

A.1.7 SWIFT GUEST INVESTIGATOR PROGRAM – CYCLE 1

1. Scope of Program

1.1 Overview

This program element solicits proposals for basic research relevant to the Swift gamma-ray burst mission. The primary goal of this mission is to determine the origin of gamma-ray bursts (GRB's) and use these bursts to probe the early universe. This solicitation is for Cycle 1 of the Swift Guest Investigator (GI) Program, which is expected to begin ~ 4.5 months after launch and last approximately 12 months.

The Swift GI Program is open only to scientists at U.S. institutions; similar GI programs may be considered in the United Kingdom and Italy if desired in those countries and if funding is available. Consistent with Explorer Program policy, there will be no proprietary data rights to observations conducted on Swift. All science data will be made freely available online.

The GI program is intended to provide the following benefits to participating scientists:

- Funding to carry out investigations using Swift data to conduct correlative observations at other wavelengths and to carry out theoretical investigations in support of Swift observations; and
- Involvement with the Swift science team in the analysis and interpretation of GRB data obtained with the observatory.

Finally, note that 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), all research supported by NASA's programs must now demonstrate its relationship to NASA Goals and Research Focus Area's (RFA's) as stated in the latest version of its Strategic Plan (follow links from the Web site <http://spacescience.nasa.gov/>); see also the discussion in Section 1 of the *Summary of Solicitation* of this NRA. Therefore, all proposers to this program element are asked to state their perception of this relevance in terms of the Goals, Science Objectives, and RFA's given in Table 3 found in the *Summary of Solicitation*. In particular, this program element is designed to help fulfill any of the RFA's 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 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)."

1.2 The Swift mission

Swift is a Medium Class Explorer (MIDEX) mission under development at the NASA Goddard Space Flight Center (GSFC). The lead domestic partners include Pennsylvania State University and the spacecraft contractor, Spectrum Astro. There is significant international participation by groups in the United Kingdom and Italy. The mission is currently scheduled for launch in late 2003. The Swift spacecraft carries three science instruments: a wide-field gamma-ray Burst Alert Telescope (BAT) and two sensitive, coaligned narrow-field instruments – the X-ray Telescope (XRT) and UV Optical Telescope (UVOT). The spacecraft can be autonomously repositioned to direct the XRT and UVOT toward events detected by the BAT. The BAT is a wide-field gamma-ray imager that will detect GRB's and rapidly send positions of arc minute accuracy to the spacecraft and to the ground. The BAT operates in the 15-150 keV range and has a

1.4 steradian (half-coded) field of view. It will have a GRB detection sensitivity that is ~ 5 times better than the Burst and Transient Source Experiment (BATSE) that flew on the Compton Gamma-Ray Observatory (CGRO). In addition to detecting GRB's, the BAT will perform a survey of the hard X-ray sky to a sensitivity of ~ 1 mCrab (2×10^{-11} erg cm⁻² s⁻¹). It will also scan most of the sky each 90-minute orbit and serve as a sensitive monitor for high energy transients. Positions and spectra of transients detected by BAT will be telemetered to the ground and distributed immediately to the community.

In response to GRB alerts from the BAT, the spacecraft will reorient on a time scale of ~ 1 minute to point the XRT and UVOT instruments at a GRB or other transient. These instruments will perform multiwavelength measurements of the bright early afterglow (and also later-time afterglow) emission to provide sub-arc second positions, precise photometry and fine spectroscopy. The XRT is a Wolter 1 grazing incidence telescope which operates in the 0.2-10 keV band and has a field-of-view of 24 arc minutes with an angular resolution of 15 arc seconds and positional determination accuracy of 5 arc seconds. The detector is a cooled CCD, providing spectroscopy with a resolution $E/\Delta E \sim 10$ at 1 keV and an effective area of 110 cm². The UVOT is a Ritchey-Chrétien folded-optics telescope operating in the 170 - 650 nm band. It has a field-of-view of 17 arc minutes, with an angular resolution of 0.9 arc seconds and positional determination accuracy of 0.3 arc seconds. UVOT will provide a sensitivity of 24th magnitude for a 1000 second integration and has 6 filters for color photometry and 2 gratings for fine spectroscopy ($E/\Delta E \sim 300$) of sources brighter than 17th magnitude. The narrow-field instruments will provide a stream of afterglow images and spectra from GRB's that are sent out immediately on the internet. They can also be used for follow-up observations of non-GRB transients detected by the BAT or by other observatories. Data from serendipitous sources in the fields-of-view of both instruments will routinely be sent to the ground for analysis.

Swift will be launched into a low Earth orbit with an inclination of 22 degrees and an altitude of 600 km. The baseline mission duration is two years, with possible extension beyond this initial period depending upon the continued scientific productivity of the mission. The orbital lifetime of the satellite is expected to be approximately 10 years.

