

D.12 ASTROPHYSICS PROBES MISSION CONCEPT STUDIES

NOTICE: Amended on August 16, 2016. This amendment creates a new opportunity in ROSES-16 in this program element, D.12 Astrophysics Probe mission concept studies. A Preproposal teleconference will occur on September 13, 2016, 1-2 pm. The dial in number for the teleconference will be 877-951-7311, passcode 4496156. Any new information that comes out of questions and answers from the teleconference or questions sent directly to the NASA point of contact will be posted in a FAQ on the NSPIRES web page for this program element. Notices of Intent are requested by September 16, 2016, and the due date for proposals is November 15, 2016.

1. Scope of Program

NASA has started preparations for the 2020 Astronomy and Astrophysics Decadal Survey (<http://science.nasa.gov/astrophysics/2020-decadal-survey-planning/>). One of the tasks of the 2020 Decadal Survey Committee will be to recommend a portfolio of astrophysics missions. The Decadal Survey Committee may choose to recommend a portfolio of missions containing a mix of prioritized large- and medium-size mission concepts, or even a program of competed medium-size missions. NASA and the community are interested in providing appropriate input to the 2020 Decadal Survey regarding medium-size mission concepts, also referred to as Astrophysics Probe concepts.

To this end, NASA is soliciting proposals to conduct mission concept studies for Astrophysics Probe missions. Following peer review of the proposed mission concept studies, NASA will select a small number of proposals for 1.5 year (18 month) funded studies. Results of the selected studies will be provided by NASA as input to the 2020 Decadal Survey.

Astrophysics Probes are envisioned to have a total lifecycle (NASA Phases A through E) cost between that of a MIDEX mission (~\$400M) and ~\$1B. Proposals for concept studies may envision missions that include contributions from other agencies (national or international), industry, and universities.

Should NASA choose to develop a mission that flows from any selected mission concept study, the responsibility for that mission will be assigned by NASA; there is no expectation that the mission concept study team or participating organizations will necessarily participate in the eventual mission development.

2. Astrophysics Science Investigation Goals

This program element solicits proposals for mission concept studies that address NASA's science objectives in astrophysics, which include discovering how the universe works, exploring how it began and evolved, and searching for life on planets around other stars. This objective is discussed in more detail in the 2014 NASA Science Plan (<http://science.nasa.gov/about-us/science-strategy/>) and the 2013 NASA Astrophysics Visionary Roadmap

(<http://science.nasa.gov/science-committee/subcommittees/nac-astrophysics-subcommittee/astrophysics-roadmap/>).

3. Programmatic Information

The goal of the Astrophysics Probes mission concept studies is to develop scientific, technical, and cost information to be used as input to the 2020 Decadal Survey. The selection of mission concepts will be driven by scientific merit, as well as likely technical feasibility and cost realism of the mission concept that is studied.

3.1 Proposal Evaluation and Awards

The three basic evaluation criteria are given in the [ROSES Summary of Solicitation](#) Section VI (a) and Section C.2 of the NASA [Guidebook for Proposers](#) and they are Relevance, Merit, and Cost. In addition to the evaluation factors given in the NASA *Guidebook for Proposers*, the evaluation factors will include:

- The scientific merit of the science goals of the mission concept proposed for study,
- The value of the proposed study given any previous or ongoing (e.g., large mission concept) mission concept studies,
- The relevance of the proposed mission concept to the scientific goals of the Astrophysics Division, as described above (Section 2), and
- The likelihood that the proposed mission concept will be in the ~\$400M to ~\$1B range.

The total budget available for this solicitation is ~\$1M. NASA will select 5-8 proposals with awards to the Principal Investigator (PI) in the range of ~\$100K - \$150K. NASA has separately budgeted the cost of design laboratory runs and final cost assessment (see Section 3.4).

3.2 Proposal Guidelines

The proposals submitted in response to this solicitation must address the science objectives noted above in Section 2. If a proposed investigation can, without any additional cost or additions, address other science goals in the NASA Science Plan, they may be briefly discussed as secondary science objectives.

As a modification to the material in Section 2.3.5 of the *NASA Guidebook for Proposers* (see reference in Section 5 below), the Scientific/Technical/Management section of proposals for this program element must include the following additional items:

- 1) A clear description of the scientific objectives and how these are met by the proposed science investigation(s), measurements, and capabilities supported by the mission concept and how they relate to NASA's strategic objectives in Astrophysics. In addition, the relationship of the proposed science investigation to the present state of knowledge in the field, to the current readiness of needed technologies, and to any other relevant missions currently operating or under development, and synergies with current and future missions, both space- and ground-based, should be addressed;

- 2) A clear description of the current readiness levels for mission critical technologies, especially any not currently under development at NASA, and a rationale supporting the stated readiness levels in the proposal, including, where possible, laboratory or field demonstrations of the technologies;
- 3) A sound justification of why a Probe-size mission is required to address the science goals; concepts for missions that can be realized within the Astrophysics Explorers Program will be considered noncompliant and will not be considered for selection;
- 4) For mission concepts already studied in the past or ongoing (see Section 3.1 above), a robust justification of the value of the proposed additional study;
- 5) A rationale detailing why it is expected that the mission should be feasible for less than ~\$1B; and
- 6) A detailed management plan, including a statement of work to be undertaken over the proposed period of performance (not to exceed 1.5 years, or 18 calendar months).

