software for distributive hetero computation
- 3) New types of data management theory and method for cloud end collaborations
- 4) Man machine coordinated smart programming mechanism and platform with domain knowledge enhancement
- 5) Confined software modelling and verification method for legal compliance

3. Brain-like intelligence and brain-like information processing

Learning from human brain has become an important way to develop new theory and technology for artificial intelligence. In this group, it is planned to support research in new types of brain-like theory, method, algorithm, models, hardware development and system architecture. 5 projects are planned to be funded in the following 5 research directions.

- 1) Mechanism and theoretical method for brain-like system information transmission
- 2) Theory and method of brain-like online learning based on neural plasticity
- 3) Theory and method of brain-like neural network learning from the human brain
- 4) Brain-like devices and bionic electric circuit for smart sensing
- 5) Brain-like system with mixed architecture simulating bio intelligence and verification through application

4. Basic theory and key technology for smart unmanned system

Smart unmanned system is now widely used in various areas. It has high autonomy and flexibility, especially great advantages in working under extreme environment. This group will focus on difficulties in the modelling, attitude sensing, autonomous control, credibility and security, gaming and coordinated control in complex and dynamic open situations. The applicants should have good research background in electromagnetic computing areas and the research results should be verified in typical electromagnetic computations. 5 projects are planned to be funded in the following 5 research directions.

- 1) Modeling and autonomous control of smart unmanned system in complex dynamic environment
- 2) Information transmission, interaction and sharing of smart unmanned system with limited resources
- 3) Attitude sensing, optimization and decision making of smart unmanned system in dynamic and open environment
- 4) Autonomous coordination and gaming of smart unmanned system
- 5) Security, credibility assessment and fast healing of smart unmanned system

5. Wide band gap semiconductor materials and devices

This group focuses on scientific problems in high quality preparation, new hetero structure and property regulation. 6 projects are planned to be funded in the following

6 research directions.

- 1) Gallium nitride power materials and devices with silicon substrate quasi vertical structure
- 2) Efficient gallium oxide doping and high performance devices
- 3) Key technology for gallium nitride based VCSEL devices
- 4) 250nm and under far ultraviolet luminous materials and devices
- 5) Key technology for gallium nitride based tetra hertz semiconductor
- 6) Single particle effect and strengthening method for wide band gap devices

6. Photoelectric integrated technology

New challenges in developing the next generation of information system require photoelectric devices which have more functions, wide bandwidth, low power consumption, smaller size, high integration and smart operations. This group focuses on key problems in photoelectric integrated technology. 6 projects are planned to be funded in the following 6 research directions.

- 1) Integrated chips for high resolution computational optical imaging
- 2) High performance communication photoelectric devices based on new material system
- 3) Tetra hertz photoelectric integrated devices for next generation of mobile communications
- 4) Photoelectric integrated chips for information sensing and processing
- 5) CMOS compatible photoelectric integration
- 6) Radio and photon hetero integration for microwave photon

Key Program project areas funded by Department in 2022

- 1. Information theory and technology for semantic communication**
- 2. Frequency compatibility and sharing for big internet constellation system**
- 3. Theory and method of spectrum situation cognition based on electromagnetic characteristics**
- 4. Theory and method of communication, guidance and remote control merging on the physical lay**
- 5. Theory and method of integration of communication, sensing and computation of the internet of vehicles**
- 6. Theory and technology of mobile communication assisted by smart reflection surface**
- 7. Theory and key technology of ultra long distance communication for interplanetary detection**
- 8. Method of marine detection beyond vision range based on electron cloud**
- 9. Exploratory studies on dolphin's sonar mechanism and bionic communication detection technology**
- 10. Video coding and 3-D enhanced display for Mars exploration**
- 11. Impact of atmospheric turbulence on laser communication systems and**

reduction techniques

12. Distributive machine learning method for large scale communication signal processing

13. Efficient coordinated processing and disturbance reduction for multi dimensional radar signals

14. Autonomous sensing and smart confrontation in regional complex environment

15. Mixed model and data driven radar information processing

16. Theory and method of radar target detection and equalized waveform for radar stealth designs

17. Mechanism and merging representation of complex electromagnetic space signals

18. Marine underwater detection by space-borne microwaves

19. Theory and method of wide vision dynamic optical field micro imaging

20. Passive microwave devices and circuit with integrated multi functional packaging

21. Heterogeneous integrated passive radio circuit based on membrane integration and membrane acoustic waves

22. Organ chips for TCM drug selection

23. Method of analyzing bio information and functions of non-coding and circular RNA

24. Theory and technology for satisfying solutions of logic equations

25. Key technology for data driven compiler testing

26. Automatic construction and application of large software defect base

27. Translation technology for AI chips

28. Native cloud runtime system for hetero hardware

29. Identification and origin tracing of fake multi media information

30. High credibility sensing service for unmanned systems

31. Cross link service security in hetero multi link scenarios

32. Smart sensing and origin tracing for internet of things

33. Theory and method for multi mode training model constructions with data and knowledge enhancement

34. Theory and technology for distributive data management for machine learning

35. Sound theoretical analysis and evaluation of decisions made by deep neural network

36. Early warning of depression by integrating information from multiple sources

37. Knowledge driven semantic interpretation and text generation in complex scenarios and multi models

38. Smart analysis and machine translation of old documents of ethnic minorities

39. Theory and method for processing natural languages with little notes

40. Coordinated analysis and evaluation of stream media of the classroom with different models

41. Analysis of the mechanism of understanding the interpersonal interactions in the teaching process

42. Prediction of the remaining life time of major equipment from incomplete data

43. Magnetic controlled capsule data for diagnosis of gastrointestinal disease

44. Fault tolerance control for manned and unmanned aircraft clusters

45. Monitor of the operation of traction system of high speed trains with verification

46. Theory and technology for complex transportation system optimization and control in the internet of vehicles environment

47. Distributive coordinated control and smart decision making for energy internet

48. Total process optimization and control in complex industrial process based on the evaluation of degrading of the control systems

49. Interaction and control of smart mobile assistant system in space station

50. New flexible sensor system for complex sensing environment based on new principle

51. Life-like intelligent system based on life and mechanical electric integration and robot actions

52. Mechanism and control of multi mode movements of bionic robot operating in water and air

53. Coordinated sensing and control of marine robot for environmental observation in extreme dynamic ocean environment

54. Robot system for operating in space and land for underground space detection

55. Preparation of high transmittance large size aluminium nitride crystal substrate

56. Key technology for secure and credible and sustained sensing chips

57. High quality large quantum point luminescent material and devices

58. High stability radio devices and circuit based on 8 inch single crystal graphene

59. Emulation technology based on models of semiconductor power devices and data

60. Key technology low power consumption high stability silicon based MEMES clock

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- 61. Design and application of kilowatt power supply based on semiconductor chips**
 - 62. Technology of mid infrared gas sensor integrated on chips**
 - 63. Basic research on high computing power and reconstruction-able optical tensor convolution computing chips**
 - 64. Tetra hertz wide band black body source and it applications**
 - 65. Generation and application of optical comb on high precision tetra hertz chips**
 - 66. High resolution tetra hertz optical acoustic bio imaging technology**
 - 67. Theory and key technology for tetra hertz gaseous optical acoustic sensing**
 - 68. Key technology for stable and in-orbit assembled large aperture optical systems**
 - 69. Femto second laser system in visible light wave band**
 - 70. Method and technology of calibration without reference to hot infrared space radiations**
 - 71. Early diagnosis of tumor based on optical method of surface plasma excimer**
 - 72. Super high resolution imaging of deep organism in living bodies**
 - 73. Algorithm of solving the electromagnetic field by expanding the eigen modes for micro nano optics**
 - 74. Large scale integrated quantum information processing chip**

Life and Medicine Section

Department of Life Sciences

The research fields funded by the Department of Life Sciences cover biology, agricultural science, ecology and population health. According to the orientation of Key Program, funding of Key Program projects are carried out in line with the principle of "limited objectives, limited scale and prominent focus". The Department of Life Sciences will carry out projects peer-review and funding focusing on the following development layout: the forefront of scientific development, major national needs, promoting revolution innovation, and solving the core scientific problems behind needs and key technologies. In 2021, the Department of Life Sciences received 625 applications, among which 624 projects were accepted and 110 projects were approved.

In 2022, the Department will continue to follow the principles of **"encouraging exploration, highlighting originality; focusing on the frontier, creating new paths; demand traction, breaking through bottlenecks; common orientation, cross-linking"**. Key Program areas in 2022 are proposed to encourage scientists to aim at the frontier of science, select fundamental and global scientific problems and carry out systematic innovative work, form key program project groups in important research directions of disciplines, and promote the development of fields. Meanwhile, more emphasis will be put on "curiosity-driven disruptive research" and trans-disciplinary study dealing with grant challenges is encouraged. In 2022, based on the overall arrangement for the Key Program of NSFC, the Department of Life Sciences will arrange a total direct cost budget of 300 million yuan, to support similar number of Key Program projects as that of 2021. The funding intensity is roughly the same as that in 2021. Applicants should put forward reasonable budget according to the actual financial needs of their research.

In order to apply for the Key Program, applicants should read the application requirements, special notes, and the funding plan of the Department in this chapter carefully. Moreover, since the research areas in the Department cover a broad spectrum from fundamental biological sciences and basic medicine to agricultural science, the designated areas of Key Program in each discipline is closely correlated with the funding areas of the discipline. **Please note that applicants should correctly apply for the Key Program according to the funding areas. Those as described in "matters needing attention "as described in "Scientific departments" parts are**

equally applicable to the Key Program.

The requirements for application to the Key Program projects of the Department are as follows:

(1) Applicants should propose research topics and compose every parts of the proposal following the guidelines of designated areas issued by the Department in 2022. In the column of annotations on the basic information table of the application form, applicant should fill in the applied research area; with the corresponding application code lined out in each discipline's designated areas correctly.

(2) Applicants for the Key Program of the Department are required to attach the first pages of five representative research articles (published in the recent five years) closely related to the proposal (upload as attachment with application).

The designated areas of each Division in the Department of Life Sciences in 2022 are as follows:

- 1. Characteristics and transmission infection mechanism of pathogenic microorganisms (C01)**
- 2. Special microbial groups and their interaction with environment (C01)**
- 3. Regulation mechanism of plant organ / tissue genesis and sequential development (C0207)**
- 4. Mechanism of plant\environment and other biological interactions (C02)**
- 5. Evolution and adaptation of important animal traits (C0401)**
- 6. Mechanisms of animal phylogeny and diversity formation (C0402)**
- 7. Inheritance or epigenetic mechanism of phenotype and important function (C06)**
- 8. Bioinformatics methods and big data analysis (C06)**
- 9. Cell signal transduction and cell adaptation (C07)**
- 10. Intracellular structure and regulation (C07)**
- 11. Gametogenesis, embryo and organ development (C12)**
- 12. Construction and regeneration of stem cells and organs (C12)**
- 13. Mechanisms of immune cell development, differentiation and response (C08)**
- 14. Mechanism, abnormality and intervention of Immune regulation (C08)**
- 15. Neurobiological basis of instinctive behavior (C0905)**
- 16. Synaptic development and plasticity (C0902)**
- 17. Psychological mechanism of emotion and social cognition (C0907)**
- 18. Regulation of tissue and organ homeostasis and correlation with the occurrence and development of diseases (C11)**
- 19. Metabolic regulation and diseases (C11)**
- 20. Dynamic regulation mechanism of biological macromolecules (C0502)**
- 21. Metabolic process of substances, signal transmission and regulation (C0509)**

- 22. Tissue engineering and organoid architecture (C10)**
- 23. Effects of biomaterials and drug delivery (C10)**
- 24. Analysis and reconstruction of important biological process (C2101)**
- 25. Development and application of editing, manipulation and imaging technology for biomolecules (C2105)**
- 26. Formation and maintenance mechanism of ecosystem multifunctionality (C03)**
- 27. Ecological effects and mechanism of pests (C03)**
- 28. Directional Cultivation and efficient utilization of forest and grass biomass (C16)**
- 29. Biological basis and regulation mechanism of excellent characters of forest and grass (C16)**
- 30. Molecular basis and genetic regulatory network of crop complex traits (C13)**
- 31. Biological mechanism of the coordination between crop quality formation, yield and quality (C13)**
- 32. Biological basis and regulatory mechanism of food processing, manufacturing and storage (C20)**
- 33. Mechanisms of food nutrition, flavor formation and safety control (C20)**
- 34. Mechanism and control basis of crop pest disaster and evolution (C14)**
- 35. Identification and regulation of pest resistance genes in crops (C14)**
- 36. Biological basis of efficient cultivation and quality formation of horticultural crops (C15)**
- 37. Mechanism and improvement of crop nutrient efficient utilization (C15)**
- 38. Biological basis for the formation of important traits of livestock, poultry, bee or silkworm (C17)**
- 39. Precise nutrition of livestock and poultry and efficient utilization of feed (C17)**
- 40. Pathogenic biology, pathogenic mechanism and drug resistance mechanism of zoonoses (C18)**
- 41. Pathogenesis and host response mechanism of important diseases in livestock and poultry (C18)**
- 42. Occurrence and control mechanism of important diseases in aquaculture (C19)**
- 43. Breeding and formation mechanism of economic characters of aquaculture organisms (C19)**

Moreover, considering common problems in the past years, the Department of Life Sciences particularly reminds applicants of avoiding the following listed mistakes. Otherwise, proposals may be rejected during the preliminary checking procedure:

- (1) Applications do not specify the title of designated research areas in the column

of “Annotations” on the basic information table in main body of the application text;

(2) Applications do not fill in the corresponding application code specified by this *guide*;

(3) Applications to Key Program, without submitting the 5 representative publications within 5 years (since 2017) as first author or corresponding author.

