D.9 NuSTAR General Observer – Cycle 7

NOTICE: Amended October 19, 2020. A number of changes have been made to this program element and the Phase-1 due date has changed to January 29, 2021. Changes to the text include: Table 1 on Key Observatory Performance Parameters has been updated to reflect the recent improvement in NuSTAR's timing calibration. Section 1.3.1 on Programmatic Constraints has been updated to remove the limit on total bright source observing time (keeping other restrictions on observing bright targets in place) and to clarify that all joint time proposals need to include a NuSTAR component. Updates to Section 1.3.2 on Multi-Year Programs include that joint programs with NICER can be for Cycle 7 only, i.e., not multi-year. In Section 1.3.4 on ToO Observations the limit on total ToO observing time has been increased to 1 Ms. A few updates and clarifications of Programmatic Information have been made throughout Section 2. In Section 3 the Summary of Key Information table has been modified to display an increased budget and the updated contact information of the new NuSTAR Mission Scientist. New text is in bold and deleted text is struck through.

Phase-1 proposals submitted to this program will be evaluated using a dual-anonymous review process. Under this system, not only are proposers unaware of the identity of the members on the review panel, but the reviewers do not have explicit knowledge of the proposal teams. Proposals must be accordingly prepared following the guidelines in Section 2.2.1 and in the associated "Guidelines for Anonymous Proposals" document.

1. Scope of Program

1.1 Overview

The Nuclear Spectroscopic Telescope Array (NuSTAR) Small Explorer (SMEX) mission is the first orbiting telescope to focus light in the high energy X-ray region of the electromagnetic spectrum (E > 10 keV), with an effective bandpass of 3–79 keV. The observatory provides a combined improvement in sensitivity and spatial/spectral resolution by factors of 10 to 100 over previous missions that have operated at these energies. The NuSTAR General Observer (GO) Program solicits proposals for basic research relevant to the NuSTAR mission.

NuSTAR Cycle 7 will commence on or about June 1, 2021, and last for a nominal period of 12 months. Based upon the outcome of the 2019 NASA Astrophysics Senior Review process, NuSTAR operations are currently funded through September 30, 2022. Further details on the Cycle 7 program may be found on the NuSTAR GO Program website (http://nustar.gsfc.nasa.gov).

Observing time will be made available to scientists at both U.S. and non-U.S. institutions. Individuals may submit proposals for three general types of observations: "standard-mode", "Target-of-Opportunity" (ToO, see Section 1.3.4), and "Large Programs" (LP, see Section 1.3.5). In addition to proposals for ToO observations

submitted in response to this program element, unsolicited requests for ToO observations may be made through the NuSTAR Science Operations Center. Note that unsolicited ToO requests are ineligible for funding under the NuSTAR GO Program. The data from NuSTAR observations selected under this ROSES program element will have a limited exclusive-use period dependent upon the observation type. Data from approved standard-mode GO and LP observations will have a nominal one-year exclusive-use period commencing at the time of the availability of the processed data to the observer. Data from approved ToO observations will have a corresponding six-month exclusive-use period. Note that Principal Investigators (PIs) may waive the exclusive-use period and opt for the observation(s) to be placed directly into the NuSTAR public archive. Data resulting from unsolicited ToO requests will have no exclusive-use period.

In addition to investigations utilizing NuSTAR observations only, proposals involving coordinated observations with the European Space Agency (ESA)/NASA X-ray Multi-Mirror Mission (XMM)-Newton X-ray observatory, NASA's Neil Gehrels Swift observatory, and NASA's Neutron star Interior Composition ExploreR (NICER) mission are also solicited under this ROSES program element. Prospective proposers of joint observations with these facilities should refer to Section 1.3.1 for details concerning the evaluation and implementation of such proposals.

Opportunities for carrying out NuSTAR observations in conjunction with NASA's Chandra X-ray Observatory, Neil Gehrels Swift observatory, NICER, and with ESA's XMM-Newton and INTEGRAL observatories are also available through the relevant Calls for Proposals for those missions. More information is available on the NuSTAR website: https://www.nustar.caltech.edu/page/for_proposers.

Funding for investigations selected under the NuSTAR GO Program is available only to individuals at U.S. institutions who are identified as Principal Investigators (PIs). U.S.-based Co-Investigators on non-US-led proposals are not eligible for funding.

Proposals for investigations directed primarily towards the conduct of supporting theoretical or laboratory astrophysics research or ground-based observations relevant to the NuSTAR mission or observations primarily for calibration of NuSTAR or other instruments are not solicited under this program. Such requests should be made to the NuSTAR PI.

