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APPENDIX D. ASTROPHYSICS RESEARCH PROGRAM

D.1 ASTROPHYSICS RESEARCH PROGRAM OVERVIEW

1. Introduction

The objectives of research solicited in program elements described in program elements D.2 through D.12 of this NASA Research Announcement (NRA) are focused on achieving the goals of the Science Mission Directorate’s Astrophysics Research Program, as defined in the NASA Science Plan (available at http://science.nasa.gov/about-us/science-strategy). Proposers to the elements described in Appendix D are encouraged to read this NASA Science Plan to gauge the relevance of their research to the Astrophysics Research Program.

The NASA Guidebook for Proposers and the ROSES Summary of Solicitation (Section IV) provide clear and specific requirements for the format of proposals submitted in response to this solicitation: page limits, acceptable font sizes, line spacing, margins, etc. See also Table 1 of the ROSES Summary of Solicitation. Some of the program elements listed below also include formatting requirements. These requirements have been developed to ensure a level playing field for all proposers. The Astrophysics Division takes these requirements seriously, and proposals found to violate them will be penalized, even to the extent of not being evaluated or considered for funding. It is the responsibility of the proposer to ensure that a submission complies with all formatting requirements.

Most proposals to ROSES will require a data management plan (DMP) or an explanation of why one is not necessary given the nature of the work proposed (e.g., instrument development proposals, see Sections 3, 6, and 7, below). This requirement will be satisfied by responding to the compulsory NSPIRES cover page question about the DMP. It is expected that the majority of proposals will simply state that the proposer will meet the mandatory minimum requirement by making the data behind figures and tables available electronically at the time of publication, ideally in supplementary material with the article. More information on the data management plan is available in the SARA DMP FAQs.

Proposers are reminded that it is the PDF version of their proposal in NSPIRES that will be judged for compliance. In rare cases, cross-platform translation of PDF documents can alter the formatting of a document. To ensure that they still conform to all formatting requirements, proposers are strongly urged to download copies of all documents after upload to NSPIRES.

Unless otherwise noted in the individual program elements, NASA does not anticipate awarding contracts in response to proposals submitted to most program elements in Appendix D, because it would not be appropriate for the nature of the work solicited. Contracts may be awarded in response to proposals to D.3 APRA and D.8 SAT, as appropriate.

The program elements included as of the release date of this ROSES NRA are described below. Abstracts of previously selected investigations may be found online at http://nspires.nasaprs.com/ by choosing "Solicitations" followed by "Closed/Past.
Selected”, searching on the name or abbreviation of the program (e.g., ADAP), and downloading the selections PDF file from the home page of that program element.

2. **Astrophysics Data Analysis**

**PLEASE NOTE that because of the partial government shutdown and subsequent delay in the release of ROSES-2019, the ADAP solicitation for calendar year 2019 was solicited via a late amendment to ROSES-2018 so that its historically early due dates could be maintained.** The Astrophysics Data Analysis Program (ADAP; program element D.2) supports research with a primary emphasis on the analysis of archival data from current and past NASA space astrophysics missions. The magnitude and scope of the archival data from those missions enables science that transcends traditional wavelength regimes and allows researchers to answer questions that would be difficult, if not impossible, to address through an individual observing program. The program now also supports the analysis of publicly available data from the Neutron star Interior Composition Explorer (NICER) and some approved Guest Observer (GO) programs using Spitzer, even if those observations have yet to be executed, or the data are still within their proprietary period.

3. **Astrophysics Research and Analysis**

The Astrophysics Research and Analysis program (APRA; program element D.3) supports suborbital and suborbital-class investigations, development of detectors and supporting technology, and laboratory astrophysics. Basic research proposals in these areas are solicited for investigations that are relevant to NASA's programs in astronomy and astrophysics, including the entire range of photons, gravitational waves, and particle astrophysics. The emphasis of this solicitation is on technologies and investigations that advance NASA astrophysics missions and goals. Projects devoted to technology development efforts (Detector Development and Supporting Technology categories) that do not generate scientific data need not provide a data management plan and proposers may simply cite this statement in response to the NSPIRES cover page question in lieu of presenting a plan.