(4) Applications indicate the designated areas in the “Annotation” column, but the actual research contents do not match the scope of funding;

(5) Applications submitted by applicants who are still holding a full time position abroad, or who cannot ensure necessary time and efforts for implementing the proposed research in China.

For other issues to be noted for proposal preparation, please refer to the *Guide on the “matters needing attention” as described in “Scientific departments” parts.*

Department of Health Sciences

In 2021, a total of 758 applications for the Key Program in 44 thematic areas and macroscopic areas were received, 123 of which were finally funded with a total funding of 357.20 million Yuan (direct cost) and an average funding of 2.9041 million yuan (direct cost) per project. In 2022, the funding plan for the Key Program will still be divided into two categories: 100 projects in the listed thematic areas and 25 projects in macroscopic areas. The average funding intensity of direct cost is about 3 million yuan per project, and the duration is 5 years.

According to the significant national needs, combining the discipline development strategy and the priority funding direction in the field of health science, a total of 39 thematic areas for solicited Key Program were proposed by the Department following expert appraisal in 2022. Applicants are encouraged to decide project name, research contents and approach on their own based on the scope of the Key Program. **The Annotation column should be chosen one of the below published 39 research areas of Key Programs; the application code 1 column should be chosen the labeled application code after name.**

To timely support the key scientific issues facing significant national demands and science frontiers in the world, the Department of Health Sciences continues to fund the Key Program in macroscopic areas. **For those fields that have achieved significant progress or innovative findings in the initiation, development, prognosis, diagnosis, treatment and prevention of critical illness, applicants can choose research directions for the Key Program if the planned research content falls out of the scope of the Key Program. The Annotation column should be chosen the Key Program in macroscopic areas, whereas the application code**

column can be decided on their own. The grant should be attached with a description of 800 words regarding the progress of achieved innovation. The application will not be accepted without this description.

Applications for Key Program fail to provide relevant materials as required above will not be accepted. For the requirements and precautions of the proposals, please refer to the general introduction of Key Program in the *Guide*.

(1) The Department will generally not fund the applicants in 2022 who either have been intensively funded in 2021 from NSFC [such as Key Program, Key International (Regional) Joint Research Program, Major Research Plan, Key Program of Major Research Plan or Programs of Joint Funds, Special Fund for Research on National Major Research Instruments], or are applying for repetitive or similar research to their ongoing national scientific projects funded by other governmental agencies.

(2) Applicants are required to attach the first page of their representative paper in PDF format to the electronic version of the application, and provide the full text of the representative paper in PDF format as attachment.

In 2022, the research fields of Key Program in Department of Health Sciences are as follows:

1. Mechanistic insights into the development of acute lung injury (H01)
2. The key links of the evolution and precision diagnosis and treatment for lymphoma (H08)
3. Role of metabolic microenvironment in cardiac remodeling (H02)
4. Key proteins related to cellular signaling pathways and vascular injury repair (H02)
5. Pathogenesis and intervention strategies of inflammatory diseases in the digestive system (H03)
6. Mechanism of cell-microenvironment interaction in the occurrence and development of various renal diseases (H05)
7. Study on the crosstalk between tissues and organs in metabolic diseases (H07)
8. Microenvironment regulation mechanism in heredity, development or regeneration of craniomaxillofacial tissues and organs (H15)
9. Inflammatory ophthalmopathy and intervention study (H13)
10. Early pathogenesis and intervention strategy of neurodegeneration and related diseases (H09)
11. Immune inflammatory mechanism and intervention strategy of acute brain injury (H09)
12. Neural regulation, intervention and its mechanism of common mental disorders (H10)
13. Metabolic regulation and intervention strategy of aging (H19)
14. Key scientific issues and strategies of fertility protection (H04)

15. The key factors and mechanisms affecting immunotherapy efficacy (H11)
16. Immune escape, tolerance and disease occurrence and development (H11)
17. Pathogenesis and diagnostic strategy of complex and undiagnosed neurological diseases (H23)
18. Characteristic changes and intervention study of human body working ability in special environment (H24)
19. Key technologies for accurate identification of difficult biological samples (H25)
20. Research on accuracy and intelligence of image-guided interventional therapy (H27)
21. Construction and regeneration and repair study of spatially characterized organoids based on bioactive materials (H28)
22. Study on the interaction between pathogen infection and host and its mechanism (H21/H22)
23. Mechanism of spine development, degeneration and related disorders (H06)
24. Mechanism and intervention strategy of multiple organ failure during emergency and critical care medicine (H16)
25. Study on the effect and mechanism of rehabilitation intervention on neural and locomotor dysfunction (H20)
26. The mechanism underlying tumor immune microenvironment and metastasis (H18)
27. Discovery of candidate targets based on synthetic lethality and the underlying mechanism (H18)
28. Cell death modes and tumor immune therapy (H18)
29. The mechanism underlying the effect of neuropsychiatric factors on tumor genesis, development and treatment (H18)
30. Pathogenesis and intervention strategies of immune skin diseases (H12)
31. Research on the mechanism of target effect of radiation injury (H29)
32. Research on risk factors and preventive strategies of malignant tumors in common chronic disease population (H30)
33. Research on the influence and mechanism of nutritional, environmental and occupational factors on neurological and mental health (H30)
34. Research on drug candidates and mechanisms of anti-plateau hypoxia prevention and treatment (H34)
35. Discovery of new targets and effective compounds for neuropsychiatric diseases and investigation on the action mechanisms (H35)
36. Biological mechanism of acupuncture and moxibustion with different stimulation patterns (H31)
37. Biological basis of Traditional Chinese Medicine syndromes, corresponding therapeutic principles and methods in cardiovascular diseases (H31)

38. Biopharmaceutical basis of Traditional Chinese Medicine formulation design (H32)

39. Immunological mechanism of prevention and treatment of rheumatic immune diseases with integrated traditional Chinese and Western Medicine (H33)

Interdisciplinary and Integration Section

Department of Management Sciences

In 2021, the Department received a total of 143 Key Program applications, and funded 35 projects. The average funding for direct cost was 2.03 million yuan per project.

During the 14th Five-Year Plan period, the Department will release funding fields of Key Program annually. The Key Programs should be focused on three aspects as follows: (1) scientific frontier issues that can promote discipline development, obtain great innovative achievement, and generate international impacts; (2) important theoretical and application issues regarding economy development, society development, reform and opening-up, and the improvement of China's comprehensive competitiveness, which need to be urgently addressed, and are possible to be addressed; (3) systematic and in-depth innovative research, which explores management theories and laws for Chinese characteristic and has sound research background or good potential for discipline development.

The funding priority areas described in this *Guide* outline the main contents and scopes. Please note that the title of application is not required to be exactly the same as the area titles of the following listed Key Programs. Applicants are required to possess solid research experiences and abilities in the areas that they are applying for. Applicants are encouraged to exploit their full advantages, present deep academic thoughts in their applications, make the research goals clear and concrete, emphasize the key points of research, focus on one or several key points of the research and actually address them, and have theoretical breakthroughs. In addition, applications are required to apply theories to practice and meet the nation's key demands, discover key scientific issues from important practical management issues from a perspective of China's situations and conduct in-depth research, and try to provide new approaches to address practical management issues. Applicants should focus on scientific methodologies, emphasize on the application of scientific approaches, and take real data and actual cases as the fundamental information of their research.

Key priority areas of Key Program in 2022

Applicants who apply for Key Program of the Department should choose the codes noted after the areas of the Key Program as the first application code, and fill the name of the corresponding areas in the Appendix of the application. Applications that fail to do so will not be accepted.

In 2022, the Department proposes priority areas as below for Key Program, and

plans to support 36 projects. The funding for direct cost will be about 2.10 million yuan per project, and the implementation period of the projects will be 5 years.

1. Intelligent manufacturing management theory and method

(1) Intelligent manufacturing simulation and decision theory based on digital twin (G0103)

(2) Intelligent manufacturing service platform mode innovation and mechanism design (G0117)

(3) Customized production and quality management facing to intelligent manufacturing (G0108)

(4) Life-cycle management for intelligent manufacturing with low carbon (G0108)

(5) Production management and operation mechanism for major technical equipment (G0108)

2. Optimization and innovation for integrated operation of civil aviation (G0102)

3. Behaviors and algorithms in online marketplaces (G0106)

4. New retail mode of online live broadcasting and optimization of supply chain system (G0109)

5. Risk management of data safety for internet of things based on block chain (G0113)

6. Large-scale transportation hub and surrounding transportation system optimization management and control (G0116)

7. Behaviors and management for man-machine system (G0118)

8. Research on enterprise operation and management under the era of digital intelligence

(1) Research on enterprise marketing innovation theory under the era of digital intelligence (G0207)

(2) Organization mode transformation and employee's behavior under the era of digital intelligence (G0208)

(3) Research on data application and organization effectiveness under the era of digital intelligence (G0209)

(4) Enterprise investment and financing and risk management under the era of digital intelligence (G0210)

(5) Operation management and business model innovation under the era of digital intelligence (G0211)

9. Research on micro-foundation theory on enterprise strategy and entrepreneurship (G0201)

10. Integrated development mode of innovation chain and industrial chain of China's enterprise (G0202)

11. Motivation, mechanism and mode of doing basic research by China's

enterprise (G0203)**12. Research on leadership mode and theory for platform enterprises (G0204)****13. Research on accounting of enterprises' "value flows-energy flows-carbon flows" (G0206)****14. Basic theory of digital economy development**

- (1) Research on the theory and method of digital economy measurement (G0301)
- (2) Theoretical research on financial risk management under the background of digital economy (G0303, G0307)
- (3) Research on the impact mechanism and policy of the change of digital economy on employment (G0305, G0313)

15. Basic theory of regional economy and industrial economy development

- (1) Theoretical model and key element system of new kinetic energy cultivation for the revitalization and development of old industrial bases (G0309, G0312)
- (2) Stimulating the vitality of market players and optimizing the business environment (G0309, G0310, G0312)
- (3) Development model of urban-rural integration and industrial innovation under the strategy of rural revitalization (G0309, G0311)
- (4) Industrial influence and sustainable development theory under the constraint of "double carbon" goal (G0309, G0314)

16. Environmental and ecological management

- (1) Risk management of key emission reduction technologies of carbon neutral based on complex systems (G0411)
- (2) Dynamic simulation and governance of complex environmental risk systems driven by artificial intelligence technology (G0411)
- (3) Research on multi-dimensional policy simulation of carbon neutral based on complex system modeling (G0411)
- (4) Complex mechanism of energy transition and its economic, social and environmental impact (G0411, G0412)

17. Public administration and social governance

- (1) Theory and mechanism of reform and innovation of public governance system (G0401)
- (2) Theory, paradigm and policy of community governance driven by big data (G0401)
- (3) Construction of social intelligence system and social computing in social governance (G0410)
- (4) Change of information resources and knowledge management theory empowered by digital intelligence (G0414)

Major Research Plan

Major Research Plan is designed to be a program cluster which contains a number of projects with relatively unified objectives and orientations by focusing on critical scientific issues in accordance with major national strategic demands and key scientific frontiers, strengthening the top-level design, encapsulating scientific goals and gathering advantageous research resources, so as to facilitate crossing and convergence of multiple-disciplines, foster innovative talents and teams, promote the original innovation ability of the basic research in China and provide scientific support for the national economy, social development and national security.

The Major Research Plan follows the principle of “definite objective, stable support, integration and promotion, and leap-forward development”. The funding period for Major Research Plan projects is 8 years in general.

An applicant must meet the following eligibilities:

- (1) Have the experience of undertaking basic research projects.
- (2) Have a senior professional position (title).

In-site post-doctors, or graduate students, or researchers without a research institution or whose host institutions have not been registered at NSFC cannot apply as the Principle Investigator.

An applicant may submit no more than one proposal in the same year, and grantees of the Major Research Plan program are not allowed to apply for this kind of programs in the following year, excluding Integrated Program and Strategic Research Program.

The Major Research Plan consists of three subcategories, namely, the Fostering Program, Key Program and Integrated Program, of which each one is open to application. Proposals shall be prepared in accordance with the requirement for the Major Research Plan and outlines of application, highlighting definite objective and key breakthrough, featuring interdisciplinary research, emphasizing on the contributions to solving critical scientific issues and fulfilling the overall goals of the Major Research Plan. Applicants should select “Major Research Plan” for the column of the funding type in the application form of proposal, and Fostering Program, Key Program, or Integrated Program for the column of sub-type, and input the title of the Major Research Plan in the annotation.

Generally, the duration for Fostering Program project is 3 years, for Key Program project is 4 years, and that for Integrated Program project is

determined by the Steering Committee of each Major Research Plan based on the actual need. For Fostering Program project and Key Program project, the collaborative institutions involved may not exceed 2 in number. The number of collaborative institutions involved in one Integrated Program project may not exceed 4. The main participants must be the actual contributor to the Integrated Program project, and total number of main participants may not exceed 9.

Regulations on managing and sharing of data and information should be observed in order to implement the overall scientific objectives and multi-disciplinary integration of the Major Research Plan. During the progress of project, attention should be paid to the supporting relationship among various programs.

Annual academic seminar on funding projects of the Major Research Plan and aperiodic academic symposium on relevant research area should be held, so as to strengthen academic exchange, achieve research on the overall scientific objectives and cross and integration of multi-disciplines. The PIs of the granted projects are obliged to participate in these activities.

