An RFP for Chinese Scientists

BEYOND The HORIZONs

Grants for Research on Big Questions
in Astronomy, Astrophysics and Cosmology

Projected Timeline for Program Activities

November 1, 2011	Release of the formal Request for Proposals by NAOC
February 15, 2012	RFP deadline for submitting letter of intent
April 1, 2012	RFP deadline for submitting full proposals
June 15, 2012	Announcement of winning proposals
August 1, 2012	First round funding commences
November 15, 2014	Conclusion of program

OVERVIEW

The purpose of the *Beyond the Horizons* Request for Proposals (RFP) program is to advance basic scientific understanding in areas of astronomy, astrophysics and physical cosmology that clearly engage deep and profound "big questions" of a philosophical nature using scientific methods of research. The program is to support bold and relatively high risk and non-incremental research that is scientifically rigorous. The program is particularly intended to support research that, because of its ambitious, non-mainstream nature, or because of the breadth of the questions asked, would not be funded by most conventional funding entities.

The program particularly focuses on supporting rigorous scientific research into the big questions that naturally arise from science itself but have potential to expand the boundaries and deepen the foundation of scientific inquiry, thus achieving an enduring impact and paving the way for a more comprehensive understanding of the world.

This is the third and final year of a $2M program, funded jointly by the National Astronomical Observatories, CAS and the John Templeton Foundation.

GRANTS OFFERED

The following grants are offered:

- Four to five Junior Grants to be awarded in 2012 (depending on quality), up to two years each in duration at up to $20, 000 per year. These grants may be awarded to promising researchers in advanced, pre-doctoral (within the final two years) or postdoctoral programs. The total budget for this third round of awards for this category is about $180,000. Proposals by young scientists are particularly encouraged.
- Two to three Senior Grants in 2012 (depending on application quality) up to two years each in duration at up to $40,000 per year. The total in this category is expected to be about $200,000.
- One to two Experimental Grants in 2012 (depending on application quality) up to two years each in duration at up to $100,000 per year. The total budget for 2012 is about $300,000.
- Special small networking grants may be requested to provide for the costs associated with the short-term exchange of scholars among grant winning institutions, or for exchanges in other formats that connect scholars interested in the ground breaking grants that are the goal of this competition. The grants totaling up to $30,000 (two year total) may be awarded in 2012.
- The exact amounts for each category will be determined by the jury to allow flexibility in responding to the requests actually received.

ELIGIBILITY

- This RFP is limited to research in astronomy, astrophysics, and cosmology. Both theoreticians and experimentalists are encouraged to apply. Collaborative proposals between scientists and philosophers of science are also welcome if the investigation is scientifically rigorous and relevant to the Big Questions pertaining to this RFP grant program.

- This RFP is limited to research with potentially significant and broad implications for our understanding of the deep or "ultimate" nature of reality. Key examples of such topical themes are listed in the final section entitled, "Big Questions in Astronomy, Astrophysics & Cosmology."
- This RFP is intended to fill the gap in conventional funding. Being "fundamental" is not good enough for the works submitted for this Research Grant. The RFP is not for "mainstream" research such that the research, in principle, could be funded by conventional funding sources. The program is intended to support research that, because of its ambitious, non-mainstream nature, or because of the breadth of the questions asked would be unlikely to receive mainstream funding support at this time.
- The proposed research must be rigorous and deeply creative in terms of ideas and the demonstrated capabilities and talents of the applicants.
- Although drawing on previous work and solid expertise, researchers must push themselves toward an area of inquiry that is clearly foundational.
- The offer of the Research Grant will be limited to research that has the potential to significantly impact basic and "big picture" understandings of the universe.
- Technical proposals are ideal. However, it is important that they are not 'merely technical.' It should be clear how results directly engage the big questions related to astronomy, astrophysics, and cosmology. It is the sole burden of the applicant to make a detailed case.
- *As an aid to applicants in understanding the goals of the program, we have provided a list of potential questions at the end of this document*. You are by no means limited to work on these questions or even the general themes out of which these particular example questions grow.
- This RFP is limited to research carried out in China (including Taiwan, Hong Kong, and Macao) by residents of those locations. All grant funds must be expended in China. The PI must be a certified member of a Chinese research establishment. Non-Chinese PIs must provide institutional certification that they have an appointment lasting for at least 80% of the period of the grant applied for.