1.2 The NuSTAR Mission

NuSTAR is a PI-led NASA Small Explorer (SMEX) mission. The PI institution is the California Institute of Technology, which is responsible for the overall direction of the program. NASA's Jet Propulsion Laboratory (JPL) is responsible for the project management. The lead domestic partners include Columbia University, the University of California at Berkeley, and NASA's Goddard Space Flight Center. The Danish Technical University Space Centre and the Agenzia Spaziale Italiana (ASI) made significant contributions to the hardware and data analysis software development, respectively. ASI is an active participant in mission operations, providing access to the Italian ground station at Malindi, Kenya. The NuSTAR Mission Operations Center (MOC) is at the University of California at Berkeley Space Sciences Laboratory, and the Science Operations Center (SOC) is at the California Institute of Technology.

NuSTAR was launched on June 13, 2012, from the Kwajalein Atoll in the Marshall Islands into a low-Earth orbit with an inclination of 6 degrees and an altitude of 630 km x 610 km. After an initial six-week checkout period and subsequent two-year baseline mission, **NuSTAR transitioned to being primarily community-led through a General Observer (GO) program, which began in 2015.** ~~the NuSTAR GO program was initiated~~. Based upon the results of the NASA 2019 Senior Review, support for mission operations was extended through September 30, 2022. The observatory has no expendables, and the orbit lifetime is estimated at ~10-15 years from launch. Currently in its ninth year of operations, the observatory continues to function nominally. The NuSTAR spacecraft carries two sensitive, co-aligned, narrow-field instruments. Table 1 summarizes the primary performance specifications. Details of the observatory and instrument design can be found at http://nustar.caltech.edu/, as well as the NuSTAR mission paper, Harrison et al. (2013; ApJ, 770, 103).

Table 1: Key Observatory Performance Parameters

Parameter	Value
Energy range	3–78.4 keV
Angular resolution (HPD)	58″
Angular resolution (FWHM)	18″
FoV (50% resp.) at 10 keV	10′
FoV (50% resp.) at 68 keV	6′
Sensitivity (6–10 keV) (10^6 s, 3σ, ΔE/E = 0.5)	2 x 10^{-15} erg cm^{-2} s^{-1}
Sensitivity (10–30 keV) (10^6 s, 3σ, ΔE/E = 0.5)	1 x 10^{-14} erg cm^{-2} s^{-1}
Background in HPD (3–10 keV) Background in HPD (10–30 keV)	9.0 x 10^{-4} counts s^{-1} 1.1 x 10^{-3} counts s^{-1}
Strong source (>10σ) positioning	1.5″ (1σ)
ToO response time	< 48 hr
Slew rate	0.06° s^{-1}
Settling time	200 s (typically)
Timing accuracy (after barycenter correction)	**65 μs (1σ)**

1.3 NuSTAR Cycle 7 General Information

The total amount of time allocated to GO during NuSTAR Cycle 7 is expected to be 11.3 Ms (70% of the total available observing time), of which 8.5 Ms will be allocated to NuSTAR observations selected through this program element. The remaining GO time will be allocated to joint observations:

- Up to 1.5 Ms to NuSTAR/XMM-Newton joint proposals submitted to the XMM-Newton Cycle 20 Call for Proposals.

- Up to 0.5 Ms to NuSTAR/Chandra joint observing proposals submitted to the Chandra Cycle 23 Call for Proposal.
- Up to 400 ks to NuSTAR/NICER joint observing proposals submitted to the NICER Cycle 3 Call for Proposals.
- Up to 300 ks to NuSTAR/**Neil** Gehrels Swift joint observing proposals submitted to the Gehrels Swift Cycle 17 Call for Proposals.
- Up to 100 ks to NuSTAR/INTEGRAL joint observing proposals submitted to the INTEGRAL Cycle 19 Call for Proposals.

It is anticipated that approximately 50 investigations will be selected for implementation under the NuSTAR Cycle 7 GO program.

The remaining 30% of the observing time will be allocated through the NuSTAR Project to the NuSTAR legacy survey observations (3%); NuSTAR PI discretionary time (17%), including unsolicited ToO observations open to the scientific community; and time reserved for calibration observations, engineering tasks, and resolution of operational issues (10%). The NuSTAR legacy surveys represent extensions of the Galactic and Extragalactic surveys conducted during the baseline mission (see http://www.nustar.caltech.edu/page/legacy_surveys for additional information).

Proposers to this program must clearly describe how their proposed investigation capitalizes on the unique capabilities of NuSTAR. Proposals for investigations involving targets previously observed or currently planned for observation with NuSTAR must provide a justification of the need for the requested additional data. The "as-flown" observing timeline for NuSTAR may be found at http://www.srl.caltech.edu/NuSTAR_Public/NuSTAROperationSite/AFT_Public.php, and lists of the approved NuSTAR GO targets from previous cycles are available at https://heasarc.gsfc.nasa.gov/docs/nustar/previous_cycles.html. Proposers may also search the NuSTAR master catalog (numaster) table for a complete list of targets planned for observations as well as completed observations, including NuSTAR targets awarded through other solicitations (e.g., by Chandra and XMM-Newton joint programs with NuSTAR). See https://heasarc.gsfc.nasa.gov/W3Browse/all/numaster.html.