For details of each Major Research Plan, please refer to the relevant sections of introductions on Major Research Plan in this *Guide*.

Program Guidance for other Major Research Plans will be released successively on the NSFC website.

Construction and Manipulation of the Second Generation Quantum System

This major research plan aims to build and manipulate the second-generation quantum system showing quantum behaviors such as entanglement / superposition quantum states, carry out forward-looking and basic research in quantum information science, promote interdisciplinary research in mathematics, information, engineering materials, chemistry and other disciplines, and lay a physical foundation for the realization of quantum technologies such as quantum computers.

I. Scientific Targets

The overall scientific targets of the plan are:

(1) Explore and prepare high-quality materials that can be used for quantum computing and quantum detection, realize the accurate construction of quantum states, and explore new quantum systems.

(2) Develop quantum state measurement and manipulation technology, improve the accuracy of detection and regulation, and explore new technical methods.

(3) Carry out forward-looking research on correctable solid-state quantum computing, high temperature superconductivity mechanism, topological quantum system and low dimensional quantum system, and made major scientific breakthroughs in several directions.

II. Key Scientific Problems

(1) Controllable preparation of key quantum functional materials and accurate construction of quantum state system.

(2) Experimental technology and theoretical method of precise detection and manipulation of quantum states.

(3) Research on solid state quantum computing such as superconductivity.

(4) Exploration of new quantum computing system and implementation scheme.

III. Funding Plan for 2022

This major research plan will fund exploratory and new-direction applications in the form of Fostering Projects. It is planned to fund about 15 projects. The average direct cost is about 800,000 yuan per project. The funding period is 3 years. The research period in the application should be "January 1, 2023 to December 31, 2025"; applications that have accumulated good work and are expected to make important breakthroughs in the construction and manipulation of second-generation quantum systems will be supported in the form of key support projects. About 10 projects are planned to be funded, the average funding intensity of direct costs is about 3.5 million

yuan per project, the funding period is 4 years, and the research period in the application should be “January 1, 2023 to December 31, 2026”.

IV. Key research directions funded in 2022

In 2022, this major research plan will focus on forward-looking and fundamental research on quantum computing-oriented physical systems, and will fund the construction and manipulation of second-generation quantum systems in the form of "Fostering Projects" and "Key Support Projects". The main research directions are as follows:

1. Controllable preparation of quantum functional materials and precise construction of quantum state systems

- (1) Design and preparation of quantum computing functional materials;
- (2) Design and preparation of materials and devices for non-Abelian Anyon statistics;
- (3) Construction of quantum systems based on various quantum states.

2. Experimental techniques, methods and theories for precise detection and manipulation of quantum states

- (1) Quantum state measurement technology and method;
- (2) Control technology and scheme of quantum entanglement;
- (3) Research on the theory, method and quantum algorithm of quantum computing error correction;
- (4) Research and development and integration of ultra-low temperature quantum control and measurement technology.

3. Solid-state quantum computing

- (1) Quantum computing devices such as superconductors and semiconductors with long coherence time;
- (2) The fidelity of quantum gate manipulation is improved;
- (3) Integration and manipulation of qubits.

4. Exploration of topological quantum computing system and implementation scheme

- (1) Research on the non-Abelian statistical properties of Majorana zero-energy modes;
- (2) Design and implementation of topological qubits.

V. Principles of Selection

To ensure the overall goal is achieved, this major research plan requires that all applications should focus on the construction and manipulation of second-generation quantum systems. The directions of priority support are as follows:

- (1) Research on the controllable preparation of key quantum functional materials in the frontier field and the precise construction of quantum state systems.
- (2) Research on experimental techniques and theoretical methods for precise detection and manipulation of quantum states, encourage the development of

corresponding original techniques and methods, and research that is expected to produce major applications.

(3) Research on solid-state quantum computing such as superconductivity is encouraged to explore new and original solutions.

(4) Exploration of new quantum computing systems and schemes.

(5) Multidisciplinary substantive cross-cooperative research, especially the cross-cutting research of the second-generation quantum system in the fields of information, engineering and materials science, and chemistry.

(6) Pay attention to the organic combination of theory and experiment.

VI. Notice for Application

(1) The applicant and host institute shall carefully read and implement the relevant requirements in the *Guide to Programs*, the *Guide* and the Notice on the application and Final Reports Referring Funding Application and Conclusion of NSFC in 2022.

(2) The Major Research Plan aims to guide and integrate the strategic direction and advantages of multidisciplinary related research closely around the core scientific issues, so as to form a project cluster. According to the specific scientific problems to be solved in the Major Research Plan and the research direction to be funded published in the *Guide*, the applicant shall independently formulate the project name, scientific objectives, research content, technical route and corresponding research funds.

(3) The funding category in the application is "Major Research Plan", the subclass description is "Fostering Project" or "Key Project", the "Description" is "Construction and Control of Second-generation Quantum System", and the corresponding application code is selected according to the specific research content of the application. There shall be no more than two cooperative research institutions for Fostering Projects and Key Projects.

(4) In the "Project Basis and Research Content" part of the application, the applicant shall first explain that the application conforms to the key funded research directions in the *Guide*, as well as its contribution to solving the core scientific problems of the major research plan and realizing the scientific objectives of the major research plan. If the applicant has had other science and technology projects related to this major research plan, the difference and connection between the current application and other related projects shall be written in the "Research Basis and Working Conditions" part of the application.

(5) In order to achieve the overall scientific objectives and multidisciplinary integration of the major research plan, the person in charge of the funded project shall promise to abide by the provisions on the management and sharing of relevant data and materials, and pay attention to the mutual support relationship with other projects of the major research plan during the implementation of the project.

(6) In order to strengthen the academic exchange of the project and promote the

formation of project groups and interdisciplinary intersection and integration, the Major Research Plan will hold an annual academic exchange meeting for funded projects every year, and will organize academic seminars in relevant fields from time to time. The person in charge of the funded project is obliged to participate in the above academic exchange activities organized by the guiding expert group and management working group of this Major Research Plan.

(7) The application form is accepted by the Department of Mathematical Physics Science, Tel.: 010-62325055.

Excellent Young Scientists Fund

The Excellent Young Scientists Fund supports young scholars with good achievements in basic research to conduct innovative research in areas on their own choice, so as to promote fast growth of creative young talents and foster a number of outstanding talents on the international science frontiers.

1. The applicant for Excellent Young Scientist Fund should be based in the host institute and meet the following qualifications:

(1) Abide by the laws of the People's Republic of China and the management regulations of NSFC. Have good scientific integrity, and consciously practice the spirit of scientists in the new era;

(2) Be under the age of 38 (for male, born on or after January 1, 1984) or 40 (for female, born on or after January 1, 1982) by January 1 of the year of application;

(3) Have senior professional position (title) or PhD degree;

(4) Have the experience of conducting basic research projects or other basic research;

(5) Have no employment with foreign institutions;

(6) Be able to work in host institution for no less than 9 months per year.

2. The following people may not apply:

(1) Grantees of the National Science Fund for Distinguished Young Scholars or the Excellent Young Scientists Fund;

(2) Applicants for the National Science Fund for Distinguished Young Scholars in the same year;

(3) Post-doctors and graduate students;

Special reminder to the applicants:

In 2022, Excellent Young Scientists Fund will use the ceilings system, and the funding will no longer consist of direct costs and indirect costs, with 2 million yuan for each grant.

In 2022, according to the requirements of on the overall planning and connection of the national scientific and technological talent plan, the applicant can only have one grant of the national scientific and technological talent plan at the same level during the funding period, and cannot apply against the level. Those who have received any kind of grant from the same level of the national

science and technology talent plan and are in the funding period, and those who have received any kind of funding from the national science and technology talent plan at the higher level shall not apply for the Excellent Young Scientists Fund.

In 2021, 6558 applications were received and 620 projects were funded, with a funding of 1.24 billion yuan.

In 2022, 630 Excellent Young Scientists projects are planned to be funded for a period of 3 years.

Funding for Projects of Excellent Young Scientists Fund in 2021

Departments	No. of applications	No. of awards	Success rate (%)
Mathematical and Physical Sciences	717	71	9.90
Chemical Sciences	805	86	10.68
Life Sciences	872	86	9.86
Earth Sciences	690	59	8.55
Engineering and Materials Sciences	1 231	109	8.85
Information Sciences	897	90	10.03
Management Sciences	234	21	8.97
Health Sciences	755	74	9.80
Interdisciplinary Sciences	357	24	6.72
Total or average	6 558	620	9.45

Excellent Young Scientists Fund (Hong Kong and Macao)

In order to support the scientific and technological innovation and development of the Hong Kong and Macao Special Administrative Regions (hereinafter referred to as the Hong Kong and Macao), encourage patriotic scientific researchers who love Hong Kong and Macao to participate in the central science and technology funding plan, and contribute to the construction of a strong country in science and technology, NSFC will continue to launch the Excellent Young Scientists Fund (Hong Kong and Macao) to scientific researchers of the host institutions of the Hong Kong and Macao Special Administrative Regions in 2022.

1. The applicant for Excellent Young Scientist Fund (Hong Kong and Macao) should be based in the host institutions and meet the following qualifications:

(1) Abide by the Basic Law of the Hong Kong Special Administrative Region of the People's Republic of China, the basic law of the Macao Special Administrative Region of the People's Republic of China and the management regulations of NSFC, have good scientific integrity and consciously practice the spirit of scientists in the new era;

(2) Be officially employed in the host institutions of Hong Kong and Macao;

(3) Guarantee to work in the host institution of Hong Kong and Macao during the Funding period be more than 9 months per year;

(4) Be under the age of 38 (for male, born on or after January 1, 1984) or 40 (for female, born on or after January 1, 1982) by January 1 of the year of application;

(5) Have a senior professional position (title) or PhD degree;

(6) Have the experience of conducting basic research projects or other basic research.

2. The following people may not apply:

(1) Grantees of the National Science Fund for Distinguished Young Scholars or the Excellent Young Scientists Fund;

(2) Post-doctors and graduate students.

In 2022, the Excellent Young Scientists Fund (Hong Kong and Macao) will implement the ceilings system, and the funding will no longer consist of direct costs and indirect costs, with each funding of 2 million yuan.

In 2021, 165 applications were received and 25 projects were funded by the Excellent Young Scientists Fund (Hong Kong and Macao), with a funding of 50 million yuan.

In 2022, 25 the Excellent Young Scientists Fund (Hong Kong and Macao) projects are planned to be funded for a period of 3 years.

Funding for Projects of Excellent Young Scientists Fund (Hong Kong and Macao) in 2021

Unit: 10,000 yuan

Departments	No. of applications	No. of awards	Success rate (%)
Mathematical and Physical Sciences	26	4	15.38
Chemical Sciences	17	2	11.76
Life Sciences	20	4	20.00
Earth Sciences	15	3	20.00
Engineering and Materials Sciences	30	4	13.33
Information Sciences	25	5	20.00
Management Sciences	12	1	8.33
Health Sciences	20	2	10.00
Total or average	165	25	15.15

National Science Fund for Distinguished Young Scholars

The National Science Fund for Distinguished Young Scholars supports young scholars who have made outstanding achievements in basic research to select their own research directions and conduct creative research, so as to speed up the growth of young scientific talents, attract overseas talents and foster a group of prominent academic pacemakers in the forefront of international science and technology.

1. The applicant for National Science Fund for Distinguished Young Scholars should be based in the host institution and meet the following qualifications:

(1) Abide by the laws of the People's Republic of China and the management regulations of NSFC, have good scientific integrity and consciously practice the spirit of scientists in the new era;

(2) Be under the age of 45 by January 1 of the year of application (born on or after January 1, 1975);

(3) Have a senior professional position (title) or PhD degree;

(4) Have the experience of presiding over basic research projects or conducting other basic research;

(5) Not be employed by foreign institutions;

(6) Be able to work in host institution for no less than 9 months per year within the Funding period.

2. The following people may not apply:

(1) Post-doctors or graduate students;

(2) Grantees of ongoing project of the Excellent Young Scientists Fund (application is allowable on the year of completion of the funding of the Excellent Young Scientists Fund);

(3) Applicants for the Excellent Young Scientists Fund in the same year;

(4) People studying for a post-doctoral degree or graduate degree.

In particular, the applicant is reminded that:

In 2022, National Science Fund for Distinguished Young Scholars will implement the ceilings system, and the funding will no longer consist of direct costs and indirect costs. The funding for each item is 4 million yuan (2.8 million yuan for mathematics and management science).

In 2022, according to the requirements of on the overall planning and connection

of the national scientific and technological talent plan, the applicant can only have one grant of the national scientific and technological talent plan at the same level during the funding period. Those who have received any kind of grant from the same level of the national science and technology talent plan and are in the funding period shall not apply for the National Science Fund for Distinguished Young Scholars.

In 2021, National Science Fund for Distinguished Young Scholars received 4105 applications and supported 314 projects, with a funding of 1233.2 million yuan.

In 2022, the National Science Fund for Distinguished Young Scholars plans to fund 315 projects for 5 years.

Funding for Projects of National Science Fund for Distinguished Young Scholars in 2021

Unit: 10,000 yuan

Departments	No. of applications	No. of awards	Success rate (%)
Mathematical and Physical Sciences	497	37	7.44
Chemical Sciences	548	45	8.21
Life Sciences	470	38	8.09
Earth Sciences	419	32	7.64
Engineering and Materials Sciences	700	57	8.14
Information Sciences	547	43	7.86
Management Sciences	121	10	8.26
Health Sciences	467	38	8.14
Interdisciplinary Sciences	336	14	4.17
Total or average	4 105	314	7.65

Science Fund for Creative Research Groups

The Science Fund for Creative Research Groups supports outstanding academic leaders at home and abroad to independently choose research directions, independently establish and lead research teams to carry out innovative basic research, overcome difficulties, and cultivate research teams that occupy a place in the forefront of international science.