4. **Astrophysics Theory**

The Astrophysics Theory Program (ATP; program element D.4) supports theoretical investigations or modeling of the astrophysical phenomena targeted by past, current, or future NASA astrophysics space missions. Laboratory work related to NASA strategic goals in gravitation and fundamental physics is now supported in the Astrophysics Research and Analysis program (APRA; program element D.3). Theoretical work pertaining to atomic and molecular astrophysics and other topics directly related to Laboratory Astrophysics should also be proposed to APRA. Beginning in ROSES-2017, the Astrophysics Theory Program (ATP) element of ROSES converted to soliciting proposals on a biennial basis. Thus, NASA did not solicit ATP proposals as part of ROSES-2018, but is soliciting ATP proposals in ROSES-2019.
5. Astrophysics Guest Investigators

Six program elements support science investigations that require and/or support new data obtained with currently operating NASA astrophysics space missions. Guest investigator programs are included for the Neil Gehrels Swift Observatory gamma-ray burst explorer (program element D.5), the Fermi Gamma-ray Space Telescope (program element D.6), the nuclear spectroscopic telescope NuSTAR (program element D.9), the Transiting Exoplanet Survey Satellite (TESS, program element D.10), and the Neutron star Interior Composition Explorer (NICER, program element D.11). Guest investigator programs for the Hubble Space Telescope (http://www.stsci.edu/hst/), the Chandra X-ray Observatory (http://cxc.harvard.edu/), Stratospheric Observatory for Infrared Astronomy (SOFIA) (https://www.sofia.usra.edu/), and the Spitzer Space Telescope (http://www.spitzer.caltech.edu/) are solicited separately by the respective science centers of those missions.

6. Strategic Astrophysics Technology

The Strategic Astrophysics Technology program (SAT; program element D.7) supports focused development efforts for key technologies to the point at which they are ready to feed into major missions in the three science themes of the Astrophysics Division: Exoplanet Exploration, Cosmic Origins, and the Physics of the Cosmos. This program is specifically designed to address middle technology readiness level (TRL) "gaps" between levels 3 and 6: the maturation of technologies that have been established as feasible, but which are not yet sufficiently mature to incorporate into flight missions without introducing an unacceptable level of risk. NASA does not require a data management plan for proposals to SAT.

7. Nancy Grace Roman Technology Fellowship Program

The goals of the Nancy Grace Roman Technology Fellowship (RTF) program in Astrophysics are to provide early-career researchers the opportunity to develop the skills necessary to lead astrophysics flight instrument development projects, including suborbital investigations, in preparation to become principal investigators (PIs) of future astrophysics missions; to develop innovative technologies for space astrophysics that have the potential to enable major scientific breakthroughs; and to foster new talent by putting early-career instrument builders on a trajectory towards long-term positions.

The RTF program, as described in program element D.8, now consists of two components with two different submission procedures. The first component is a one-page application from an eligible early-career individual to be named a Roman Technology Fellow. The application is submitted as part of a proposal submitted to the Astrophysics Research and Analysis (APRA) Program described in program element D.3 of this ROSES solicitation. The second component is the subsequent submission of a proposal for Fellowship Funding by a previously selected Roman Technology Fellow once that individual obtains a permanent or permanent-track position, in order to start a laboratory or develop a research group at the Fellow's institution.
8. Exoplanet Research Program (XRP)

PLEASE NOTE that because of the partial government shutdown and subsequent delay in the release of ROSES-2019, the XRP solicitation for calendar year 2019 was solicited via a late amendment to ROSES-2018 so that its historically early due dates could be maintained. The cross-division program on exoplanets is described in program element E.3. Investigations related to the detection and characterization of planetary systems that are directly tied to the NASA strategic goal to search for Earth-like planets are of interest to the Astrophysics Division.

9. Habitable Worlds Program

The cross-division program on habitable planets is described in program element E.4. The Astrophysics Division will consider supporting investigations that are focused upon the characterization of potentially habitable exoplanets and their atmospheres in order to inform targeting and/or operational choices for current NASA Astrophysics missions and/or formulation data for future NASA Astrophysics observatories.

10. SmallSat Studies

This program supports six-month studies of spaceflight mission concepts that can be accomplished for low cost using small spacecraft in standard form factors, including CubeSats, CubeSat constellations, Expendable Launch Vehicle Secondary Payload Adapter (ESPA) and ESPA-grande-ring compatible spacecraft, launched as secondary payloads. The placeholder for this Astrophysics Science SmallSat Studies will be replaced with the final text for this program element by amendment to this NRA no less than 90 days prior to the proposal due date.