A list of approved ToO observations accepted through the NuSTAR GO and joint GO programs is available on the NuSTAR SOC website: http://www.srl.caltech.edu/NuSTAR_Public/NuSTAROperationSite/TOO_programs.php

Observations of targets proposed through this ROSES program element will take precedence over legacy program observations of those targets that have not been executed as of the submission deadline. The applicable legacy observations will be suspended until the disposition of the proposed GO observations is determined in the Phase-1 review. Proposed GO observations of legacy targets that are not accepted as part of the Cycle 7 program will be restored to the legacy program. A list of legacy observations that are planned to be performed by the end of Cycle 7 will be made available on the NuSTAR website http://www.nustar.caltech.edu/page/legacy_surveys.

For those Phase-1 proposals recommended for implementation, the approved target observations will be assigned a Category A, B, C or L (L designates a Large program target, see section 1.3.5) and a recommended exposure time. Note that for proposals including observations of multiple targets, the priority of each target observation will be

separately categorized. Assuming nominal operational efficiency, it is anticipated that observations of most standard-mode Category A, B or L targets will be carried out during Cycle 7. Any standard-mode, non-time-constrained Category A, B or L observations not observed during Cycle 7 will be carried over to Cycle 8. See section 1.3.2 for details about multi-year observing proposals.

Observations of Category C targets will be executed on a best-effort basis. Category C targets not scheduled during a particular observing cycle will *not* be carried over to the succeeding cycle; such observations may be re-proposed to a future observing cycle. Finally, note that proposals for observations of Cycle 6 Category C targets that have not been scheduled prior to the Cycle 7 proposal due date may be submitted to Cycle 7. Such proposals will be considered for selection in Cycle 7 only if the corresponding Cycle 6 observation is not executed in Cycle 6.

Proposers should note that NuSTAR's low-inclination (6°), low-Earth orbit allows, on average, a maximum continuous exposure of ~ 3.2 ks per 5.7 ks satellite orbit for targets below a declination |Dec| of ~ 65°; for targets at high declination, |Dec| > 65°, the unocculted period may be longer. Unless there is a specific reason why the total elapsed time of an observation is important, proposers should specify only the net exposure time required for achievement of the proposed science goals, excluding observational efficiency factors (Earth occultations and South Atlantic Anomaly passages) in the observing time calculation; specification of the total elapsed time requirement will result in the observation being classified as time-constrained (see Section 1.3.3).

1.3.1 *Programmatic Constraints*

Proposals are subject to the following limitations:

- The requested time per observation (i.e., a single "visit" to a target) is constrained to a minimum of 20 ks;
- Targets for which time-constrained observations are requested will only be given highest priority for scheduling during Cycle 7 if they are designated Category A (see Section 1.3.3);
- ~~Due to the limited number of ground station passes, observations of high count-rate targets place significant demands upon mission resources. Consequently, it is anticipated that the total time available for observation of bright sources (predicted instrument count rate above 100 counts s^{-1} for both modules using 50% PSF extraction with no deadtime) during Cycle 7 will be limited to a maximum of 1 Ms. Note that, for very bright sources, the instrument count rate is significantly lower than the incident event rate due to detector deadtime effects.~~ Proposals requesting observations of bright sources **(predicted instrument count rate above 100 counts s^{-1} for both modules using 50% PSF extraction with no deadtime)** with durations > 30 ks are operationally difficult to carry out. Accordingly, such proposals must provide a sufficiently compelling motivation to be considered for acceptance. In addition, proposals requesting observations of bright sources with exposures longer than 75 ks will be considered for implementation *only* if the total requested time is distributed in multiple observations, each with exposure < 75 ks and separated by more than 1 week;