Applicants and participants should meet the following requirements:

(1) Have the experience of conducting basic research projects or other basic research;

(2) Guarantee to work in host institutions for no less than 6 months per year within the funding period;

(3) Be composed of one academic leader, an independent team, no more than five research backbone researchers, with the foundation of long-term cooperation;

(4) As a project applicant, academic leaders should have senior professional and technical positions (professional titles), high academic attainments and international influence, and be under the age of 55 on January 1 of the application year (born after January 1, 1967);

(5) Backbone researchers or group members should hold senior professional position (title) or have PhD degrees;

(6) Applicants and participants should be in the same host institution.

PIs who have been awarded the Science Fund for Creative Research Groups before may not apply again. PI and participants with senior academic title of an ongoing project supported by the Science Fund for Creative Research Groups may not apply or participate in the application. Participants who quit from a project supported by the Science Fund for Creative Research Groups are not permitted to apply again in 2 years after the quit.

Applicants with senior academic titles may only apply for one project of the Science Fund for Creative Research Groups each year. **The total number of Science Fund for Creative Research Groups and Basic Science Center Program shall not exceed 1.**

In 2021, a total of 322 applications for the Science Fund for Creative Research

Groups were received and 42 awards were made with a total direct cost funding of 414 million.

The funding duration of the Science Fund for Creative Research Groups is 5 years. The direct cost is 10 million yuan and the indirect cost is 2 million yuan per award (8 million yuan for direct cost and 2 million yuan for indirect cost for awards by mathematical and management sciences).

Awards Granted by the Science Fund for Creative Research Groups in 2021

Unit: 10,000 yuan

Departments	No. of applications	Awards		Success rate (%)
		No. of awards	Direct cost	
Mathematical and Physical Sciences	35	5	4 800	14.29
Chemical Sciences	32	5	5 000	15.63
Life Sciences	31	5	5 000	16.13
Earth Sciences	44	5	5 000	11.36
Engineering and Materials Sciences	52	6	6 000	11.54
Information Sciences	49	5	5 000	10.20
Management Sciences	9	2	1 600	22.22
Health Sciences	40	5	5 000	12.50
Interdisciplinary Sciences	30	4	4 000	13.33
Total or average	322	42	41 400	13.04

Basic Science Center Program

The Basic Science Center Program aims to gather and integrate domestic advantageous scientific research resources, targets at international science frontiers, advance deployment, gives full play to the advantages and characteristics of the science funding system, relies on high-level academic leaders, attracts and assemble outstanding S&T talents from different disciplines, and promotes in-depth cross-disciplinary integration, supports scientific personnel to conduct research and exploration in a relatively long-term and stable way, so as to produce a number of original achievements at international leading level, seize the dominant position in international scientific development and establish a number of academic highlands with important international influence.

Applicants and key participants for the Basic Science Center Program should meet the following qualifications:

(1) Have the experience of undertaking basic research project or doing other basic research;

(2) The applicant should be an excellent research team with multi-disciplinary crossings at the scientific frontiers, including 1 academic leader and at most 4 key participants.

(3) As the applicant, the academic leader should be an internationally well-known scientist in the field, with senior academic position (title), outstanding academic ability and a proven track record of coordinating and managing large-scale projects, strong coordination and cohesion, and able to assemble excellent researchers from various scientific backgrounds, under the age of 60 by January 1 of the year of application (born on or after January 1, 1962);

(4) Key applicants should be mainly young or middle-aged, with senior academic position (title) and outstanding research achievements in related scientific fields and potential for continuous growth.

Note to applicants:

The total number of host institute and cooperative research institute cannot exceed 3.

At the stage of application, the Basic Science Center Program is not counted in the total number of application and on-going projects, but counted before receiving NSFC's formal funding decision and after approval. Moreover the applications that

have not reached the on-site investigation are not counted. After receiving the Basic Science Center Program, the applicant and the key participants cannot apply for or participate in other types of program except for the National Science Fund for Distinguished Young Scholars and the Excellent Young Scientist Fund.

The total number of applications for National Major Instrument Equipment R&D Program and Basic Science Center Program for one applicant within the same year cannot exceed 1.

The total number of Science Fund for Creative Research Group and Basic Science Center Program that one researcher applies for either as the applicant or the main participants (including key participants and key research personnel) cannot exceed 1.

The applicant and the participant with senior academic positions (titles) of the on-going project of the Basic Science Center Program cannot apply for the same program either as the applicant or participant, unless it is in the last year of the funding. The participants who quit from the project of the Science Fund for Creative Research Groups or the Basic Science Center Program shall not apply or participate for 2 years.

In the course of application, select “Science Center Program” in the funding category, “Basic Science Center Program” in the subclass introduction and the correct application code according to the actual research content.

The funding period of Basic Science Center Program is 5 years. The direct cost shall not exceed 60 million yuan (for mathematics and management sciences, the direct cost shall not exceed 50 million yuan).

Tianyuan Fund for Mathematics

Tianyuan Fund for Mathematics is a special fund to integrate collective wisdom of mathematicians, explore funding method that suits the unique features of mathematics, and make China a strong country in mathematics. This fund supports researchers to conduct research according to the features and need of mathematics, foster young talents, promote academic exchange, optimize research environment, spread mathematical culture and thus strengthen creativity of China in mathematics. The fund mainly provides the following 5 types of funding in 2022.

1. Tianyuan Center of Mathematics

The main objective of the Tianyuan Center of Mathematics is to set up a platform for cooperative research and academic exchange. Focusing on several topics and interdisciplinary areas, the project shall foster research talents through various types of academic activities, and promote research in various branches of mathematics and interdisciplinary studies in China.

This project aims at frontier areas and important directions in mathematical research, and supports various academic exchange activities all over China, including summer schools and training of young teachers of mathematics. Applicants decide the project title. Please include the significance, scope, plan, and background of the proposed activity, and possible collaborators in the application.

In 2022, it is planned to offer extended funding for the funded projects, funding two projects, one of which has a duration of 4 years and a funding intensity of 12 million yuan, and the other has a funding period of 5 years and a funding intensity of 15 million yuan.

2. Tianyuan Mathematics Exchange Center

For building an international academic exchange platform, the Tianyuan Mathematics Exchange Center is internationally oriented and supports high-level mathematics exchange projects around the cutting-edge research fields and important development directions of mathematics and its applications. It aims to promote in-depth exchanges and cooperation between domestic and international mathematicians on important issues in the research field. Each exchange and discussion project should invite a number of internationally renowned mathematicians and domestic scholars at the forefront of mathematical research to participate in the form of a combination of academic reports and free discussion.

Each exchange project shall be organized and implemented by 3-5 main organizers, who must be internationally renowned experts in this field. The application for the project shall be submitted by a major organizer who has Chinese nationality and works full-time in the domestic host institution, and the written consent of each major organizer is required. There can be no more than 50 participants in the exchange project, and the duration is about one week. The application shall include the scientific significance, content scope, specific schedule, organization personnel and preliminary list of participants.

3. Tianyuan Visiting Mathematicians Program

This program aims at promoting a balanced development of mathematical research in China by supporting talented young mathematicians in less developed regions in China to work with leading mathematicians in China. The hosting institution should have good mathematical background.

Requirements on application:

(1) Joint application. Application should be submitted jointly by the visiting mathematician and the host advisor. The visiting young mathematician should be from less developed regions and born after January 1, 1983, and the host mathematician should be national famous mathematician with international influence, and no teacher-student relationship with the visiting mathematician. The visiting mathematician should not working in the same city with the host advisor. The applicant should provide detailed information such as scientific significance, contents and objectives of exchange. The visiting time should not be less than 9 months.

(2) Please attach a letter of promise as a supplement to the application. The letter of promise should include the terms of visiting, including salaries, working conditions and evaluations.

(3) Please attach an agreement as a supplement to the application. The visitor and host should sign the agreement on contents, funding and sharing of the right of intellectual properties.

(4) The host shall only apply for no more than one application of this program in the same year.

The funding will be 200,000 yuan per project for the host and 100,000 yuan per project for the visitor.

4. Special lectures, high level workshops on mathematics

Special lectures are organized for postgraduate students focusing on one or several related themes so as to introduce frontier topics in mathematical research. Lectures could include basic courses and special courses with large audience lasting for 3 weeks. Application should provide teaching outline, teaching contents and name list of the lecturers.

High level workshop mainly support research groups of high level and excellent aged and young mathematicians to sponsor workshops on clear topics and important international mathematical issues. At least one review paper should be published after the workshop, and proceedings or papers are highly recommended.

Special lectures, high level workshops on mathematics based on Tianyuan Center of Mathematics will be prioritized. Each project will be funded with 200,000 yuan.

5. Mathematical culture and communication project

This type of project supports the publication of mathematics communication series/books, including organizing domestic scholars to write or translate foreign works, in order to improve the interest of college, middle school and primary school students in learning mathematics and the public's understanding of mathematics; the publication of influential national journals related to mathematical culture, mathematical communication, mathematical education and mathematical modeling, improve the level of running journals and expand their influence among the public; and important national mathematical communication activities organized by colleges and universities, research institutions, science associations at or above the provincial level and mathematical societies.

The submission period of online application of mathematics Tianyuan project is divided into two periods: from March 1, 2022 to 16:00 on March 20, 2022; and from July 1, 2022 to 16:00 on July 20, 2022. After completing the application, the applicant shall submit the electronic application and its attachments online. All the attachment materials required in the application materials (the original of relevant supporting materials, approval documents and other paper materials required by special instructions) are uploaded in electronic scanning, and there is no need to submit a paper application. After the project is approved, the paper signature and seal page of the application shall be bound at the end of the funded project plan and submitted together. The information signed and sealed shall be strictly consistent with the electronic application.

The funding category of the application form is "Mathematics Tianyuan Fund project", the sub category description is "Mathematics Tianyuan Fund", and in the "Notes" one of the above five types of projects should be filled in according to the application content. For all projects, the code of mathematics discipline shall be selected for application code 1. **Applications for projects with inaccurate or unselected selections above will not be accepted.** The funding period of Mathematics Tianyuan Fund project generally does not exceed 1 year.

Mathematics Tianyuan Fund project has no indirect expenses, and the applied funds are direct expenses. During the implementation of the projects supported by the Tianyuan Fund for Mathematics, it is necessary to mark as follows "the projects supported by the Tianyuan Fund for Mathematics of the National Natural

Science Foundation of China”.

Special Fund for Research on National Major Research Instruments

The Fund aims to encourage and develop the exploratory research and development of instruments with creative ideas, and major research instruments and equipment with original creative ideas, which should be based on frontier of science and national needs and guided by scientific targets, so as to enhance original innovation in China.

Projects funded by the Special Fund for Research on National Major Research Instruments comprise two categories of departmental recommended projects and free application projects.

Funding for Projects of Special Fund for Research on National Major Research Instruments in 2021

Unit: 10,000 yuan

	No. of applications	No. of awards	Direct cost	Average funding for direct costs
Departmental recommendation	56	4	33,708.56	8,427.14
Free application	594	75	60,934.36	812.46

The funding duration for projects of the Special Fund for Research on National Major Research Instruments is 5 years, and the number of collaborative institutions in one project should not exceed 5.

1. Eligibility for applicants

Applicants for the Special Fund for Research on National Major Research Instruments should:

- (1) Have the experience of presiding basic research;
- (2) Hold a senior professional position (title).

In-site post-doctors, full-time postgraduate students, researchers without host institutions, and researchers whose host institutions have not been registered at NSFC are not eligible for application.

2. Requirements for application

(1) For free application projects, applicants may submit research proposals via their host institutions. The budget for direct costs is less than 10 million yuan per

project.

(2) For departmental recommended projects, the following 14 departments are entitled to recommend projects of the Special Fund for Research on National Major Research Instruments: Ministry of Education, Chinese Academy of Sciences, Ministry of Natural Resources, Ministry of Industry and Information Technology, Ministry of Ecology and Environment, Ministry of Agriculture and Rural Affairs, National Health Commission, China Earthquake Administration, State Administration for Market Regulation, China Meteorological Administration, China Academy of Engineering Physics, Equipment Development Department and Logistic Support Department of Central Military Commission. The budget for direct costs of the departmental recommended projects of the Special Fund for Research on National Major Research Instruments should be 10 million yuan or above per project.

3. Notes on application

(1) Applicants are advised to read this *Guide* carefully and prepare research proposals in accordance with the preparation outline of applications of the Special Fund for Research on National Major Research Instruments. Please select the "Special Fund for Research on National Major Research Instruments" from the funding categories, and select "free application" or "department recommendation" under the subcategory of funding. Please choose subject area code in all departments except that of the Department of Management Sciences. Applicants are advised to clarify the details if they are carrying out other national projects which have some links with the current application. Explanation of the similarities and differences in research contents between the ongoing project and the current application should be presented.

(2) For applicants and participants with senior academic positions (titles), the number of applications plus ongoing projects of the Special Program on Major Research Instruments as well as the Major R&D on National Major Research Facility and Scientific Equipment administered by the Ministry of Science and Technology should not exceed one in total.

(3) Projects of the Special Fund for Research on National Major Research Instruments are funded by the way of cost reimbursement, so applicants are advised to make their budget requests in an objective and practical manner according to the real costs of the development of instruments. NSFC will invite experts to assess the budget requests.