1.3 Types of Proposals

The Swift science team core science program is organized by Key Projects that cover both GRB and non-GRB topics. These projects represent investigations directed toward addressing the science goals discussed in the original Swift MIDEX proposal. Each Key Project has a small number of Swift science team members assigned to it. A compilation of the Swift Key Projects is provided at <http://swiftsc.gsfc.nasa.gov>. This Cycle 1 Swift GI program (during year 1 of the 2-year baseline mission) solicits proposals in the following areas:

- New GRB projects not duplicative of team key projects and not requiring GI-specified observatory pointings;
- Correlative observations of GRB's with non-Swift instruments and observatories; and
- Theoretical investigations that will advance the mission science return in the area of GRB's.

In Cycle 1, GI's may propose to initiate their own new GRB projects, avoiding duplication of existing efforts while supplementing the Swift science return with their unique facilities and capabilities. Proposers should address how their activities will complement the Swift science team core science program. The extent to which the proposed research will enhance the science return from Swift and the demands placed upon mission resources by an investigation will be considered in the proposal evaluation process (see Section 2.2 below).

It is anticipated that correlative observations will substantially augment the science return from Swift. The Swift instruments will make breakthrough measurements of GRB afterglows starting immediately following the burst. However, it will not be possible to follow up all GRB's on all time scales since viewing constraints and scheduling conflicts will preclude some Swift observations. Also, the onboard capability, although significant, does not cover all of the scientifically valuable measurements that need to be made. Candidate correlative observations that will add significantly to the Swift science include radio imaging and photometry, infrared spectroscopy (for high z bursts redshifted out of the bandpass of the UVOT), deep optical imaging and spectroscopy (to >28 th magnitude compared to the UVOT 24th magnitude limit) of the afterglow and possible host galaxy, deep X-ray imaging and spectroscopy, and rapid optical observations with time scales shorter than the 1-minute Swift response time.

Finally, theoretical studies related to the observations conducted with Swift hold the potential to significantly enhance the scientific impact of the mission. Accordingly, GI proposals for theoretical investigations are solicited during Cycle 1 with the requirement that they specifically address how the anticipated results will advance the mission GRB science objectives.

It is anticipated that the Swift GI program may be expanded in Cycle 2 to include areas of research in non-GRB science and possibly allow GI-specified pointings, depending on the experience gained during Cycle 1 of the mission. Note that proposals for non-GRB research are not solicited under Cycle 1; investigators seeking support for such research during Cycle 1

may submit their proposal to the Astrophysics Data Analysis Program (ADP) discussed in Section A.1.2 of this NRA.

2. Programmatic Information

2.1 General Information

It is anticipated that approximately \$1M will be available through this solicitation for the support of approximately 30 Cycle 1 Guest Investigations of one year duration each. The Swift Cycle 1 GI program is open to all individuals employed at U.S. institutions (including Swift science team members). Scientists participating in the Swift mission, including Associate Scientists and members of the Follow-up Team who are not funded by the Project are eligible for support under this Cycle 1 GI program. Swift science team members already receiving support from the Project are also eligible for support during Cycle 1, although such individuals must provide a compelling justification for the award of additional funds under the GI program. Note that all proposers, independent of their affiliation with the Swift mission, must list their current and pending support in their proposal. Finally, it is the intent of this program that at least half of the available GI funding be awarded to scientists not already formally associated with Swift.

2.2 Proposal Submission and Evaluation

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 - 2003* (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 6 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.
- **Due to the nature of prospective investigations within the Swift GI program, the Scientific/Technical/Management section of proposals is limited to 4 pages, instead of the default 15 pages specified in the *Guidebook*, and the budget section is limited to 2 pages.**

Proposals will be evaluated by a peer evaluation panel with respect to the criteria specified in Section C.3 of the Guidebook, where it is understood that the intrinsic merit of a proposal shall include the following factors:

- The suitability of using the Swift observatory and data products for the proposed investigation;
- The extent to which the investigation complements approved Key Projects and enhances the anticipated science return from the mission in the area of GRB research;
- The degree to which the proposed investigation places demands upon mission resources; and
- For theoretical investigations, the degree to which the investigation directly advances the mission GRB science goals.

2.3 Supplemental Information

Further details of the proposal submission requirements and process may be found at the Swift Science Center Web site

<http://swiftsc.gsfc.nasa.gov/>,

which includes a detailed mission description; technical information about the Swift mission, instruments, and feasibility; information regarding proposal submission; and instructions for completing the required proposal forms.

Technical questions concerning this program element may be directed to the Swift Science Center:

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