

2025 Thematic R&D Funding Scheme – Key R&D Projects

(In Response to National Needs)

Application Guide for the Field of Lunar and Planetary Sciences

I. Background

To give full play to Macao's unique role in scientific and technological innovation, and to enhance China's scientific research capacity and international influence in the field of lunar and planetary sciences, the Science and Technology Development Fund (FDCT), based on consultations with local experts and supported by Mainland professionals, has developed this key R&D guide. With a strategic and stepwise approach to align with national needs, the guide supports Macao in conducting research on planetary science and exploration technologies, contributing to the advancement of the nation's space endeavors.

II. Overall Objective

In response to the strategic needs of China's lunar and planetary exploration, this initiative aims to address key scientific and technological issues in the analysis of extraterrestrial samples. The project will establish a sample analysis platform, develop core analytical technologies for trace sample composition, structure and physical properties, and deepen the understanding of the formation and evolution of extraterrestrial bodies, the evolution of the space environment, and the utilization of extraterrestrial resources, thereby supporting the development of national deep space exploration and space science.

III. Research Focus

Theme: Research on Key Scientific and Technological Issues in the Analysis of Extraterrestrial Samples

The research will focus on establishing sample analysis platforms and developing core analytical techniques for trace sample composition, structure, and physical properties. Based on sample characterization, it will explore the formation and evolution of the Moon, Mars, and small celestial bodies. It will also address important scientific questions related to the spatiotemporal evolution of micrometeoroids, solar wind, and solar energetic particles. The project will promote the development and expanded

application of micro-area analytical techniques for trace samples, and deepen the understanding of the formation and evolutionary history of extraterrestrial bodies and the space environment.

Assessment Indicators:

1. Establish a database on the amorphous layer thickness caused by solar wind and flux of solar energetic particles in minerals from the lunar soil samples of Chang'e-5 and Chang'e-6 missions, with no fewer than 80 samples.
2. Establish a database on the micromechanical properties of lunar soil, including parameters such as mineral types, Young's modulus, and friction coefficients, with no fewer than 100 samples.
3. Develop a numerical model of the interaction between solar wind, solar energetic particles, cosmic rays, and lunar soil samples.
4. Publish no fewer than 20 research papers in the field of extraterrestrial sample analysis, and apply for no fewer than 3 invention patents.

IV. Application Requirements

1. The lead applicant must be an institution based in Macao and must collaborate with a national-level research institution in the Mainland.
2. The project implementation period is four years. The maximum funding amount for each project is MOP 15 million.

V. Experts Participating in the Preparation of the Guide

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