International (Regional) Cooperation and Exchange Programs

In order to improve the quality of China's scientific research and its international competitiveness, the International (Regional) Cooperation and Exchange Programs aim at creating and deepening cooperation opportunities, funding Chinese scientists to conduct substantial cooperation with their international collaborators in science frontier and take full advantage of international scientific and technological resources on the basis of "equal cooperation, mutual benefits, and equal sharing of results".

The funding system of the International (Regional) Cooperation and Exchange Programs is currently comprised of Key International (Regional) Joint Research Program, International (Regional) Joint Research and Exchange Programs funded under the Agreements/MoUs between NSFC and its foreign partners.

Key International (Regional) Joint Research Program

The Key International (Regional) Joint Research Program (hereafter referred to as Key Joint Research Program) gives priority to research in the following areas: the priority funding areas of NSFC, areas that China urgently needs to develop, international mega research projects and programs with Chinese participation, and utilizing large-scale scientific facilities abroad.

Researchers applying for this program shall, in accordance with the priority funding areas announced by relevant scientific departments in the *Guide*, choose innovative joint research subjects centering on major scientific issues, and clarify the necessity and complementarities of the cooperation. Chinese applicants in the mainland and their partners shall have long-term steady collaboration (e.g., coauthored publications and continued personnel exchanges and interactions) and the partners shall have matching resources for this research. In the process of cooperation, attention shall be given to the sharing of outcomes and the protection of intellectual property rights.

In 2021, altogether 75 out of the total 413 applications under the Key Joint Research Program were funded with a total funding of 186 million yuan for direct costs.

In 2022, the Key Joint Research Program plans to fund 80 projects with the same average funding for direct costs per project as in 2021, and the duration of each project is 5 years.

An applicant must meet the following eligibilities:

- (1) With the position (title) of professor or associate professor;
- (2) As the PIs of on-going or completed NSFC research project with the duration of no less than 3 years.
- (3) Having a good foundation for cooperation with foreign (regional) partners.

Partners should meet the following eligibilities:

- (1) Engage in scientific research abroad and be in charge of research laboratories or hold key research projects independently;
- (2) With the position (title) of professor or associate professor in the host countries/regions.

Appendix Documents

Apart from the Chinese application form, the applicant must also submit the following documents as required:

- (1) English Application Form: The English Application Form can be downloaded in NSFC's Internet-based Science Information System (ISIS) and should be submitted online at the time of submission.

(2) Letter of Agreement: A copy of the Letter of Agreement signed between/among the collaborating PIs must be provided. Unilaterally signed letters are not valid. The Letter of Agreement mainly covers:

- (i) Research contents and objectives;
- (ii) List of collaborating PIs and participants;
- (iii) Duration, mechanism and plan of joint research;
- (iv) Ownership, use and transfer of IPR;
- (v) Relevant budgetary arrangements.

Please refer to the sample Letter of Agreement which can be downloaded at http://www.nsf.gov.cn/Portals/0/fj/fj20161230_02.doc.

(3) Documents verifying the partners' holding or participation in research projects related to the application, or a list of publications related to the submitted application by the foreign partners in the past 3 years.

(4) Letter of confirmation by the partner.

If the partner cannot sign the English Application Form, a letter of confirmation by him/her should be provided. The letter of confirmation must be written in official forms including the title, logo and contact information of the foreign collaborator's employer. The letter of confirmation should contain contact information about the partner. In addition, it should contain detailed information such as the title of the research, the content and period of cooperation, the way to share IPR, etc. as well as the confirmation that the partner has read and agrees with the English Application Form.

Funding Priorities for the Key Joint Research Program in 2022

1. Department of Mathematical and Physical Sciences

- (1) Modern theories of algebra and geometry;
- (2) Modern analysis theory and its application;
- (3) New theories and new methods of computing in the era of big data and artificial intelligence;
- (4) Cognition, design and control of complex system dynamics mechanism;
- (5) Mechanics of new materials and new structures;
- (6) Theories, methods and control of high-speed flow;
- (7) Dark matter, dark energy and galaxy survey research;
- (8) Multi-messenger detection and research of the Milky Way, stars, the sun and planetary systems;
- (9) Research on key technologies for next-generation telescopes;
- (10) Quantum materials and devices;
- (11) Quantum information and quantum precision measurement;
- (12) The mechanism and regulation of electromagnetic and sound fields in complex structures and media;
- (13) The nature and interaction of basic fermions;

- (14) The essence of strong interaction force;
- (15) Key scientific issues in thermonuclear fusion;
- (16) Joint research based on large-scale scientific facilities at home and abroad.

2. Department of Chemical Sciences

- (1) Accurate construction of molecular functional systems;
- (2) Transmission, reaction and measurement under unconventional conditions;
- (3) Surface interface basis of material science;
- (4) Molecular state selection and kinetics;
- (5) Electrochemical energy beyond the traditional system;
- (6) Molecular chemical engineering under the new paradigm;
- (7) Multifunctional coupled chemical sensing and imaging;
- (8) Immunology and neurochemical biology;
- (9) Green synthesis method and process;
- (10) Chemistry and chemical engineering basis for efficient conversion and utilization of energy and resources;
- (11) Tidal sources and safe transformation of key chemicals in environmental ecosystems;
- (12) Application of big data and artificial intelligence in chemistry and chemical engineering;
- (13) Chemical creation of new materials;
- (14) Design, regulation and theory of soft matter functional system;
- (15) The molecular basis of multi-level interactive communication in living systems;
- (16) Molecular research driven by large scientific devices.

Please refer to the fields mentioned above when applying. The content should reflect the complementarity and necessity of basic, cross-cutting, and collaborative research.

3. Department of Life Sciences

- (1) The evolutionary mechanism of important biological traits and environmental adaptation;
- (2) Pathogenic microorganism pathogenesis, host interaction mechanism and immune regulation;
- (3) The molecular basis of cell fate plasticity and organogenesis, senescence and regeneration;
- (4) Biological information flow of body functional activities;
- (5) The neurobiological basis of cognition and perception;
- (6) Detection and analysis of biomolecular events across time, space and scale;
- (7) Accurate design, transformation and simulation of living organisms;
- (8) The response and adaptation of ecosystem to global change;
- (9) Targeted cultivation and efficient utilization of forest and grass biomass;

(10) Biological basis and regulatory mechanism of food safety, nutrition and quality;

(11) Theoretical basis for gene discovery and molecular design breeding of important genetic resources of crops;

(12) The occurrence and evolution mechanism of crop pests and their control basis;

(13) Formation and regulation mechanism of horticultural crop quality traits;

(14) The biological basis of the formation of important traits of agricultural animals;

(15) Biology of pathogens of important diseases of agricultural animals.

China's international cooperation and exchanges in the field of biology should be guided by national demands and interests, and be closely combined with China's medium and long-term scientific and technological development plans and major scientific and technological special program. Due attention will be paid to joint research between strong partnering research teams and joint research between Chinese researchers and foreign partners with superior research capacities or facilities. Chinese applicants are encouraged to take the lead in joint research activities.

4. Department of Earth Sciences

(1) Land surface critical processes and their multiple effects;

(2) Environmental pollution processes and prevention;

(3) Human activities and consequent eco-environmental effects;

(4) System and mechanism of metallogenic accumulation;

(5) Dynamic processes of continental plates interiors and boundaries;

(6) Coupling relation between deep and surface earth processes;

(7) Mechanism, monitoring, early warning and risk control of geological disasters;

(8) Solar-Earth energy transfer processes and the impacts on human activities;

(9) Water cycle and ecohydrological process;

(10) Key processes and extreme climate events in weather and climate system;

(11) Monsoon, drought and global change;

(12) Origins and major evolutionary events of key biological taxa and the environmental backgrounds;

(13) Life processes in the extreme environment;

(14) Dynamic processes and mechanisms of marine multi-scale interactions;

(15) Marine ecological system and deep-sea biological resources;

(16) Advanced science and technology platforms to promote the development of Earth and planetary sciences;

(17) Human activities and environment along the Belt and Road regions;

(18) Nano-geoscience research platform;

(19) Global comparison of major geo-environment-biological events;

- (20) Polar science research;
- (21) Planetary Earth science;
- (22) Interfacial structure and properties of global subduction zones;
- (23) Integrated observation and research on Pacific Ocean, Indian Ocean and South China Sea;
- (24) Earth system model development and application;
- (25) Formation of mineral and oil and gas resources and global environment;
- (26) Health geoscience.

5. Department of Engineering and Materials Sciences

- (1) High-performance lightweight metal materials;
- (2) New metal functional materials;
- (3) Inorganic non-metallic new materials;
- (4) Environmentally friendly materials;
- (5) Safe and efficient mining and green processing and utilization of resources;
- (6) Intelligent manufacturing, bio-manufacturing and sustainable manufacturing;
- (7) Efficient and clean utilization of renewable energy, new energy and energy;
- (8) Efficient power conversion and transformation system;
- (9) Comprehensive disaster prevention and reduction and life-span design of intelligent buildings and civil engineering in smart cities;
- (10) Water security and sustainable and efficient use of water;
- (11) A new generation of urban water environment protection under global climate change;
- (12) Multi-medium environmental pollution control and ecological restoration;
- (13) Marine structures and marine equipment;
- (14) Marine technology and marine engineering;
- (15) Intelligent transportation and carrier engineering;
- (16) Flexible wearable materials;
- (17) Smart materials.

6. Department of Information Sciences

- (1) Basic theories and key technologies of B5G mobile communication and network;
- (2) Detection imaging theory and key technologies;
- (3) Remote sensing information processing;
- (4) Medical information detection and processing;
- (5) New calculation theory and software method;
- (6) The architecture and system of large-scale and complex computing scenarios;
- (7) Big data calculation theory and application;
- (8) New control theory and methods;
- (9) Brain-like model and brain-like information processing;
- (10) Semiconductor electronic devices and integration;

- (11) Micro-nano electromechanical devices and control systems;
- (12) Biological, medical optics and photonics;
- (13) Photonic integration technology and devices.

7. Department of Management Sciences

- (1) Behavioral law in the management systems;
- (2) Analysis, experiment and modeling of complex management systems;
- (3) Data-driven financial innovation and risk laws;
- (4) Enterprise innovation behavior and national innovation system management;
- (5) Management science issues in the service economy;
- (6) Research on China's economic structure transformation and mechanism reconstruction;
- (7) The basic management laws of national security;
- (8) Management rules and mechanisms of new urbanization;
- (9) Mobile internet medical and health management;
- (10) International macroeconomic policy coordination mechanism and international economic governance structure;
- (11) Climate change and public health;
- (12) Scientific ethics and scientific research integrity.

8. Department of Health Sciences

- (1) New mechanisms of the common pathology of development, inflammation, metabolism, probiotics, microenvironment, etc.
- (2) Pathogenesis and precise diagnosis and treatment of major chronic diseases;
- (3) Epidemiology of chronic diseases and injuries and related prevention and intervention strategies;
- (4) Rapid identification, pathogenesis, prevention, early warning new treatment of emerging and emergency infectious diseases;
- (5) Infectious diseases and antibiotic resistance;
- (6) Frontier research on first aid, trauma, rehabilitation and regenerative medicine;
- (7) Women and children's health;
- (8) Research on the frontier of reproduction, development, aging related diseases;
- (9) Nutrition, environmental, genetic and health;
- (10) Stem cells and diseases;
- (11) Organ fibrosis and prevention mechanism;
- (12) Tissue and organ damage, dysfunction and intervention;
- (13) Protection of organs and replacement therapy;
- (14) Pathogenesis and intervention of neuropsychiatric disorders;
- (15) Mechanisms of immune-related diseases and new immunotherapy strategies;
- (16) Interdisciplinary scientific research on diseases;
- (17) Medical imaging and biomedical engineering;

- (18) Innovative medical technologies and personalized medicine;
- (19) Biomarkers and personalized medicine;
- (20) Discovery of new drug targets and pharmacological validation;
- (21) Modern scientific connotation of traditional Chinese medicine theories;
- (22) Material basis and mechanism of traditional Chinese medicine;
- (23) Basic research on special and forensic medicine.

In principle, PIs in programs with large funding amounts such as Key International (Regional) Joint Research Program, Major Program, Key Projects of Major Research Plan Program granted in 2021, will not be considered by the Department of Health Sciences for funding under the Key International (Regional) Joint Research Program in 2022.

International (Regional) Cooperation and Exchange Programs under Agreements/MoUs

Jointly organized and funded by NSFC and international science funding agencies (or research institutions and international organizations), the International (Regional) Cooperation and Exchange Programs under Agreements/MoUs support bilateral and multilateral joint research and academic exchanges between Chinese scientists and their partners. For years, NSFC has continued to strengthen the research on the policies of international collaboration with its partners, expanded its cooperation network and funding areas with the U.S., Canada, and Australia, and enhanced its collaboration and exchanges with partners in South America. NSFC promotes its comprehensive partnership with European partners through diversified collaborative activities with respective European partner countries, and cooperates with the EU as a whole. The collaboration mechanisms with Japan and South Korea have been further improved, and the funding scale for the Asian 3 Foresight Program has been expanded. NSFC continues to seek scientific cooperation in wider research areas with Israel and Singapore, and further the bilateral cooperation with partners of developing countries with potential and impacts, such as India, South Africa, Brazil, Thailand, Egypt, Iran, etc. NSFC further expands its multilateral cooperation through international organizations by leveraging its unique role of coordinating cross-border scientific research programs to engage more Chinese researchers in the participation, planning and implementation of cross-border regional research plans with scientific significance. In addition, NSFC contributes to the implementation of the Belt and Road Initiative by promoting the cooperation between Chinese researchers and their partners along the Belt and Road routes through the Sustainable Development International Cooperation program. Adhering to the One country, Two systems Policy of the central government, NSFC has attached significance to the scientific collaboration between the Chinese mainland and Hong Kong, Macao Special Administrative Region, and the Taiwan region. NSFC has by far signed 100 cooperation agreements/MoUs with science funding agencies and research institutions in 53 countries/regions. After NSFC and its partners agree on the modes of cooperation and exchange, funding areas, types of grants, funding intensity, and review mechanisms through negotiation, both sides will

release guides on their websites to call for proposals and organize reviews.