☙ CRITERIA OF MERIT

Each proposal will be evaluated according to the following criteria:

- *Potential* for significant contribution to our basic foundational understanding of nature, and the likelihood for opening new, fruitful lines of inquiry The preferences will be given to the proposals that succeed in arguing that new areas of research may open up as a result of the research or, alternatively that the mainstream approach to big questions and dilemmas can be upset by the proposed research (up to 30 points).
- Intrinsic *intellectual merit*, *scientific rigor* and *originality* of the submitted proposal (up to 30 points)
- *Qualifications* of the applicants and proposals (up to 20 points)

- Persuasiveness of the *practicality* of the plan and of the applicant's ability to use the grant to continue to advance the themes explored in the proposal submitted as the basis for the application (up to 20 points)

The Program is NOT likely to Support the Following Research:

- The RFP is NOT for **mainstream** research such that the research, in principle, could be funded by conventional funding sources. Being "fundamental" or being "technical" is not good enough for the works submitted for this Research Grant. The following are some examples of areas this program is NOT likely to support:
    - "Fundamental" research in string theories and/or quantum gravity (these are now considered mainstream research topics)
    - Research on a novel candidate for dark matter
    - Computer simulations of evolutions of galaxies
    - Astrophysical determinations of dark energy properties
    - However, a proposal, though drawing on ideas such as those noted, may be considered if it is made clear that the proposal (1) pushes the boundary of fundamental inquiry further and (2) is relevant to the program intent.

  It is the sole responsibility of the proposer of programs such as these to show that they are outside the realm of what can be funded by conventional sources.

- The RFP is NOT for **incremental** research advances, such as "normal" research in astronomy, astrophysics, or cosmology based on existing ideas.
    - However, a proposal, though drawing on previous work, may be considered if it is clear that it (1) pushes the boundary of the fundamental inquiry further and (2) is relevant to the program intent.

The proposals that are subject to the above stated quantitative evaluation MUST past the filtering process described above.

☙ USE OF GRANTS

Acceptable use of grant funds includes the following:

- Student or postdoctoral salary and benefits for part of the academic year.
- Summer salary and teaching buyout for academics (ONLY applicable to Non-Mainland area).
- Support for specific projects during sabbaticals (ONLY applicable to Non-Mainland area).
- Assistance in writing or publishing books.
- Modest allowance for justifiable lab equipment, computers, publication charges, and other supplies.
- Modest travel allowance.
- These are primarily research support grants, though of course research can be accomplished in any number of ways. No more than 10% of a grant may be devoted to indirect costs, overhead or administration.

☙ GRANT PROCESS

- Call for Proposals Announced: November 1, 2011.
- Letters of intent due January 15, 2012. Letters of intent will be used to judge the size of the response and to provide a basis for choosing an appropriate jury. Letters of intent must include name and institutions of proposer and co-proposers, name of the institution to which the grant is to be awarded, title of the proposal, abstract of the proposed research, and a budget estimate of up to 10 lines. Entire letter should be only one page long. Institutional certification that a non-Chinese PI has an appointment for 80% of the period for which funds are requested should be attached, as a second page.
- Full Proposal Application deadline for the grants: April 1, 2012. Please make sure to use the specified form for full proposals, which can be downloaded from "How to Apply" at the project homepage: http://www.china-vo.org/nv400/.
- Announcement of winning proposals: June 15, 2012.
- Commencement possibility: August 1, 2012.
- Receipt of final reports: August, 2013 (one year grants); August, 2014 (two year grants).
- Interim reports at 6-month intervals are required.
- Conclusion of the program: November 15, 2014.

☙ OTHER INFORMATION

Please send all required documents including the letter of intent, full proposal forms, etc. to

Dr. Haining Li
Email: rfp@nao.cas.cn

PDF format is preferred. Questions and inquiries regarding this RFP may be e-mailed to: rfp@nao.cas.cn. No telephone inquiries will be accepted by the program.

☙ Big Questions in Astronomy, Astrophysics & Cosmology

The program will address research topics deemed appropriate by the advisory and program committees. Potential research topics for the committees' examination will include, but are not limited to the following. (Please note: most PIs will find that some of these questions are more relevant to their work than others.) The program recognizes that it is extremely difficult (or impossible at the present level of scientific understanding) to directly answer some of the following questions. However, the program requires that a proposed research project either be directly relevant to some of the following questions or shed some *important* light on them (and some other questions to be adapted by the advisory and program committees in accordance with the donor intent).

1. Does the universe have a beginning? If so, how did the universe originate?
2. Why do the laws of physics have the form they do? Where do the laws of physics come from?
3. Was the Big Bang the origin of the universe? Was our Big Bang the only one?

4. What is the origin of the complexity (or emergent properties) of matter in the universe?
5. How will the universe end?
6. What determines the values of the "fundamental" constants?
7. What explains the large scale ratios of forces we observe?
8. Does the (quantum mechanical) ensemble of universes exist? If so, how do we know?
9. Does the multiverse exist? If so, can it be verified through scientific testing?
10. If the multiverse exists, why does a particular multiverse exist rather than any other?
11. Can cosmological space-time be infinite?
12. Is our universe "finely-tuned" for life and intelligence? If so, why?
13. Is there life on other planets? Are we alone in the universe?
14. Where did intelligent life come from? Can other forms of intelligent life (such as non-carbon-based life) exist?
15. Why does the universe seem evolutionarily creative?