

A.2.10 Space Astrophysics Research and Analysis (SARA) Program

1. Scope of Program

The Space Astrophysics Research and Analysis (SARA) program solicits basic research proposals for investigations that are relevant to NASA's programs in astronomy and astrophysics in the wavelength regime greater than approximately 100 Å through the radio spectrum (except within Laboratory Astrophysics, as noted below). There are two primary goals: (i) to obtain a better understanding of astrophysical objects and phenomena as revealed by their electromagnetic radiation; and (ii) to investigate topics in general relativistic and gravitational astrophysics. While excellence of proposed research is the primary selection criterion, relevance to NASA missions is a necessary criterion and must be explicitly described in the proposal. Lists of past, present, and future missions of interest are given in Tables I and II below, which are furnished only as a guide to assessing relevance of proposals for this Program Element.

This SARA Program Element combines the Ultraviolet, Visible, and Gravitational Astrophysics program, and elements of the Infrared, Submillimeter, Radio, Interferometry Astronomy program as advertised in ROSS-98. Note that the **Laboratory Astrophysics** component of the SARA program now includes aspects previously contained in ROSS-98 of the High Energy Astrophysics Program and the Astrophysics Theory Program (ATP). Thus, the "Atomic and Molecular Astrophysics" component of the ROSS-98 ATP is now included within SARA. However, compilation of large databases of parameters should be directed to the Applied Information Systems Research Program (described in Appendix A.5.2). Proposals for ground-based observations will be considered only if: (a) they are in direct support of NASA space astrophysics goals, and (b) the proposers are ineligible, by virtue of their institutional affiliation, to receive direct or indirect support from the National Science Foundation for ground-based astronomy.

Topics of interest to this SARA program fall into the following four research categories:

- *Laboratory astrophysics (theoretical or experimental for all wavelengths)* - for example, predissociation in diatomic molecules, electron-ion collisions, compilation of transition probability data, measurement of absolute oscillator strengths, spectroscopic studies of PAH's, investigation of carbon clusters, computation of atomic or molecular parameters;
- *Supporting technology studies (longward of 100 Å)* - for example, ultra-light holographic/diffraction grating development, thin films, lightweight composite mirrors, spectrometers, interferometers, infrared cameras;

- *General relativity and physics of gravitation* - for example, lunar-laser ranging tests of relativity, solar-system tests of gravitational theories using satellite data, low frequency gravitational wave astronomy; and
- *Ground-based astronomy (longward of 100 Å)* - for example, calibration of supergiants for Hubble Space Telescope, development of observational techniques.

Table I - Past, Current, and Future NASA Missions Having Objectives for UV, Visible, and Gravitational Astrophysics

(Note: Links to mission home pages may be found through the World Wide Web URL <<http://www.hq.nasa.gov/office/oss/missions/index.htm>>.)

<u>MISSION</u>	<u>LAUNCH YEAR</u>	<u>REMARKS</u>
• International Ultraviolet Explorer (IUE) 1200–3200Å	1978	Terminated in 1996.
• Hipparcos	1989	ESA astrometry mission.
• Hubble Space Telescope (HST) <i>Goddard High Resolution Spectrograph (GHRS)</i> 1150–8000Å <i>Faint Object Camera (FOC)</i> 1150–6500Å <i>Faint Object Spectrograph (FOS)</i> 1050–3200Å <i>Wide Field/Planetary Camera 2 (WF/PC2)</i> 1150–11000Å <i>Space Telescope Imaging Spectrograph (STIS)</i> 1150–11000Å	1990	In operation. Ceased operation. Ceased operation. Ceased operation. In operation. In operation.
• Astro-1	1990	Completed 9 day mission.
• Astro-2 400 – 3000 Å	1995	Completed 16 day mission.
• Extreme Ultraviolet Explorer (EUVE) 80–800Å	1992	In operation, Guest Observer program.
• Orbiting and Retrievable Far and Extreme Ultraviolet Spectrometer (ORFEUS)/ Interstellar Medium Absorption Profile Spectrograph (IMAPS) 400–1200Å	1993	Completed 5 day mission.
• ORFEUS II / MAPS	1996	Completed 13 day mission.
• On-going tests of relativity	—	Various current interplanetary spacecraft.
• Far Ultraviolet Spectroscopic Explorer (FUSE) 800–1200Å	1999	3 year mission.
• HST Advanced Camera for Surveys (ACS)	2000	HST replacement instrument.
• Gravity Probe-B (GP-B) - Lense Thirring Effect	2000	2 year mission.