The International (Regional) Cooperation and Exchange Programs under Agreements/MoUs consist of 2 types of programs: the Joint Research Program and the Exchange Program.

The Joint Research Program: In this category, NSFC and its international partners fund bilateral or multilateral joint research projects to support Chinese researchers and their partners to conduct basic research under the framework of cooperation agreements/MoUs.

The Exchange Program: This category aims at supporting Chinese researchers who have ongoing NSFC projects to participate in international cooperation and exchange activities to promote innovation, cultivate talents, and improve the development of disciplines and research quality of ongoing NSFC projects. The Exchange Program featured by mutual visits consists of Personnel Exchange Program and Academic Conference Program. The Personnel Exchange Program enables Chinese researchers to maintain sound bilateral or multilateral relations with their partners through cooperation and exchange activities, so as to lay a solid foundation for future in-depth and substantial collaboration. The Academic Conference Program aims at supporting researchers to organize bilateral or multilateral international conferences in and outside of China to keep pace with the latest research frontiers and hotspots in the international academic arena, establish and deepen cooperation between Chinese researchers and their foreign peers, strengthen the publicity of the research results of NSFC projects and enhance the international influence of China's scientific research.

For more information on the application eligibility, funding priorities, funding duration, and application requirements, please refer to the following introductions of funding opportunities and the calls for proposals launched on the NSFC website.

Applicants can refer to the column for International Cooperation on NSFC's website for relevant information about these programs in 2022. An introduction of funding opportunities in 2022 under this category is listed as follows.

Asia and Africa

Japan

Japan Society for the Promotion of Science (JSPS)

NSFC and JSPS jointly fund the exchange projects and bilateral workshops in 2022. For detailed requirements about the application, please refer to the call for proposals to be launched on NSFC's website in June/July.

(1) Exchange Program

NSFC and JSPS jointly fund the exchange projects between the Chinese and Japanese researchers. The funding period is 2 years and 9 months. The maximum funding amount for each project is 200,000 yuan for Chinese researchers from NSFC, supporting the traveling cost of the Chinese researchers to Japan and local expenses of the Japanese researchers in China. The traveling cost of Japanese researchers to China and local expense of the Chinese researchers in Japan will be covered by JSPS. The number of projects to be funded will be decided by both sides through negotiation.

(2) Bilateral Workshop

Participants of a bilateral workshop from each side must come from at least 3 institutions. The maximum funding amount for each project is 200,000 yuan from NSFC. For bi-lateral workshops held in China, the local cost of the attendees and the expense of the workshop will be covered by NSFC, while the cost of the international traveling of Japanese attendees will be covered by JSPS. For bi-lateral workshops held in Japan, the local cost of the attendees and the expense of the workshop will be covered by JSPS, while the cost of the international traveling of Chinese attendees will be covered by NSFC. The number of workshops to be funded will be decided by both sides through negotiation.

South Korea

National Research Foundation (NRF)

NSFC and NRF will jointly support joint research projects, exchange projects and bilateral workshops in 2022. For detailed requirements about the application, please refer to the call for proposals to be launched on NSFC's website.

(1) Joint Research Program

NSFC and NRF jointly fund the research projects in areas of common interest between Chinese researchers and Korean researchers. The maximum funding amount for each project is 2 million yuan from NSFC with a funding period of 3 years.

(2) Exchange Program

NSFC and NRF jointly fund the exchange projects between the Chinese and Korean researchers. The funding period is 2 years. The maximum funding amount for each project is 150,000 yuan for Chinese researchers from NSFC, supporting the traveling cost of the Chinese researchers to Korea and local expenses of the Korean researchers in China. The traveling cost of Korean researchers to China and local expense of the Chinese researchers in Korea will be covered by NRF. The number of projects to be funded will be decided by both sides through negotiation.

(3) Bilateral Workshop

Participants of a bilateral workshop from each side must come from at least 3 institutions. The maximum funding amount for each project is 150,000 yuan from NSFC. For bi-lateral workshops held in China, the local cost of the attendees and the expense of the workshop will be covered by NSFC, while the cost of the international

traveling of Korean attendees will be covered by NRF. For bi-lateral workshops held in Korea, the local cost of the attendees and the expense of the workshop will be covered by NRF, while the cost of the international traveling of Chinese attendees will be covered by NSFC. The number of workshops to be funded will be decided by both sides through negotiation.

Three Asian Countries (China, Japan and South Korea)

A3 Foresight Program

The A3 Foresight Program is a joint research program set up and sponsored by NSFC, Japan Society for the Promotion of Science (JSPS), and National Research Foundation of Korea (NRF) together. NSFC, JSPS and NRF support researchers from China, Japan and South Korea to conduct collaborative world-class research in selected strategic areas with the aim to foster outstanding young researchers and address common regional challenges.

The priority areas of A3 Foresight Program for each year are consistent with the themes of the Northeastern Asian Symposium jointly organized by NSFC, JSPS and NRF, with NSFC funding up to 4 million yuan per project for 5 years. For detailed requirements about the application, please refer to the call for proposals to be launched on NSFC's website in November.

Mongolia

Mongolian Foundation for Science and Technology (MFST)

Joint Research Program

NSFC and MFST jointly fund research projects in areas of common interest between Chinese and Mongolian researchers. The maximum funding amount for each project is 2 million yuan from NSFC with a funding period of 3 years. For detailed requirements about the application, please refer to the call for proposals to be launched on NSFC's website.

Thailand

National Research Council of Thailand (NRCT)

In 2022, NSFC and NRCT will jointly support joint research projects, exchange projects and bilateral workshops. For detailed requirements about the application, please refer to the call for proposals to be launched on NSFC's website.

(1) Joint Research Program

NSFC and NRCT jointly fund the research projects in areas of common interest between Chinese and Thailand researchers. The maximum funding amount for each project is 2 million yuan from NSFC with a funding period of 3 years.

(2) Exchange Program

NSFC and NRCT jointly fund exchange projects. The themes, number of projects to be funded and funding intensity will be decided by both sides through negotiation.

(3) Bilateral Workshop

NSFC and NRCT jointly fund bilateral workshops. The themes and number of workshops to be funded will be decided by both sides through negotiation.

Pakistan

Pakistan Science Foundation (PSF)

In 2022, NSFC and PSF jointly fund research projects and exchange projects. For detailed requirements about the application, please refer to the call for proposals to be launched on NSFC's website.

(1) Joint Research Program

NSFC and PSF jointly fund research projects in areas of common interest between Chinese and Pakistani researchers. The maximum funding amount for each project is 2 million yuan from NSFC with a funding period of 3 years.

(2) Exchange Program

NSFC and PSF jointly fund exchange projects. The themes, number of projects to be funded and funding intensity will be decided by both sides through negotiation.

Iran

Iran National Science Foundation (INSF)

Joint Research Program

NSFC and INSF jointly fund research projects in areas of common interest between Chinese and Iranian researchers. The maximum funding amount for each project is 2 million yuan from NSFC with a funding period of 3 years. For detailed requirements about the application, please refer to the call for proposals to be launched on NSFC's website.

The United Arab Emirates (UAE)

Ministry of Education (MOE) of UAE

Exchange Program

NSFC and MOE of UAE jointly fund exchange projects. For detailed requirements about the application, please refer to the call for proposals to be launched on NSFC's website.

Egypt

Academy of Scientific Research and Technology (ASRT)

Joint Research Program

NSFC and ASRT jointly fund research projects in areas of common interest between Chinese and Egyptian researchers. The maximum funding amount for each project is 2 million yuan from NSFC with a funding period of 3 years. For detailed requirements about the application, please refer to the call for proposals to be launched on NSFC's website.

Other Cooperation Channels

NSFC has signed bilateral collaborative agreements for funding personnel exchange projects and bilateral workshops with the National Research Foundation of Singapore (NRF), Israel Science Foundation (ISF), Department of Science and Technology of India (DST), Council of Scientific & Industrial Research of India (CSIR), etc. Call announcement will be based on mutual negotiation. For detailed requirements about the application, please refer to the call for proposals to be launched on NSFC's website.

America and Australasia

USA

The National Science Foundation (NSF)

According to the cooperative agreement between NSFC and NSF, both sides jointly support research and exchange projects in areas of common interests.

(1) Joint Research Program

NSFC and NSF jointly solicit collaborative research proposals in the areas of biodiversity on a changing planet (BoCP), ecology and evolution of infectious diseases (EEID) and sustainable regional system (SRS) in the year of 2022.

NSFC and NSF will release the call for proposals together. The Chinese and U.S. researchers should submit the proposals to NSFC and NSF respectively. NSFC and NSF will jointly make final funding decisions based on the review conducted in the agreed approach and procedures. For detailed requirements about application in 2022, please refer to the call for proposals to be launched on NSFC's website.

(2) Exchange Program

NSFC and NSF will fund exchange projects in the areas of biodiversity on a changing planet (BoCP) and ecology and evolution of infectious diseases (EEID).

NSFC and NSF will release the call for proposals together. The Chinese and U.S. researchers should submit the proposals to NSFC and NSF respectively. The proposals will be reviewed by NSFC and NSF according to the agreed approach and procedures. And the final funding decisions will be mutually made. For detailed requirements about application in 2022, please refer to the call for proposals to be launched on

NSFC's website.

Bill & Melinda Gates Foundation (BMGF)

According to the cooperative agreement between NSFC and BMGF, both sides jointly support research projects and bilateral workshops in areas of common interests.

(1) Joint Research Program

NSFC and BMGF will jointly solicit collaborative research proposals in malaria and other areas. in the year of 2022.

NSFC and BMGF will release the call for proposals together. NSFC and BMGF will jointly make final funding decisions based on the review conducted in the agreed approach and procedures. For detailed requirements about application in 2022, please refer to the call for proposals to be launched on NSFC's website.

(2) Bilateral Workshop

NSFC and BMGF will fund bilateral workshops in areas and numbers mutually identified and agreed by both parties.

Canada

Canadian Institutes of Health Research (CIHR)

According to the cooperative agreement between NSFC and CIHR, both sides jointly support research projects in areas of common interests.

NSFC and CIHR will release the call for proposals together. The Chinese and Canadian researchers should submit the proposals to NSFC and CIHR respectively. NSFC and CIHR will jointly make final funding decisions based on the review conducted in the agreed approach and procedures. For detailed requirements about application in 2022, please refer to the call for proposals to be launched on NSFC's website.

Brazil

São Paulo Research Foundation (FAPESP)

According to the cooperative agreement between NSFC and FAPESP, both sides jointly support research projects and bilateral workshops in areas of common interests.

(1) Joint Research Program

NSFC and FAPESP will jointly solicit collaborative research proposals in the area of climate change and environmental sustainability in the year of 2022.

NSFC and FAPESP will release the call for proposals together. The Chinese and São Paulo researchers should submit the proposals to NSFC and FAPESP respectively. NSFC and FAPESP will jointly make final funding decisions based on the review conducted in the agreed approach and procedures. For detailed requirements about application in 2022, please refer to the call for proposals to be launched on NSFC's website.

(2) Bilateral Workshop

NSFC and FAPESP will fund bilateral workshops in areas and numbers mutually identified and agreed by both parties.

Chile

The National Research and Development Agency (ANID)

According to the cooperative agreement between NSFC and ANID, both sides jointly support research projects and bilateral workshops in areas of common interests.

(1) Joint Research Program

NSFC and ANID will release the call for proposals together. The Chinese and Chilean researchers should submit the proposals to NSFC and ANID respectively. NSFC and ANID will jointly make final funding decisions based on the review conducted in the agreed approach and procedures. For detailed requirements about application in 2022, please refer to the call for proposals to be launched on NSFC's website.

(2) Bilateral Workshop

NSFC and ANID will fund bilateral workshops in areas and numbers mutually identified and agreed by both parties.

Argentina

**National Scientific and Technical Research Council of Argentina
(CONICET)**

According to the cooperation agreement between NSFC and CONICET, both sides jointly support research projects and bilateral workshops in areas of common interests.

(1) Joint Research Program

NSFC and CONICET will release the call for proposals together. The Chinese and Argentine researchers should submit the proposals to NSFC and CONICET respectively. NSFC and CONICET will jointly make final funding decisions based on the review conducted in the agreed approach and procedures. For detailed requirements about application in 2022, please refer to the call for proposals to be launched on NSFC's website.

(2) Bilateral Workshop

NSFC and CONICET will fund bilateral workshops in areas and numbers mutually identified and agreed by both parties.

Other Cooperation Channels

NSFC has signed bilateral cooperative agreements for funding joint research projects, personnel exchange projects and bilateral workshops with the National Institutes of Health(NIH), the Gordon and Betty Moore Foundation (GBMF), the

Research Foundation of Quebec (FRQ), the Health Research Council of New Zealand, the Brazilian Federal Agency for Support and Evaluation of Graduate Education (CAPES), Consejo Nacional de Ciencia y Tecnología of Mexico (CONACYT), and the Ministerio de Ciencia, Tecnología y Medio Ambiente-República de Cuba (CITMA) and etc. The specific projects are jointly decided on a case-by-case basis through mutual agreement.

