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## **Postprint: Analysis of Applications and Funding for Regular Projects in the Astronomy Discipline of the National Natural Science Foundation of China in 2021**

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### **Abstract**

This paper introduces and analyzes in detail the application and funding status of regular projects in the astronomy discipline of the National Natural Science Foundation of China in 2021, and proposes recommendations for the funding work in 2022.

### **Full Text**

#### **Analysis of the Application and Funding of Regular Programs in Astronomy by the National Natural Science Foundation of China in 2021**

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### **Abstract**

This paper provides a detailed introduction and analysis of the application and funding status of regular programs in astronomy funded by the National Natural Science Foundation of China (NSFC) in 2021, and offers recommendations for the funding work in astronomy for 2022.

**Keywords:** National Natural Science Foundation of China; astronomy; application; funding

## 1. Application Status and Analysis of Regular Programs in Astronomy for 2021

During the 2021 NSFC centralized application period, the astronomy discipline received a total of 1,104 applications for various types of regular programs, with total requested direct funding of 1,604.59 million yuan. Detailed information on these applications is presented in Table 1, which also includes application data for the past five years for comparison. Table 1 shows that compared with 2020, the number of applications in 2021 increased by 147, representing a growth rate of 15.36%. Specifically, general program applications increased by 55 (13.41% growth), higher than the overall NSFC rate (a decrease of 1.30%) and the Department of Mathematical and Physical Sciences rate (0.51% growth). Young scientist program applications increased by 42 (12.92% growth), also exceeding the overall NSFC (8.20% growth) and departmental (9.26% growth) rates. Regional program applications increased by 3.

In 2020, the growth rates for general and young scientist programs in astronomy were lower than those of the overall NSFC and the department, while key program applications decreased by 25%. In contrast, 2021 saw substantial increases in applications for general, young scientist, and key programs, primarily because the Astronomy Joint Fund agreement expired in 2020 and no guidelines for the Astronomy Joint Fund were issued during the centralized application period.

Among the 2021 regular program applications, 7 were not accepted for review: 3 general programs, 3 young scientist programs, and 1 regional program. Reasons included: (1) recommendation letters lacking handwritten signatures from peer experts; (2) incorrect project duration specified by non-postdoctoral applicants; and (3) inaccurate personal resumes.

According to regulations, recommendation letters from peer experts must bear handwritten signatures; electronic signatures are not permitted. Only post-doctoral researchers may flexibly select funding durations based on their post-doctoral tenure; other applicants cannot arbitrarily choose project durations. Personal resumes involve academic integrity and must accurately detail education and work history, including correct names of institutions and supervisors/collaborators without abbreviation or errors. Additionally, the Department of Mathematical and Physical Sciences has strengthened its review of publication citations this year. Articles not yet accepted for publication at the time of application cannot be listed as research achievements. For articles accepted but not yet published, acceptance letters must be provided, and information regarding first authors, corresponding authors, and publication dates must strictly match the formal publication without misattribution or omission.

### 1.2 Distribution by Discipline, Applicant Age, and Institution

To better understand the basic characteristics of 2021 applications, this paper conducted a preliminary statistical analysis from three perspectives: applicant age, discipline, and institution, with results presented in Tables 2, 3, and 4.

Table 2 shows that applicants under 40 years old accounted for 58.92% of general program applications (64.15% in 2020), while applicants over 30 accounted for 76.57% of young scientist program applications (74.77% in 2020). Table 3 indicates that both general and young scientist programs received relatively more applications in the areas of “Astronomical Technology and Methods” and “Stellar Physics and Interstellar Medium.”

In 2021, researchers from 118 institutions (20 Chinese Academy of Sciences institutes, 93 universities, and 5 other departments) submitted 465 general program applications, representing an increase of 31 institutions compared with the previous year, with the new applicants primarily being universities. Chinese Academy of Sciences institutes, universities, and other departments submitted 300, 160, and 5 applications respectively, accounting for 64.52%, 34.41%, and 1.08% of general program applications. While CAS researchers remain the main applicant group, the proportion of applications from universities continues to rise. Table 4 shows that the National Astronomical Observatories, Purple Mountain Observatory, Yunnan Observatories, and Shanghai Astronomical Observatory of the Chinese Academy of Sciences each submitted more than 40 general program applications this year, collectively accounting for 47.53% of all general program applications (50.98% in 2020).