- Sources with fluxes > 10^{-11} ergs s^{-1} cm^{-2} within 5° of the target may cause increased nonuniform background gradients due to stray light. Users should check observations for potential stray light contributions using the tools available at http://nustar.caltech.edu/page/researchers. If the results of the constraint check indicates that the position may have a 'Potential stray light issue', proposers should submit a request for a feasibility analysis to nustar-help@srl.caltech.edu at least two business days prior to the proposal submission deadline;
- Proposals for joint NuSTAR/XMM-Newton programs in Cycle 7 will be accepted up to a total of 1.5 Ms of XMM-Newton observing time. Joint proposals must provide a compelling justification of the need for both the NuSTAR and XMM-Newton data for achieving the primary science goals and receive a Category A, B or L rating to be considered for acceptance. **No XMM-Newton observing time will be awarded without the need for NuSTAR observing time on the same target.** Individuals considering submission of a Cycle 7 proposal for joint NuSTAR/XMM-**Newton** observations should consult the XMM-Newton Cycle 20 approved NuSTAR target list prior to submission of their proposal. Duplicate observations of the same targets by NuSTAR will typically not be awarded;
- Proposals for joint NuSTAR/Neil Gehrels Swift programs in Cycle 7 will be accepted up to a total of 300 ks of Neil Gehrels Swift observing time. Joint proposals must provide a compelling justification of the need for both the NuSTAR and Neil Gehrels Swift data for achieving the primary science goals and receive a Category A, B or L rating to be considered for acceptance. **No Neil Gehrels Swift observing time will be awarded without the need for NuSTAR observing time on the same target.** Proposers are strongly encouraged to carefully read the Neil Gehrels Swift/NuSTAR memorandum of understanding. Neil Gehrels Swift data sets obtained through approved joint NuSTAR/Gehrels Swift proposals will not be proprietary and will be immediately released publicly via the HEASARC data archive. Note that for most NuSTAR pointings, 1–2 ks "snapshot" observations are routinely performed by Neil Gehrels Swift (unless there are multiple observations of the same target, coordinated NuSTAR observations with other X-ray observatories, and during times of Gamma-Ray Bursts and Neil Gehrels Swift ToOs) without the need for a specific joint observing proposal. Individuals considering submission of a Cycle 7 proposal for joint NuSTAR/Neil Gehrels Swift observations should consult the Neil Gehrels Swift Cycle 17 approved NuSTAR target list prior to submission of their proposal. Duplicate observations of the same targets by NuSTAR will typically not be awarded;
- Proposals for joint NuSTAR/NICER programs in Cycle 7 will be accepted up to a total of 250 ks of NICER observing time. Joint proposals must provide a compelling justification of the need for both the NuSTAR and NICER data for achieving the primary science goals and receive a Category A, B or L rating to be considered for acceptance. **No NICER observing time will be awarded without the need for NuSTAR observing time on the same target.** NICER data sets obtained through approved joint NuSTAR/NICER proposals have the standard NuSTAR exclusive-use period and will be released publicly via the HEASARC

data archive. Individuals considering submission of a Cycle 7 proposal for joint NuSTAR/ NICER observations should consult the NICER Cycle 3 approved NuSTAR target list prior to submission of their proposal. Duplicate observations of the same targets by NuSTAR will typically not be awarded;
- Proposals requesting joint observing time with XMM-Newton, Neil Gehrels Swift, and/or NICER observatories will have an additional page of text to describe the proposed program.
- Proposals requesting coordinated observations with other space- or ground-based observatories will be designated time-constrained and subject to the restrictions described in Section 1.3.3.

1.3.2 *Multi-Year Programs*

The PI may request that observations (including ToO observations) be scheduled over a two-cycle period. Multi-year programs must be strongly justified in the proposal text. **If a multi-year program, in particular one including ToO observations, is not strongly justified in the proposal text it might be evaluated as a Cycle 7-only proposal.** No multi-year programs awarded in Cycle 7 will be carried beyond Cycle 8, i.e., all observations must occur in Cycles 7 and 8. Multi-year joint programs **with XMM-Newton or Neil Gehrels Swift** may also be proposed. **Joint programs with NICER may be for Cycle 7 only.** All approved multi-year programs must be category A, B or L. It is anticipated that Cycle 8 will commence on June 1, 2022 and have a duration of one year (pending the results of the 2022 Senior Review).

1.3.3 *Time-Constrained Observations*

Time-constrained observations are defined as observations that must be performed within a specific time window. This includes phase-constrained observations and coordinated observing campaigns with ground-based or space-based facilities. Time-constrained observations are subject to the following limitations:

- Time-constrained observations designated Category A, B or L will be given highest priority for scheduling during Cycle 7 (or Cycle 7 and 8 for multi-year programs). Time-constrained observations of Category C targets will be executed on a best-effort basis and therefore should be scientifically justified if the time constraint is not satisfied.
- The time constraints for multi-year programs can occur in Cycle 7 and/or Cycle 8.
- Time-constrained Category A, B or L observations that are not part of a multi-year program and are not scheduled during Cycle 7 may be carried over to Cycle 8 where warranted by scientific or operational circumstances (e.g., in the case of coordinated observations with other space- or ground-based observatories). Category C time-constrained observations not scheduled during Cycle 7 will *not* be carried over to Cycle 8.
- Monitoring programs are defined as investigations requiring two or more observations of the same target, each of which is considered a "visit". For such programs, the time interval between successive visits must be ≥ 14 hours. Note that programs in which the time interval between any two successive visits is ≤ 1 week will be designated as time-constrained.