Europe

European Union

European Research Council (ERC)

Talent Program

NSFC and ERC jointly fund the Chinese researchers to visit European countries for a single long-term or multiple short-term research stay (3 to 12 months in total). The Chinese researchers should join the ERC-funded project teams to carry out collaborative research based on the common interest. The international traveling cost will be covered by NSFC. The local and research costs in Europe will be covered by the ERC-granted projects. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

Joint Programming Initiative Urban Europe (JPI UE)

Joint Research Program

NSFC and JPI Urban Europe jointly fund the collaborative research between the Chinese and European researchers in the research fields of common interests. NSFC and JPI Urban Europe will jointly launch call for proposals. The Chinese and the European researchers should submit the proposals to the respective funding agencies. The submitted proposals will be evaluated according to the agreed approach and procedures. The final decision for funding will be mutually made. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

Russia

Russian Science Foundation (RSF)

Joint Research Program

NSFC and RSF jointly fund the research projects in areas of common interests between the Chinese and Russian researchers. NSFC and RSF will jointly launch call for proposals. The Chinese and the Russian researchers should submit the proposals to the respective funding agencies. The submitted proposals will be evaluated according

to the agreed approach and procedures. The final decision for funding will be mutually made. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

Germany

German Research Foundation (DFG)

Joint Research Program

NSFC and DFG jointly fund the research projects in areas of common interests between Chinese and German researchers. NSFC and DFG will jointly launch call for proposals. The Chinese and German researchers should submit the proposals to the respective funding agencies. The submitted proposals will be evaluated according to the agreed approach and procedures. The final decision for funding will be mutually made. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

UK

Royal Society (RS)

Exchange Program

NSFC and RS jointly fund the exchange visits between the Chinese and UK researchers. The funding period is 2 years. The maximum funding amount for each project is 100,000 yuan for Chinese researchers from NSFC and 12,000 pounds for UK researchers from RS. The cost for the international traveling, accommodation, meals and intercity transportation will be covered by the granted projects. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

Royal Society of Edinburgh (RSE)

Workshop Program

NSFC and RSE jointly fund the bi-lateral workshops between researchers in China and UK. The maximum funding amount for each project is 150,000 yuan from NSFC and 17,000 pounds from RSE. For bi-lateral workshops held in China, the local cost of the attendees and the expense of the workshop will be covered by NSFC, while the cost of the international traveling of British attendees will be covered by RSE. For bi-lateral workshops held in UK, the local cost of the attendees and the expense of the workshop will be covered by RSE, while the cost of the international traveling of Chinese attendees will be covered by NSFC. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

UK Research and Innovation (UKRI)

Joint Research Program

NSFC and UKRI (EPSRC, BBSRC, NERC, MRC, ESRC and STFC) jointly fund collaborative research between the Chinese and UK researchers based on the research fields of common interests. NSFC and UKRI will jointly launch the call for proposals. The Chinese and UK researchers should submit the proposals to the respective funding agencies. The submitted proposals will be evaluated according to the agreed approach and procedures. The final decision for funding will be mutually made. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

France

French National Research Agency (ANR)

Joint Research Program

NSFC and ANR jointly fund research projects in areas of common interests between Chinese and French researchers. NSFC and ANR will jointly launch call for proposals. The Chinese and French researchers should submit the proposals to the respective funding agencies. The submitted proposals will be evaluated according to the agreed approach and procedures. The final decision for funding will be mutually made. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

Netherlands

Dutch Research Council (NWO)

(1) Joint Research Program

NSFC and NWO jointly fund research projects in areas of common interests between Chinese and Dutch researchers. NSFC and NWO will jointly launch call for proposals. The Chinese and Dutch researchers should submit the proposals to the respective funding agencies. The submitted proposals will be evaluated according to the agreed approach and procedures. The final decision for funding will be mutually made. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

(2) Exchange Program

NSFC and NWO jointly fund exchange visits between the Chinese and Dutch researchers. The funding period is 2 years. The cost for the international traveling and the local expenses of the attendees will be covered by NSFC and NWO. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

(3) Workshop Program

NSFC and NWO jointly fund bi-lateral workshops between Chinese and Dutch researchers. For bi-lateral workshops held in China, the expenses for the workshops and the local costs for the attendees will be covered by NSFC. While the cost for the

international traveling of Dutch attendees will be covered by NWO. For bi-lateral workshops held in Netherlands, the cost for the international traveling of Chinese attendees will be covered by NSFC. While the expenses for the workshops and the local costs of the attendees will be covered by NWO. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

Belgium

The Research Foundation-Flanders (FWO)

Joint Research Program

NSFC and FWO jointly fund exchange visits between researchers from China and Flemish researchers from Belgium. The funding period is 2 years. The maximum funding amount for each project is 100,000 yuan from NSFC, supporting the traveling cost of the Chinese researchers to Belgium and local expenses of the Chinese researchers in Belgium. The traveling cost of the Belgian researchers to China and local expense of the Belgian researchers in China will be covered by FWO. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

The Fund for Scientific Research (FNRS)

Exchange Program

NSFC and FNRS jointly fund exchange visits between researchers from China and Wallonia-Brussels Federation (BWF) of Belgium. The funding period is 2 years. The maximum funding amount for each project is 100,000 yuan from NSFC, supporting the traveling cost of the Chinese researchers to Belgium and local expenses of the Chinese researchers in Belgium. The traveling cost of the Belgian researchers to China and local expense of the Belgian researchers in China will be covered by FNRS. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

Czech Republic

Czech Academy of Sciences (CAS)

Exchange Program

NSFC and CAS jointly fund exchange visits between researchers from China and Czech. The funding period is 2 years. The maximum funding amount for each project is 100,000 yuan from NSFC, supporting the traveling cost of the Chinese researchers to Czech Republic and local expenses of the Chinese researchers in Czech Republic. The traveling cost of Czech researchers to China and local expense of the Czech researchers in China will be covered by CAS. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

Sweden

Swedish Research Council (VR)

Joint Research Program

NSFC and VR jointly fund research projects in areas of common interest between Chinese and Swedish researchers. NSFC and VR will jointly launch call for proposals. The Chinese and Swedish researchers should submit the proposals to the respective funding agencies. The submitted proposals will be evaluated according to the agreed approach and procedures. The final decision for funding will be mutually made. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

Swedish Foundation for International Cooperation in Research and Higher Education (STINT)

Exchange Program

NSFC and STINT jointly fund exchange visits and bi-lateral workshops between the Chinese and Swedish researchers. The funding period is 3 years. The maximum funding amount for each project is 400,000 yuan from NSFC, supporting the traveling cost and local expenses in Sweden of the Chinese researchers as well as the expenses of the workshops held in China. The maximum funding amount for each project is 600,000 Swedish Kroner from STINT, supporting the traveling costs and local expenses in China of the Swedish researchers as well as the expenses for the workshops held in Sweden. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

Belarus

Belarusian Republican Foundation for Fundamental Research (BRFFR)

Exchange Program

NSFC and BRFFR jointly fund exchange visits between Chinese and Belarusian researchers. The funding period is 2 years. The maximum funding amount for each project is 200,000 yuan from NSFC, supporting the traveling cost and local expenses of Chinese and Belarusian researchers as well as the expenses for the bi-lateral workshops. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

Switzerland

Swiss National Science Foundation (SNSF)

Joint Research Program

NSFC and SNSF jointly fund research projects in areas of common interests between Chinese and Swiss researchers. NSFC and SNSF will jointly launch call for proposals. The Chinese and Swiss researchers should submit the proposals to the

respective funding agencies. The submitted proposals will be evaluated according to the agreed approach and procedures. The final decision for funding will be mutually made. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

Bulgaria

National Science Fund of Bulgaria (BNSF)

Exchange Program

NSFC and BNSF jointly fund exchange visits between Chinese and Bulgarian researchers. The funding period is 2 years. The international travelling cost, local expenses and expenses for the bi-lateral workshops will be covered by NSFC and BNSF jointly. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

Finland

Academy of Finland (AF)

(1) Exchange Program

NSFC and AF jointly fund exchange visits between the Chinese and Finnish researchers. The funding period is 2 years. The maximum funding amount for each project is 100,000 yuan from NSFC, supporting the traveling cost and local expenses for the Chinese researchers in Finland. While the traveling cost and the related expenses for the Finnish researchers in China will be covered by AF. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

(2) Workshop Program

NSFC and AF jointly fund bi-lateral workshops between Chinese and Finnish researchers. The funding period is 1 year. For the bi-lateral workshops held in China, the expenses for the workshop, the traveling cost and local expenses for Chinese attendees will be covered by NSFC. While the cost for the international traveling and local costs of Finnish attendees will be covered by AF. To the bi-lateral workshops held in Finland, the cost for the international traveling and the local costs for Chinese attendees will be covered by NSFC. While the expense for the workshops, the traveling cost and local expenses of Finnish attendees will be covered by AF. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

Norway

Research Council of Norway (RCN)

Joint Research Program

NSFC and RCN jointly fund research projects in areas of common interests

between Chinese and Norwegian researchers. NSFC and RCN will jointly launch call for proposals. The Chinese and Norwegian researchers should submit the proposals to the respective funding agencies. The submitted proposals will be evaluated according to the agreed approach and procedures. The final decision for funding will be mutually made. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

Turkey

The Scientific and Technological Research Council of Turkey (TUBITAK)

Joint Research Program

NSFC and TUBITAK jointly fund research projects in areas of common interests between Chinese and Turkish researchers. NSFC and TUBITAK will jointly launch call for proposals. The Chinese and Turkish researchers should submit the proposals to the respective funding agencies. The submitted proposals will be evaluated according to the agreed approach and procedures. The final decision for funding will be mutually made. The details for the application in 2022 can be found in the call for proposals to be launched on NSFC official website.

International Scientific Organizations and Multilateral Cooperation

International Center for Theoretical Physics (ICTP)

About 50 Chinese young researchers are funded by NSFC every year in the areas of mathematics, physics, and earth sciences to participate in various research activities at ICTP, such as summer seminars and short-term joint research. For detailed requirements about the application, please refer to the call for proposals to be launched on NSFC's website in November.

International Institute of Applied Systems Analysis (IIASA)

NSFC encourages Chinese scientists to conduct multilateral cooperation with researchers from IIASA Programs in the areas of energy, environment, land use, water, population, etc., and to jointly apply for research funding from governmental organizations, private and national science foundations, World Bank and EU Framework Program.

NSFC provides full support for 5 to 7 Chinese young scientists to participate in a 3-month Young Scientists Summer Program (YSSP) at IIASA in Vienna every year. For detailed information and application forms, please refer to the IIASA website (www.iiasa.ac.at). For detailed requirements about the application, please refer to the

call for proposals to be launched on NSFC's website.

Consultative Group on International Agricultural Research (CGIAR)

NSFC has reached agreements with 11 CGIAR affiliated institutes/centers, including the Center for Diversity International, International Center for Tropical Agriculture (CIAT), Center for International Forestry Research (CIFOR), International Maize and Wheat Improvement Center (CIMMYT), International Potato Center (CIP), International Center for Agricultural Research in the Dry Areas (ICARDA), World Agroforestry (ICRAF), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), International Food Policy Research Institute (IFPRI), International Livestock Research Institute (ILRI), and International Rice Research Institute (IRRI), to fund joint research projects conducted by researchers from both sides. The maximum funding amount for each project is 2 million yuan from NSFC with a funding period of 5 years. For detailed requirements about the application, please refer to the call for proposals to be launched on NSFC's website in February every year.

United Nations Environment Program (UNEP)

NSFC and UNEP jointly support scientists to conduct collaborative research in the fields of ecosystem, climate change, resource efficiency and environmental governance and other sustainable development related areas. Cooperation with developing countries in Africa and Asian-Pacific regions will be given special focus. The maximum funding amount for each project is 3 million yuan from NSFC with a funding period of 5 years. For detailed requirements about the application, please refer to the call for proposals to be launched on NSFC's website in February every year.

Belmont Forum (BF/IGFA)

NSFC supports Chinese researchers to participate in multilateral cooperation under the framework of the Belmont Forum. For detailed requirements about the application, please refer to the call for proposals to be launched on NSFC's website.

International Centre for Integrated Mountain Development (ICIMOD)

NSFC and ICIMOD jointly fund research projects to support researchers from China and ICIMOD member countries to advance research in the fields of sustainable development related areas in the region of Hindu Kush-Himalayas in China and the neighboring countries. For detailed requirements about the application, please refer to the call for proposals to be launched on NSFC's website.

Sustainable Development International Cooperation Program (SDIC)

Aiming at achieving the United Nations Sustainable Development Goals (SDGs), NSFC will work with other funding agencies and international organizations to fund multilateral scientific research projects to address global challenges and major scientific problems faced by all countries around the world, especially developing

countries. For detailed requirements about the application, please refer to the call for proposals to be launched on NSFC's website.

BRICS STI Framework Program

NSFC, Chinese Ministry of Science and Technology (MOST), Brazil National Council for Scientific and Technological Development (CNPq), Foundation for Assistance to Small Innovative Enterprises of Russia (FASIE), Russia Ministry of Education and Science (MON), Russian Foundation for Basic Research (RFBR), Department of Science and Technology of India (DST), Department of Science and Technology of South Africa (DST), and National Research Foundation of South Africa (NRF), jointly fund multilateral research projects under the framework of BRICS STI Framework Program. For detailed requirements about the application, please refer to the call for proposals to be launched on NSFC's website.