Table I - CONTINUED

• The Galaxy Evolution Explorer (GALEX) 1350 – 3000Å	2001	28 month mission.
• The Cosmic Hot Interstellar Plasma Spectrometer (CHIPS)90 – 260Å	2001	12 month mission.
• Cosmic Origins Spectrograph (COS)	2003	HST replacement instrument.
• Space Interferometry Mission (SIM)	TBD	Selected for study.

Table II - Past, Current, and Future NASA Missions Having Objectives in Infrared, Submillimeter, and Radio Astrophysics

<u>MISSION</u>	<u>LAUNCH YEAR</u>	<u>REMARKS</u>
• Hubble Space Telescope (HST) Near Infrared Camera and Multi-object Spectrometer (NICMOS)	1990	In operation. Ceased operation
• Infrared Space Observatory (ISO)	1995	Terminated in 1998.
• Space Very Long Baseline Interferometry (SVLBI)	1996	In operation
• Submillimeter Wave Astronomy Satellite (SWAS)	1998	In operation
• Wide-field Infrared Explorer (WIRE)	1999	Survey of IR emission from galaxies and GO Programs
• Space Infrared Telescope Facility (SIRTF)	2002	Great Observatory
• Stratospheric Observatory for Infrared Astronomy (SOFIA)	2002	Multipurpose Observatory
• Next Generation Space Telescope (NGST)	2007	Study of the Universe at high red shift
• Microwave Anisotropy Probe (MAP)	2000	CMBR
• Far Infrared Space Telescope (FIRST)	2007	
• PLANCK	2007	
• Terrestrial Planet Finder	2011	

2. Programmatic Information

It is expected that roughly \$3M will be available in FY 2000 for the funding of about 50 new three-year projects split among four categories: supporting technology, laboratory astrophysics, gravitation and general relativity, and ground-based astronomy. Investigators may propose programs of any size. The actual amount of funding awarded to a particular program will be determined by the merit of the program and programmatic goals of the Office of Space Science.

Proposers are encouraged to define a program that may be accomplished in a three-year period. It is recognized that the proposed investigation may evolve with time. Accordingly, emphasis should be placed upon the first year's effort, with as much detail as possible on the planned second and third year's activities. Proposals for investigations requiring less than a three-year time scale to complete are encouraged, as are those which require a longer time scale to complete, though the latter must undergo subsequent peer reviews every three years. Key projected milestones and accomplishments during each period of the proposed effort should be identified.

NOTE: Appendix C contains critical information necessary for the preparation and submission of proposals submitted in response to this NRA. In particular, Section C.5.3 contains detailed standards concerning the format, page limits, and contents of a proposal. The submission of a proposal not in compliance with these standards may complicate and/or hinder its efficient and complete evaluation. Therefore, deficiencies in format and/or omission of key information may result in a proposal being found unacceptable for evaluation, or if evaluated, being adversely affected during the evaluation process.

The schedules for submission of the Notice of Intent (NOI) and proposals are given in Table 1 of the cover letter of this NRA. The Web site for submitting both the NOI and the *Cover Page/Proposal Summary* (see Appendix C.5.3) is <<http://propos.oss.hq.nasa.gov>>; proposers without access to the Web or who experience difficulty in using this site may contact Ms. Debra Tripp (E-mail: deb.tripp@hq.nasa.gov) for assistance. Hard copies of the proposals are to be sent to:

ROSS-99 NASA Research Announcement
Space Astrophysics Research and Analysis Program
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Additional information may be obtained from the following Discipline Scientists:

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