- Note that proposed Neil Gehrels Swift observing time can include monitoring that precedes, follows and/or (for ToOs) triggers NuSTAR observing time.

For coordinated or time-constrained observations, it is the proposer's responsibility to inform the NuSTAR SOC of the observing time windows as soon as possible, but at a minimum of one month before initiation of the observations. In cases where observations involve coordination with other space-based observatories, the NuSTAR SOC will be responsible for communicating detailed schedule constraints with the relevant operations team(s).

1.3.4 *Target of Opportunity (ToO) Observations*

A total of up to ~~500 ks~~ **1 Ms** of NuSTAR Cycle 7 observing time will be made available for proposals to observe ToOs, subject to the constraints listed below. Individuals interested in submitting ToO proposals should note the following:

- Proposals must provide exact, detailed trigger criteria and a credible estimate (including justification) of the probability of triggering the ToO during Cycle 7 (and Cycle 8 for multi-year proposals);
- Proposers ~~should indicate~~ **must strongly justify the response time required to meet the scientific objectives** on the Astrophysics Research Knowledgebase (ARK)/Remote Proposal System (RPS) proposal submission form (http://heasarc.gsfc.nasa.gov/ark/rps/) ~~the response time required to meet the scientific objectives~~. Note that the minimum response time that may be specified for NuSTAR observations is 48 hours; proposals will be evaluated based on this criterion. However, a more rapid response time may be requested by the PI; such requests will be accommodated on a best-effort basis;
- The observations must have an astrophysical trigger and be designated as Category A;
- Proposals for ToO observations that can be triggered from a class of objects or set of potential targets are permitted;
- Active ToO programs submitted to the Chandra/NuSTAR, XMM-Newton/NuSTAR, INTEGRAL/NuSTAR, Neil Gehrels Swift/NuSTAR or NICER/NuSTAR GO Program Calls for Proposals approved prior to the Cycle 7 solicitation will take precedence over NuSTAR Cycle 7 proposals with the same targets and trigger criteria.
- ToO programs accepted as part of the NuSTAR Cycle 7 GO program will take precedence over unsolicited ToOs.
- In the case of Large Program ToOs with multiple observations, only the initial observation is counted against the ~~500 ks~~ **1 Ms** maximum ToO exposure time (since subsequent observations are considered to be monitoring observations).

It is the responsibility of the PI of an accepted ToO proposal to alert the NuSTAR SOC when the trigger conditions for their accepted ToO have been satisfied. This is done via submission of a NuSTAR ToO Request Form; detailed information is available at http://nustar.caltech.edu/page/too_policy. Prior to submission of this form, the PI should verify the visibility of the target at http://www.srl.caltech.edu/NuSTAR_Public/NuSTAROperationSite/CheckConstraint.php Multi-year ToO programs may be triggered in Cycle 7 or Cycle 8. Accepted Cycle 7 ToO

observations not designated as multi-year can only be triggered until the end of the cycle and observations not triggered during Cycle 7 will not be carried over to Cycle 8. Such observations may be re-proposed to a subsequent cycle. Data from approved Cycle 7 ToO observations will have a six-month exclusive use period after which the data will be placed in the public archive.

Note that requests for observations of unsolicited ToOs may be submitted via the NuSTAR ToO web site (http://www.srl.caltech.edu/NuSTAR_Public/GO/GOsubmit.php). Decisions regarding the disposition of unsolicited ToO requests will be made by the NuSTAR Principal Investigator or official designee. Requests for such unsolicited ToO observations are ineligible for funding under the NuSTAR GO Program.

1.3.5 *Large Programs (LPs)*

A total of up to 2 Ms of NuSTAR Cycle 7 observing time will be made available for the Large Program (LP) category. The minimum total exposure time for LP proposals is 500 ks, and such proposals are allowed an additional page of text to describe the proposed program. Data from approved Cycle 7 LPs will have a one-year exclusive use period after which the data will be placed in the public archive. A single-trigger ToO may be proposed as part of an LP (e.g., where a long observation is needed after the initial trigger). Data from an approved LP with a ToO will have a six-month exclusive use period.