Hong Kong and Macao SARs and Taiwan Region of China

NSFC has established cooperation with the Research Grant Council of Hong Kong (RGC), Beijing-Hong Kong Academic Exchange Centre, Macao Foundation for the Development of Science and Technology, and K.T. Li Foundation for the Development of Science and Technology in Taiwan Region, jointly funding cooperation and exchange between researchers from the inland of China and Hong Kong and Macao SARs, and between researchers from two sides of the Taiwan Straits in areas of common interest. Types of activities that can be funded are joint research projects and exchange projects (including exchanged visits and academic workshops).

Hong Kong

NSFC and the Research Grant Council of Hong Kong (RGC) will continue to fund joint research in areas of natural sciences in 2022. The priority funding areas include information sciences, biological sciences, new materials, marine and environmental sciences, medical sciences, and management sciences. Meanwhile, it is to further encourage academic exchanges between young researchers from Hong Kong SAR and the inland of China, and academic forums are organized and funded in areas of common interest. For detailed requirements, please refer to the call for proposals launched in the column of "Notice and Announcements" on NSFC's website. Application or participation using Hong Kong SAR and the inland of China statuses by a researcher at the same time is not permitted.

Macao

In 2022, NSFC and Macao Foundation for Science and Technology Development (FDCT) will, under the framework of the signed cooperative agreement, together fund joint basic research projects between scientists from the inland of China and Macao. The priority areas include information science, TCM research, marine science, environmental science, biological science, new materials as well as space science. Meanwhile, NSFC and FDCT will organize and fund academic workshops in areas of mutual interest for academic communities from the inland of China and Macao region. For detailed requirements, please refer to the call for proposals launched in the column of “Notice and Announcements” on NSFC’s website.

Taiwan

NSFC has been dedicating to encourage and promote scientific cooperation and exchange between scientists on both sides of the Taiwan Straits. In 2022, NSFC will continue to support cross-Straits academic workshops held by scientists from the mainland of China and the Taiwan region. NSFC will also fund substantial joint research projects according to the consensus reached with K.T. Li Foundation for the Development of Science and Technology. For detailed requirements, please refer to the call for proposals launched in the column of “Notice and Announcements” on NSFC’s website.

Sino-German Center for Research Promotion

The Sino-German Center for Research Promotion (abbreviated as SGC) is a research funding agency, jointly set up by NSFC and German Research Foundation (DFG). SGC’s legal status is NSFC’s affiliated institution. It aims at promoting scientific cooperation and exchange between Chinese and German researchers and providing all-around services with its diverse funding instruments for researchers at various stages of their careers, and thus is able to push forward in-depth cooperation and development in fundamental science between China and Germany.

1. Subjects Covered

The SGC mainly supports the cooperation activities between Chinese and German scientists in fundamental research in all fields of natural sciences.

2. Eligibility of Applicants

An applicant from China must be a PI or participant in an NSFC granted project (either ongoing or already completed) with a duration of at least 3 years; or an

excellent young researcher who is less than 35 years old (born on January 1, 1987 or later) and holding a doctorate (applicable only to certain programs). Applicants from Germany must be eligible to apply for funding from DFG. Eligible Chinese and German scientists may submit a proposal jointly to the SGC.

3. Application Limit

The projects funded by the SGC are not subject to NSFC's regulation on the limit of the number of projects that an individual researcher could undertake or apply for.

4. Programs

(1) Preparatory Visit

Chinese and German scientists may apply to the SGC for funds to pay a short visit to their partners' institutions in order to make preparations and plans for proposing a Bilateral Workshop, Summer School, Young Scientist Forum, Mobility Program or NSFC-DFG Joint Research Project. Through the short visit, the two sides could work out a plan for a joint project efficiently, complete the preparation and submit their joint proposal as soon as possible.

(2) Bilateral Workshop

The most fundamental program supported by the SGC is Bilateral Workshops which aim at promoting setting up new partnerships, deepening existing partnerships, and stimulating new joint research projects between Chinese and German scientists. The workshops must have specific scientific themes, and be coordinated and co-hosted by senior scientists from both sides. To ensure the authoritativeness and representativeness, participants of the workshops must be representative scientists in related fields in both countries, and should come from different institutions and regions. The workshop could be held either in China or Germany. The SGC could provide funding for up to 40 participants for each workshop, i.e., not more than 15 participants from the travelling party and at most 25 participants from the hosting party. The number of participants from the same institution should not exceed a third of all the participants from that party. In addition, scientists from a third party can be invited to the workshop and the total number of such scientists should be no more than 3. Formal representatives from Germany must have doctorates. The SGC provides funding for domestic and international travel expenses, local subsistence of all formal participants, venue fees and other necessary costs of the workshop according to its current funding rates standard.

(3) Post-Workshops Young Scientist Academic Visit

The SGC encourages early career researchers participating in a Sino-German workshop to spend an immediately following additional research stay in a cooperation partner's group. Applicants for Post-Workshops Young Scientist Academic Visit should be formal representatives of Bilateral Workshops funded by SGC, and who have received an invitation letter for scientific visit from cooperation partner. Up to 2

participants from each bilateral workshop can apply for this visit. The funding duration is up to 14 days, and the funding rates cover travel expenses inside China or Germany, catering and hotel accommodation costs.

(4) Mobility Program

The Program aims at supporting in-depth cooperation and exchanges between Chinese and German scientists in a specific field over a period of 3 years. It mainly supports scientists' short-term visits and small-scale workshops. The SGC covers domestic and international travel expenses, accommodation costs, meal cost and venue fees according to its current funding rates standard. A maximum of 1.5 million yuan (or equivalent sum of euros) per project would be provided to both Chinese and German teams.

(5) Summer School

The Program aims to introduce advanced scientific methods, techniques and their applications to young scientists and provide them with training and discussion on specific issues in a certain area. The SGC attaches great importance to the selection of the young scientists to attend the summer school and requires that the participants of the seminars must be selected according to an open and competitive selection procedure. The SGC may fund 4 to 6 senior experienced scientists from both countries as lecturers. The applicants on both sides must be among the funded lecturers. Participants are mainly university undergraduates, graduates or young researchers from both countries. The number of participants is decided according to specific conditions, such as equipment and infrastructure of the laboratory, but it shall not exceed 40 persons in total. The number of participants shall not exceed 15 from travelling party, and 25 from the hosting party. The summer school can be held either in Germany or in China and usually lasts at most 14 days, including one day for arrival and one for departure. The SGC provides funding for all formal participants and lecturers for domestic and international travel expenses, local accommodation & meal costs and venue fees according to its current funding rates standard.

(6) Young Scientists Forum

The Program aims at providing a venue for Chinese and German young scientists active in their own fields to meet and discuss with each other, providing them with an opportunity to introduce their own work to the outstanding scientists and learn new research methods. The forum could be held either in China or Germany. The SGC in principle provides 5 to 7 days' funding including one day's academic visit and arrival & departure. The total number of participants shall not exceed 42 persons. The travelling party shall not be more than 16 persons (15 young scientists and one senior scientist). The receiving party shall not exceed 26 persons (25 young scientists and one senior scientist). In addition, scientists from a third party can be invited to the workshop and the total number of such scientists should be no more than 3, that is,

20% of the number of participants from the travelling party. Apart from the basic eligibility required, the participants shall be less than 40 years old (as of the holding date of forum). The German participants must have doctorates. The Chinese assistant professors (lecturer) are also eligible to attend. The organization of the forum shall be coordinated by a young scientist from each side. The SGC provides funding for international travel expenses, inter-city travel expenses, local subsistence costs and venue fees according to its current funding rates standard.

(7) Excellent Early-career German Scholar Program

The Program is established in order to further promote scientific cooperation between China and Germany, strengthen scientific and technological exchanges between young scholars of these two countries. The program will fund excellent early-career German scholars to carry out researches for a period of time in China, so as to familiarize them with Chinese research system, and establish and strengthen the interaction and long-term cooperation with Chinese scientists. This program can be funded in the following two terms: the short term and the long term. The Short-term funding covers domestic and international travel expenses, catering and hotel accommodation costs for up to two months; the Long-term funding period is three years, supporting up to 3 research stays in China with a whole duration of 6 months completed within three years. Funding rates cover domestic and up to three round trips of international travel expenses, catering and hotel accommodation costs, and an add-on for research expenses of up to 300,000 yuan.

(8) Lindau Program

Lindau Nobel Laureate Meeting is held in late June each year in Lindau, Germany. Excellent young scientists from around the globe are also invited to attend the event. The SGC, together with Lindau Nobel Laureates Foundation, invites and funds 30 excellent Chinese PhD students to participate in the Nobel Laureate meeting in Lindau, Germany, followed by a week-long academic visit to the German research institutions well-known in relevant disciplines solely organized by the SGC. Candidates are selected throughout China and must be recommended by their home institutions. The final approval list is decided by correspondence review and interviews by a panel of Chinese and German experts. The SGC provides funding for formally selected students for international travel expenses, inter-city travel expenses and accommodation costs according to its current funding rates. The SGC will handle the visa affairs for the selected students and pay for the related fees.

(9) Post-Lindau Program

Grantees of Lindau Program who has got the PhD degree and a fixed position in a Chinese research institution may apply for the funding from the SGC for an academic stay of less than 12 months in Germany if they could get invitations from German research institutions or universities, and approval from their host institutions. The SGC provides funding for international travel expenses, inter-city travel expenses,

accommodation costs and insurance expenses according to its current funding rates standard.

The Mobility Program will be accepted according to a solicited call, while other types of programs will be accepted in a continuous mode at any time. The detailed requirements, application forms and processes of each type of program in 2022 can be found at the website of the SGC: <https://sinogermanscience.dfg.nsf.cn>

Research Fund for International Scientists

Aiming at providing more research opportunities for and contributing to the career development of researchers at different academic stages, the Research Fund for International Scientists (hereinafter referred to as the **RFIS**) is set up by the National Natural Science Foundation of China (NSFC) to support international scientists with foreign citizenship who are ready to conduct basic research in China's mainland. The RFIS is open to all research areas within the NSFC's funding scope. The RFIS will also enhance the long-term, sustainable academic collaboration and exchange between Chinese and international scientists.

The RFIS consists of three sub-types:

1. The Research Fund for International Young Scientists (RFIS-I)
2. The Research Fund for International Excellent Young Scientists (RFIS-II)
3. The Research Fund for International Senior Scientists (RFIS-III)

I. Eligibility

Scientific and technical personnel from supporting institutions applying for research fund projects for foreign scholars shall meet the following conditions:

1. The Research Fund for International Young Scientists (RFIS-I)

(1) Doctoral degree obtained within the past 6 years (PhD must have been obtained after January 1, 2016);

(2) Experience of conducting basic research or postdoctoral research;

(3) Commitment of working for no less than 9 months each year (calendar year) at the host institution during the implementation of the project;

(4) Compliance with Chinese laws and NSFC's relevant rules and regulations while conducting research in China.

2. The Research Fund for International Excellent Young Scientists (RFIS-II)

(1) Doctoral degree completed within the past 15 year (PhD must have been obtained after January 1, 2007);

- (2) Senior academic title;
- (3) Experience of conducting basic research projects as Principal Investigator (PI);
- (4) Commitment of working for no less than 9 months each year (calendar year) at the host institution during the implementation of the project;
- (5) Compliance with Chinese laws and NSFC's relevant rules and regulations while conducting research in China.

3. The Research Fund for International Senior Scientists (RFIS-III)

- (1) Senior academic title;
- (2) Outstanding academic achievements and significant international influence;
- (3) Commitment of working for no less than 9 months per year (calendar year) at the host institution during the implementation of the project;
- (4) Compliance with Chinese laws and NSFC's relevant rules and regulations while conducting research in China.

II. Provisions on limited application

1. The applicant who has(had) a RFIS project will not be granted in the same sub-type of RFIS. The applicant can only be granted for each sub type of the RFIS once.

2. An applicant shall only apply for one RFIS in a year. The grantee of an on-going RFIS project shall not apply for a new RFIS project. If the applicant has submitted an application for any of the sub-types of the RFIS, the application shall not apply for the following programs in the same year:

- Young Scientists Fund (YSF)
- Excellent Young Scientists Fund (EYSF, including EYSF for scholars in Hong Kong and Macao)
- National Science Fund for Distinguished Young Scholars (NSFDYS)
- Science Fund for Creative Research Groups (SFCRG)

3. An applicant shall not apply for the RFIS-I if the applicant has been the PI of an on-going or completed project of the RFIS-II, the RFIS-III, the YSF, the EYSF, the NSFDYS and the SFCRG.

4. An applicant shall not apply for the RFIS-II if the applicant has been the PI of an on-going or completed project of the RFIS-III, the EYSF, the NSFDYS and the SFCRG.

5. An applicant shall not apply for the Research Fund for International Senior Scientists (RFIS-III) if the applicant has been the PI of an on-going or completed project of the NSFDYS and the SFCRG.

III. Areas and intensity of funding

The RFIS is open to all research areas within the NSFC's funding scope in 2022, which include mathematics and physics, chemistry, life sciences, earth sciences,

engineering and material sciences, information sciences, management sciences, health sciences, and interdisciplinary sciences.

The RFIS are divided into one-year and biennial projects. For the RFIS-I, applicants can apply for up to 200,000 RMB per year (per project). For the RFIS-II, applicants can apply for up to 400,000 RMB per year (per project). For the RFIS-III, applicants can apply for up to 800,000 RMB per year (per project). All the funding is direct cost.

IV. Proposal Submission

For application matters in 2022, please pay attention to the application guide for Foreign Scholars Research Fund published in the "Notice" column on the website of NSFC and the "Special Edition for Foreign Scholar Research Fund" column on the website of the Bureau of International Cooperation.