

## A.4 ASTROPHYSICS THEORY

### 1. Scope of Program

The Astrophysics Theory Program (ATP) is intended to support efforts to develop basic theory needed for NASA's space astrophysics programs. The periods of performance of investigations for this research element range from one to three years, although most proposals that are selected have a duration of three years. Abstracts of currently funded ATP projects can be found online at <http://spacescience.nasa.gov/research.htm> (select "Past Archives and Selections," then the year of award, then ATP in the "Selection" column).

*A major change is occurring this year in the Astrophysics Theory Program.* With the introduction of the Beyond Einstein (BE) Program within the Office of Space Science (Division of Astronomy and Physics, Structure and Evolution of the Universe Theme), a new program has been created to provide ancillary theoretical and experimental support for the future missions defined by the BE Program, named the Beyond Einstein Foundation Science (BEFS) Program that will now support some of the theoretical research areas previously supported by the ATP. These include theoretical topics in gravitation, fundamental physics, cosmology, and most x-ray astrophysics. Interested proposers should carefully read the BEFS Program description in this NRA (Section A.6) as well to make sure that they are submitting their proposal to the appropriate program. Please note, however, that no proposal will be disqualified for having been submitted to ATP (BEFS) when it should have been sent to BEFS (ATP). NASA Headquarters reserves the right to move a proposal from one program to another if deemed appropriate; for this reason the proposal due dates of both programs (ATP and BEFS) are the same. (A complete description of the intellectual scope of the science objectives and possible flight missions of the BE Program can be found on the website <http://universe.gsfc.nasa.gov>. The BE Program is also briefly described in the Space Science Enterprise 2003 Strategy publication, found at the Website <http://spacescience.nasa.gov/admin/pubs/index.htm>.)

Proposals submitted for this program must:

- be directly relevant to space astrophysics by facilitating the interpretation of existing data from space astrophysics missions, foreign as well as domestic, or should lead to predictions that can be tested with space astrophysics observations;
  - address theoretical problems in space astrophysics that are either broadly applicable across astrophysics or narrowly focused on a particular subdiscipline of space astrophysics (examples include infrared and radio astrophysics, ultraviolet and visible astrophysics, high energy astrophysics, and galactic cosmic ray/particle astrophysics);
- and
- consist predominantly of theoretical studies and the development of theoretical models that may also incidentally include data analysis and comparison tests of theory against data from space astrophysics missions.

Conversely, proposals to the Astrophysics Theory program may not:

- consist primarily of data reduction or data analysis (such proposals should be directed to the mission-specific programs, the Astrophysics Data or the Long Term Space Astrophysics programs);
- address theoretical topics that are predominantly unrelated to the needs of NASA's space astrophysics programs (such proposals should be directed to other appropriate Federal agencies);
- deal strictly or predominantly with Solar System objects or solar-terrestrial interaction studies, including solar energetic particles;
- address theoretical topics supported by the BEFS Program, *viz.*, gravitational and fundamental physics, cosmology, and most x-ray astrophysics;
- request support for organizing and/or hosting scientific meetings; or
- request support for substantial computing facilities or resources.

Proposals are judged on three criteria: Scientific merit of the proposed work, cost realism, and relevance of the proposed work to NASA missions and science goals. To enable the NASA Office of Space Science to properly evaluate the relevance of proposals submitted to its programs, as well as track its progress towards achieving its goals as mandated by the Government Performance Review Act (GPRA), it is mandatory that all research supported by NASA's programs demonstrate its relationship to NASA Goals and Research Focus Areas (RFAs) as stated in the latest version of its Agency and/or OSS Strategic Plans (follow links from the Web site <http://spacescience.nasa.gov/>); see also the discussion in Section I of the *Summary of Solicitation* of this NRA. Therefore, all proposers must explain the relevance of their proposed work not only with expository text in the main body of their proposal, but also in terms of the Goals, Science Objectives, and RFAs given in Table 1 found in the *Summary of Solicitation* of this NRA. In particular, this program element is designed to help fulfill any of the RFAs for all of the Science Objectives for Goal II of both the science theme "Astronomical Search for Origins" and "Structure and Evolution of the Universe." The appropriate place for this latter statement of relevancy is in the introduction to the proposal's "Scientific/Technical/Management" section (see Section 2.3.5 in the *Guidebook for Proposers*). The index numbers in this table may be used to identify a specific RFA, for example, "Goal I, Sun-Earth Connection Theme, RFA 1(c)" or "Goal II, Astronomical Search for Origins, RFA 3(b)."

## 2. Proposal Category and Research Areas

As a change from the policy for this program in previous years, beginning with this NRA, only proposals from individual Principal Investigators will be accepted. The earlier category of "group proposal," in which several researchers were allowed to submit an omnibus proposal of related, but separate, research investigations under a designated PI, is now discontinued. Individual PIs may still include as many Co-Investigators and Collaborators as they wish on their proposals. Investigators may submit more than one

proposal to the ATP if the research areas of each is significantly distinct. If a new proposal for this program is itself based on a previously funded research effort, the proposal must identify that work and clearly summarize all significant results from it.

For the purposes of conducting the peer review, every proposal for this program must identify one (or more, if appropriate) of the Topic Categories from the list below in both its *Notice of Intent* and in the proposal submission itself (the primary use of these Topic categories is to facilitate the assignment of the proposal to an appropriate review panel; NASA reserves the right to assign a proposal to a different category):

1. *Star Formation and Pre-Main Sequence Stars* (star forming clouds, protoplanetary and debris disks, protostars, T Tauri stars, brown dwarfs, dust and astrochemistry);
2. *Main Sequence Stars*;
3. *Post-Main Sequence Stars and Collapsed Objects* (giants, isolated white dwarfs, isolated neutron stars, central stars of planetary nebulae);
4. *Gamma Ray Bursts*;
5. *Binary Systems* (cataclysmic variables, x-ray binaries, and black hole binaries);
6. *Interstellar Medium and Galactic Structure* (supernova remnants, dark clouds, interstellar dust, H II regions, diffuse galactic emission, and planetary nebulae);
7. *Normal Galaxies* (normal galaxies, interacting galaxies, starburst galaxies);
8. *Large Scale Cosmic Structures* (clusters of galaxies, galaxy environment and evolution, intrac luster medium, diffuse photon backgrounds );
9. *Cosmic Ray/Particle Astrophysics*; and
10. *Other* (NASA HQ will assign the proposal to what it deems is the most appropriate review panel.)

### 3. Programmatic Considerations

It is anticipated that approximately \$2.8M will be available through this solicitation to fund the first year of new awards. The *average* level of support per grant per year is expected to be on the order of \$100K, and periods of performance up to three years may be proposed.

### IMPORTANT INFORMATION

As discussed in the *Summary of Solicitation* of this NRA, the Office of Space Science (OSS) now uses a unified set of instructions for the preparation and submission of proposals given in the document entitled *NASA Guidebook for Proposers Responding to NASA Research Announcement - 2004* (or *NASA Guidebook for Proposers* for short) that may be accessed by opening <http://research.hq.nasa.gov/> and linking through "Helpful References," or by direct access at <http://www.hq.nasa.gov/office/procurement/nraguidebook/> (note that the updated 2003-edition of the *Guidebook* is used for this solicitation). Section IV(b) of this NRA's *Summary of Solicitation* contains the Web address relevant to the electronic

submission of a Notice of Intent (NOI) to propose and a proposal's *Cover Page/Proposal Summary/Budget Summary*, as well as the mailing address for the submission of the hard copies of a proposal.

For further information, contact the Program Officer for this program element:

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