2. Programmatic Information

2.1 General Information

It is anticipated that at least $3.**75** ~~0~~M will be available for the support of General Observations during Cycle 7. Proposals ranked as Category A, B or L by the Phase-1 peer review panel will be given the highest priority for funding. However, limited support will be made available for Category C proposals that are executed during Cycle 7. NuSTAR GO funding is open to individuals who are identified as Principal Investigators and employed at U.S. institutions. The amount of funding awarded to PIs of Category A, B or L proposals will be based upon NASA's evaluation of the cost realism and reasonableness of the Phase-2 cost proposal. In addition, eligible PIs of proposals with Category C targets that are executed during Cycle 7 can expect awards of $~~1~~ **2**0,000 to support the publication of the results. NuSTAR science team members and scientists participating in the NuSTAR mission are eligible for support under this GO Program. Note that GO proposals from NuSTAR team members who receive funding from the Project must clearly demonstrate that the proposed investigation is not redundant with their science team responsibilities. U.S. Co-Is on a U.S. PI proposal can only receive funding through a subaward from the PI institution. Following the Phase-1 peer review, Phase-2 (cost) proposals will be solicited from eligible PIs and subsequently evaluated for cost realism and reasonableness via the Phase-2 review process. Joint NuSTAR/XMM-**Newton** and NuSTAR/**Neil** Gehrels Swift, and NuSTAR/NICER Phase-1 proposals selected through this Call for Proposals are eligible for funding solely through the NuSTAR GO program; the corresponding Phase-2 cost proposals may request support for the analysis of both the NuSTAR and XMM-Newton, Neil Gehrels Swift, or

NICER data. Such proposals should not be submitted to the U.S. XMM-Newton General Observer Facility nor to the **Neil** Gehrels Swift or NICER Projects.

Proposals from non-U.S. institutions are acceptable and will only be considered on a no-exchange-of-funds basis. Non-U.S. proposals will be reviewed to the same standards as proposals from U.S. institutions and selected solely by NASA.

2.2 Proposal Submission and Evaluation

The NuSTAR GO program utilizes a two-phase proposal process. Phase-1 proposals shall provide a detailed description of the proposed investigation, including the requested NuSTAR observation(s) and associated scientific/technical justification. The Phase-1 peer review will be executed in a "dual-anonymous" fashion, where not only are proposers unaware of the identity of the members on the review panel, but the reviewers do not have explicit knowledge of the proposal teams (see Section 2.2.1).

U.S. PI's whose Phase-1 proposals with targets assigned a Category A, B or L rating by the peer review panel will be invited to submit a Phase-2 (cost) proposal. Category C programs do not require a Phase-2 proposal. Subject to acceptance of the associated Phase-2 cost submission, proposals for standard-mode observations (excluding proposals involving ToO or time-constrained observations) assigned a Category A, B or L rating will be eligible for funding immediately. Due to the uncertainty of their execution, the remaining accepted Phase-2 proposals will become eligible for funding only after the proposed observations have been carried out. Phase-2 proposals must include a detailed budget and accompanying narrative, providing a detailed description of how the requested funds will be used to achieve the goals outlined in the proposal. It is nominally expected that the PI of the Phase-1 proposal will serve as the Phase-2 proposal PI; however, for administrative purposes, an alternate individual from the Phase-1 PI's institution may serve as PI on the Phase-2 proposal. All proposal materials shall be submitted electronically, as specified below.

Instructions for the formatting and content of ROSES proposals are given in the *ROSES Summary of Solicitation* and, for topics not addressed there, refer to the *NASA Guidebook for Proposers*. Proposers must follow these instructions, except where they are overridden by the instructions given in the Astrophysics Research Program Overview or in this program element. Templates for Phase-1 proposals will be made available on the NuSTAR GO website at https://nustar.gsfc.nasa.gov. **Note that Phase-1 proposals should have a single-column format.**

2.2.1 *Specific Instructions for Dual-Anonymous Review Proposals*

The overarching objective of dual-anonymous peer review is to reduce unconscious bias in the evaluation of the merit of a proposal. Under this system, not only are proposers unaware of the identity of the members on the review panel, but the reviewers do not have explicit knowledge of the proposal teams.

Proposers should consult the "Guidelines for Anonymous Proposals" document in the "Other Documents" section on the NSPIRES of this program element for instructions on writing proposals appropriate for dual-anonymous peer review. The instructions here and in that document supersede the default instructions given in the *NASA Guidebook for Proposers* and the *ROSES Summary of Solicitation*. Proposers will also be required

to upload a separate "Expertise and Resources - Not Anonymized" document, which is not anonymized. The "Guidelines for Anonymous Proposals" document contains complete information on how to write this separate document.

In order to meet the objectives of dual-anonymous peer review, review panels will be instructed to evaluate the anonymized proposals based on their scientific merit, without initially taking into account the proposing team qualifications. As a final check, and only after the scientific evaluation is finalized for all proposals, the panel will be provided with the "Expertise and Resources - Not Anonymized" documents. The panel **may** ~~will~~ validate the qualifications of the team in order to allow the reviewers to assess the team capabilities required to execute a given proposed science investigation.