If studies include proposed contributions to the mission concept from other agencies, industry or academia, they must include at least one Co-Investigator (Co-I) from each institution or agency envisioned as making a contribution. Research conducted by team members affiliated with foreign organizations (e.g., Co-Is at foreign institutions) must be performed on a no exchange of funds basis. For more information see [the 2016 Guidebook for Proposers, Section 1.6.1. "Proposals Involving Non-U.S. Organizations"](#).

In recent years, NASA has conducted detailed studies of a few probe-size mission concepts (e.g., exoplanet probe studies¹; gravitational wave mission architecting studies²). Proposals addressing these areas are required to state very clearly what the value of an additional study will be over those already conducted by NASA.

3.3 Proposal Format

Table 1 within the NASA ROSES solicitation provides a checklist of required information to be included in proposals. All proposals submitted to ROSES must strictly conform to the formatting rules outlined in Section 2.2 of the [NASA Guidebook for Proposers](#). Proposals that violate the rules may be rejected without review or declined following review if violations are detected during the evaluation process.

3.4 Additional NASA-funded Services for selected concept studies

3.4.1 *NASA Design Laboratories*

During the concept study's period of performance, study teams may request to enlist the assistance of either the Jet Propulsion Laboratory's (JPL's) Advanced Projects Design Team (Team X) or Goddard Space Flight Center's (GSFC's) Integrated Design Center (IDC). Team X and IDC will provide space system analysis and development of conceptual designs, including:

- design of spacecraft, science instrument(s), and their interface;

¹ <https://exoplanets.nasa.gov/exep/studies/probe-scale-stdt/>

² <http://pcos.gsfc.nasa.gov/studies/gravitational-wave-mission.php>

- full end-to-end studies of an entire mission concept, including its system/subsystem concepts, requirements, and possible trade-offs;
- focused studies of only part of a proposed mission;
- independent assessments of investigator-provided studies/concepts;
- preliminary cost estimates; and
- new technologies and risk assessments.

Any team contemplating the use of a NASA design laboratory, if selected, must include that intent in the body of the proposal and specify whether it will be IDC or Team X, for NASA planning purposes. A budget for utilizing these facilities will be held by NASA and will be provided by NASA directly to JPL or GSFC; the cost of these studies should not be included in the proposed budget. The design labs will be available during the period September – December 2017.

3.4.2 *Independent Cost Assessments*

At the end of the concept study's period of performance, NASA will conduct an independent cost assessment of all the selected mission concept studies using NASA cost assessment capabilities and experts. The purpose will be to validate the mission cost to ensure that the cost estimates submitted by each study meet the life mission life cycle cost criteria (between \$400M and \$1B). The proposer can assume minimal involvement (if needed) in the NASA cost assessment. NASA will hold a budget for these cost assessments; the cost of these studies should not be included in the proposed budget.

3.5 Reporting to NASA

A quarterly status briefing will be provided to NASA by the selected proposers in the form of a quad chart. A template for the quad chart will be provided by NASA.

3.6 Community Workshop and Final Report

The proposal must include plans for presenting findings at a workshop to be held towards the end of the study. Assume for planning purposes that this will occur at a workshop at the January 7-11, 2018, meeting of the American Astronomical Society (AAS). The final concept study report will be made publicly available. The final report should include: science case and measurement(s) requirements, mission concept/architecture, telescope and instrument design concept, technologies involved, a technology gap and maturation roadmap that describes how enabling technologies should be developed (including estimated costs and schedules), data handling needs, implementation risks, deployment process and launch vehicle constraints, operations concept, and cost estimate.

4. Summary of Key Information

Expected program budget for Cycle 1 awards	~\$1M
Expected number of new awards pending adequate proposals of merit	5-8
Maximum duration of awards	18 months

Preproposal teleconference	September 13, 2016, 1-2 pm, 877-951-7311 passcode 4496156
Due date for electronic submission of Notice of Intent to propose (NOI)	See Tables 2 and 3 in the <i>ROSES Summary of Solicitation</i> .
Due date for electronic submission of proposal	See Tables 2 and 3 in the <i>ROSES Summary of Solicitation</i> .
Anticipated selection date	February 2017
Planning date for start of investigation	March 2017
Anticipated award end date	September 2018
Anticipated study report due to NASA	September 2018
Community Workshop at 231 st AAS Meeting	January 7-11, 2018 (anticipated)
Page limit for the central Science- Technical- Management section	15 pages
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 <i>ROSES Summary of Solicitation</i> .
Detailed instructions for the preparation and submission of proposals	See the <i>NASA Guidebook for Proposers</i> at http://www.hq.nasa.gov/office/procurement/nra/guidebook .
Submission medium	Electronic proposal submission is required in PDF format; no hard copy is required. See Section IV of the <i>ROSES Summary of Solicitation</i> and Chapter 3 of the <i>NASA Guidebook for Proposers</i> .
Web site for submission of proposals via NSPIRES	http://nspires.nasaprs.com (help desk available at nspires-help@nasaprs.com or (202) 479-9376)
Web site for submission of proposals via Grants.gov	http://grants.gov (help desk available at support@grants.gov or (800) 518-4726)
Funding opportunity number for downloading an application package from Grants.gov	NNH16ZDA001N-APROBES
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