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## 2. Funding Status and Analysis of Regular Programs in Astronomy for 2021

### 2.1 Funding Principles and Scale

The funding orientation of NSFC in the new era is: encouraging exploration and highlighting originality; focusing on frontiers and pioneering new approaches; addressing national needs and breaking bottlenecks; and promoting interdisciplinary integration guided by common principles. In 2021, NSFC comprehensively implemented an upgraded reform, expanding the pilot program of classified application and review to all young scientist, general, and key programs, while steadily expanding the pilot scope of the “Responsible, Credible, and Contributing” (RCC) review mechanism.

Building on the 2020 pilot RCC reform for general programs, the astronomy discipline expanded the pilot program types to include both general and key programs in 2021. Under the unified deployment of the Department of Mathematical and Physical Sciences, the astronomy division conscientiously implemented the spirit of classified review and RCC reforms, conducting project reviews in strict accordance with regulations. The overarching review principles of NSFC are: relying on experts, promoting democracy, selecting the best for support, and ensuring fairness and reasonableness. Based on expert opinions and the overall development status of the discipline, astronomy also appropriately considers coordinated development across different fields and sub-disciplines,

providing appropriate support to relatively weak disciplines, non-primary astronomical institutions, and remote regions to ensure balanced development of astronomy. Under equivalent academic standards, priority is given to female applicants and younger applicants.

According to the 2021 NSFC funding plan and the Department of Mathematical and Physical Sciences' funding arrangement, the astronomy discipline was allocated 124.59 million yuan in regular direct funding, including 64.56 million yuan for 106 general programs (14 more than last year), 22.96 million yuan for 98 young scientist programs (18 more than last year), and 2.59 million yuan for regional programs. After passing formal review, peer expert correspondence evaluation, specialized expert panel discussion and voting, and committee approval, the astronomy discipline selected and funded a total of 222 general, young scientist, regional, and key programs in 2021, with total direct funding of 124.59 million yuan. Details are provided in Tables 5 and 6. Under the new funding management policy, young scientist program funds are implemented under a "lump-sum" system, with an average annual funding of 100,000 yuan per program. The funding amounts in Table 5 still reflect the average funding intensity before the implementation of the "lump-sum" system.

### 2.3 Problems Identified During Review

During the formal review, peer expert correspondence evaluation, and discipline expert panel review processes, we identified common issues that remain consistent with previous years, including: incomplete or inaccurate personal information, overly simplistic or careless application writing, and non-standardized entry of research achievements (including papers, patents, awards, etc.). These issues will not be elaborated here; interested readers may refer to summary articles from previous years. This phenomenon warrants attention from applicants and their host institutions, which should devote greater effort to improving application quality.

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## 3. Recommendations for Astronomy Discipline Work in 2022

In 2022, the astronomy discipline will continue to be guided by Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, fully implementing new requirements for basic research and science fund development in the new era. We will maintain a balanced funding structure across sub-disciplines while providing appropriate support to non-primary astronomical institutions and those in remote regions. Under equivalent conditions, we will continue to give appropriate preference to female scholars and younger scholars.

Furthermore, we encourage researchers to utilize NSFC's original exploration project channels to conduct original research, expand international cooperation

channels, make full use of large international observational facilities, and apply for international cooperation research projects through multiple channels. We also encourage actively organizing research teams and distilling major scientific questions to apply for major programs.

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#### 4. Conclusion

This paper summarizes the application and funding status of general, young scientist, regional, and key programs in astronomy funded by NSFC in 2021, identifies some existing problems in applications, provides a brief analysis of funding status, and introduces some changes to the astronomy discipline's work in 2022. We hope these results will assist the research management departments of host institutions and astronomers in future project applications.

*Note: Figure translations are in progress. See original paper for figures.*

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