A summary of the key factors for PIs to keep in mind are:

- Proposals should eliminate language that identifies the proposers or institutions, as discussed in the Guidelines for Anonymous Proposals.
- PIs are required to upload a one-page "Expertise and Resources – Not Anonymized" PDF through ARK as a separate upload when submitting the **anonymized Scientific/Technical/Management section** ~~science justification.~~ This document must not be anonymized.
- NASA understands that dual-anonymous peer review represents a major shift in the evaluation of General Observer / General Investigator proposals, and as such there may be occasional slips in writing anonymized proposals. However, NASA reserves the right to return without review proposals that are particularly egregious in terms of the identification of the proposing team.

A summary of the key requirements for preparing anonymized Phase-1 proposals is provided in the table below. **Additional information may also be found on the web at: https://science.nasa.gov/researchers/dual-anonymous-peer-review**

Item	**Requirement**
Anonymization	Phase-1 proposals are anonymized. Phase-2 (cost) proposals are not anonymized.
Submission	Phase-1 proposals are submitted through ARK/RPS. Phase-2 (cost) proposals are submitted through NSPIRES.
References	References should be in the [1], [2] format.
Work plan	Include an anonymized one-paragraph work plan in the main body of the Phase-1 proposal.
Proposal length	No change.
Separate "Expertise and Resources - Not Anony-mized" document	This document provides a list of all team members, their roles, expertise, and contributions to the work. The document should also discuss any specific re-sources that are key to completing the proposed work.

2.2.2. *Submission and Evaluation of Phase-1 NuSTAR GO Proposals*

Individuals submitting Phase-1 proposals to the Cycle 7 NuSTAR GO Program must adhere to the following proposal submission procedures:

- Proposers must submit their Phase-1 proposals (including the accompanying target forms) electronically through the ARK/RPS website at http://heasarc.gsfc.nasa.gov/ark/rps/. Instructions for submitting proposals via ARK/RPS are provided at the HEASARC NuSTAR web site: http://nustar.gsfc.nasa.gov/;
- Due to the nature of prospective investigations within the NuSTAR GO program, the Scientific/Technical/Management section of proposals is limited to four pages (five pages for LP proposals and proposals requesting joint NuSTAR/XMM-Newton, NuSTAR/**Neil** Gehrels Swift or NuSTAR/NICER observations), in lieu of the default 15 pages specified in the *NASA Guidebook for Proposers*. The requirement for a table of contents in the body of the proposal is waived. No supporting material (e.g., Curriculum Vitae, pending/current support) is required or allowed other than what is specified in the supplemental documentation concerning the dual-anonymous review procedure.
- The proposals should have margins of no less than 1" on US letter size paper (8.5" x 11") and the text body font size should be no smaller than 15 characters per inch. Figure captions and references may be smaller but must be legible. Optional LaTeX and MS Word templates for the Scientific/Technical/Management section consistent with these requirements are provided at http://nustar.gsfc.nasa.gov;
- Proposals must not contain hyperlinks to additional material other than references to public information that do not identify the PI, Co-Is or their institutions; web pages with material specific to the proposal such as target lists **or stray light assessments** are not allowed.
- ~~The Science Justification~~ **The Scientific/Technical/Management section** and the "Expertise and Resources – Not Anonymized" documents must be uploaded to the RPS website as PDF files.
- Proposals not in compliance with these specifications may be returned without review.

In order to be included in the review of proposals for this cycle of the NuSTAR General Observer Program, all proposal materials must be submitted electronically by 4:30 p.m. Eastern Time on the Phase-1 due date provided in Tables 2 and 3 of ROSES.

Proposals will be evaluated by a science peer panel with respect to the criteria specified in Section VI.(a) of the *ROSES Summary of Solicitation*, where it is understood that the intrinsic merit of a proposal shall include the following factors:

- The extent to which the proposed investigation complements and enhances the anticipated science return from the NuSTAR mission;
- The suitability of using the NuSTAR observatory and associated data products for the proposed investigation, including the degree to which the investigation exploits the unique capabilities of NuSTAR;
- The feasibility of accomplishing the objectives of the proposed investigation with the requested observations, including the degree to which the proposal satisfies

NuSTAR observational constraints and the feasibility of the proposed analysis techniques;

- For joint observing proposals, the relevance and feasibility of the corresponding XMM-Newton, **Neil** Gehrels Swift or NICER observations;
- The degree to which the proposed observation(s) places demands upon mission resources;
- In the case of ToO proposals the justification of the trigger probabilities.

2.2.3 *Submission and Evaluation of Phase-2 proposals*

Subject to the availability of funding, eligible Phase-1 proposers with Category A, B or L observations will be contacted by the NuSTAR Program Scientist and invited to submit a Phase-2 (cost) proposal. Upon notification of selection of a Phase-1 proposal, proposers eligible for Phase-2 must follow the instructions for submitting a Phase-2 proposal given in the selection notification letter from the Phase-1 review. Phase-2 proposals must be submitted through the NASA NSPIRES electronic proposal website (http://nspires.nasaprs.com) by an Authorized Organizational Representative (AOR) of the proposing organization following the instructions in the *Summary of Solicitation* of this NRA. The cost proposal shall consist of a "Budget Details" section (maximum of two pages) and a "Budget Narrative" section (maximum of two pages).

NASA program personnel (as opposed to peer reviewers) will evaluate the Phase-2 cost proposals for cost reasonableness and will also compare the proposed cost to available funds as allowed by Section VI(a) of the *ROSES Summary of Solicitation.* Subject to the conditions stated above, proposers will be notified regarding the award amount for their Cycle 7 investigation(s) by NASA upon completion of the Phase-2 review process. Note that since the Phase-2 proposals will not be peer reviewed, the requirement to redact the budget information (per Section IV(b)(iii) of the *Summary of Solicitation*) is waived. All costs must be included in the proposal. Proposers should note that Phase-2 (cost) proposals should not be anonymized.

2.3 Supplemental Information

Further details concerning the proposal submission requirements and process can be found at the NuSTAR General Observer website (http://nustar.gsfc.nasa.gov/). This website provides instructions for completing the required proposal forms. A detailed description of the NuSTAR mission, including technical information relevant to the observatory, instruments, and observation feasibility can be found at http://nustar.caltech.edu/page/researchers. Answers to frequently asked questions can be found at http://heasarc.gsfc.nasa.gov/docs/nustar/nustar_faq.html.

3. Summary of Key Information

Expected program budget for Cycle 7 awards	~ $3.**75** ~~0~~ M
Expected number of new awards pending adequate proposals of merit	30-50
Maximum duration of awards	1 year (2 years for multi-year programs)

Due date for Notice of Intent to propose (NOI)	Option not available.
Due date for Phase-1 proposals	See Tables 2 and 3 of this ROSES NRA and Section 2.2.2.
Planning date for start of investigation	Funding will be awarded when the data are made available to the PI. NASA Center proposers should use October 1, 2021 (4 months after start of the Cycle 7 observing program) as a planning date for start of funding.
Page limit for Phase-1 proposals	Standard & ToO proposals: 4 pages. Large Program (LP) and Joint Observing Proposals: 5 pages. LaTeX and MS Word templates (available for download at http://nustar.gsfc.nasa.gov/) can be used for the proposals. No supporting material (e.g., pending/current support) will be considered for Phase-1 except what is specified in the Guidelines for Anonymous Reviews. Page limits include figures and references. This instruction supersedes the limits given in the *NASA Guidebook for Proposers*.
Relevance	This program is relevant to the Astrophysics questions and goals in the NASA Science Plan. Proposals that are relevant to this program are, by definition, relevant to NASA.
General information and overview of this solicitation	See the *ROSES Summary of Solicitation*.
General requirements for content of proposals	See Section 3 of the *NASA Guidebook for Proposers* and Section IV and Table 1 of the *ROSES Summary of Solicitation*.
Detailed instructions for the submission of Phase-1 proposals	See https://heasarc.gsfc.nasa.gov/docs/nustar/nustar_prop.html
Detailed instructions for the submission of Phase-2 proposals	See https://nspires.nasaprs.com/tutorials/ Sections 3.22-4.4 of the *NASA Guidebook for Proposers* and Section IV(b) of the *ROSES Summary of Solicitation*.

Submission medium	Electronic proposal submission is required in PDF format; no hard copy is required or permitted.
Web site for submission of Notice of Intent to propose (NOI)	Option not available.
Web site for submission of Phase-1 proposal and required forms	http://heasarc.gsfc.nasa.gov/ark/nustar/ (Help Desk available at: http://heasarc.gsfc.nasa.gov/ark/rps/help/)
Web site for submission of Phase-1 proposal via NSPIRES	Option not available.
Web site for submission of Phase-1 proposal via Grants.gov	Option not available.
Web site for submission of Phase-2 proposals	http://nspires.nasaprs.com; See Section 2.2.3
Programmatic information may be obtained from the NuSTAR Program Scientist	Hashima Hasan Astrophysics Division Science Mission Directorate NASA Headquarters Washington, DC 20546-0001 Telephone: (202) 358-0692 Email: hhasan@nasa.gov
Technical questions concerning this program element may be directed to the NuSTAR General Observer Program Office	**Tod Strohmayer** NuSTAR Mission Scientist Code 662 Goddard Space Flight Center National Aeronautics and Space Administration Greenbelt, MD 20771-0001 Telephone: **(301) 286-1256** Email: **tod.e.strohmayer@nasa.gov** ~~Andrew Ptak~~ ~~Telephone: (301) 286-1154~~ ~~Email: andrew.ptak@nasa.gov~~