

NSF Astronomy and Astrophysics Postdoctoral Fellowships (AAPF)

PROGRAM SOLICITATION

NSF 16-575

REPLACES DOCUMENT(S):

NSF 11-559



National Science Foundation

Directorate for Mathematical & Physical Sciences
Division of Astronomical Sciences

Full Proposal Deadline(s) (due by 5 p.m. submitter's local time):

October 12, 2016

Second Wednesday in October, Annually Thereafter

October 11, 2017

Second Wednesday in October, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

This program solicitation has been revised to increase the annual award amount (see Section III on Award Information) and to clarify host institution eligibility (see Section II on Program Description and Section IV on Eligibility Information).

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) ([NSF 18-1](#)), which is effective for proposals submitted, or due, on or after January 29, 2018.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

NSF Astronomy and Astrophysics Postdoctoral Fellowships (AAPF)

Synopsis of Program:

NSF Astronomy and Astrophysics Postdoctoral Fellowships provide an opportunity for highly qualified, recent doctoral scientists to carry out an integrated program of independent research and education. Fellows may engage in observational, instrumental, theoretical, laboratory or archival data research in any area of astronomy or astrophysics, in combination with a coherent educational plan for the duration of the fellowship. The program supports researchers for a period of up to three years with fellowships that may be taken to eligible host institution(s) of their choice. The program is intended to recognize early-career investigators of significant potential and to provide them with experience in research and education that will establish them in positions of distinction and leadership in the community.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Harshal Gupta, W9154, telephone: (703) 292-5039, email: hgupta@nsf.gov
- Diana Phan, W9161, telephone: (703) 292-7866, email: dphan@nsf.gov

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.049 --- Mathematical and Physical Sciences

Award Information

Anticipated Type of Award: Fellowship

Estimated Number of Awards: 8 to 9

Anticipated Funding Amount: \$900,000

in FY2017, subject to the availability of funds.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- NSF Astronomy and Astrophysics Postdoctoral Fellowships are awards to individuals; proposals are submitted directly by the fellowship candidate to NSF. Each candidate must identify one or more sponsoring scientist(s) and host institution(s) at the time of proposal submission. Candidates may propose to hold the fellowship at:
 - U.S. institutions of higher education,
 - NSF-funded centers, facilities, or institutes,
 - U.S. non-profit organizations with research and educational missions, or
 - International sites that are operated by U.S. organizations eligible for NSF funding, such as the Atacama Large Millimeter/submillimeter Array, Cerro Tololo InterAmerican Observatory, or Gemini South.

National centers, facilities or institutes funded by other federal agencies, such as NASA or the U.S. Department of Energy, are ineligible as host institutions for the NSF AAPF Program.

Who May Serve as PI:

Fellowships are awarded to individuals. The fellowship candidate submits his or her proposal directly to NSF. See the Additional Eligibility Information section for further information about eligibility limitations.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI:

Each candidate may submit only one fellowship proposal per year.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not required
- **Preliminary Proposal Submission:** Not required
- **Full Proposals:**
 - Full Proposals submitted via FastLane: *NSF Proposal and Award Policies and Procedures Guide* (PAPPG) guidelines apply. The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg.
 - Full Proposals submitted via Grants.gov: *NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov* guidelines apply (Note: The *NSF Grants.gov Application Guide* is available on the Grants.gov website and on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide).

B. Budgetary Information

- **Cost Sharing Requirements:**

Inclusion of voluntary committed cost sharing is prohibited.
- **Indirect Cost (F&A) Limitations:**

Not Applicable
- **Other Budgetary Limitations:**

Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):
 - October 12, 2016
 - Second Wednesday in October, Annually Thereafter
 - October 11, 2017
 - Second Wednesday in October, Annually Thereafter

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

Award Administration Information

Award Conditions:

Additional award conditions apply. Please see the full text of this solicitation for further information.

Reporting Requirements:

Standard NSF reporting requirements apply.

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I. INTRODUCTION

NSF Astronomy and Astrophysics Postdoctoral Fellowships (AAPF) provide an opportunity for highly qualified, recent doctoral scientists to carry out an integrated program of independent research and education. Fellows may engage in observational, instrumental,

theoretical, laboratory or archival data research in any area of astronomy or astrophysics, in combination with a coherent educational plan for the duration of the fellowship. The program supports researchers for a period of up to three years with fellowships that may be taken to eligible host institution(s) of their choice. The program is intended to recognize early-career investigators of significant potential and to provide them with experience in research and education that will establish them in positions of distinction and leadership in the community.

II. PROGRAM DESCRIPTION

NSF Astronomy and Astrophysics Postdoctoral Fellowships (AAPF) are available for the support of highly qualified, recent doctoral scientists to carry out an integrated program of research and education at the institution of their choice.

Fellows are expected to carry out a strong, coherent research program in any area of astronomy and/or astrophysics, including areas of observation, instrumentation, theory, archival data studies or laboratory astrophysics. Candidates are encouraged to approach the fellowships as opportunities to broaden their experience with research that moves beyond their previous research focus and that takes a broad view of integrating disciplines, extending technical approaches to problems, or expanding collaborations. Research that highlights the creative use of or is clearly related to NSF-funded facilities, institutes, or projects is particularly encouraged but not required. We encourage applicants to consider programs that focus on areas of research that are particularly facilitated or enabled by new ground-based capabilities in radio, optical/IR, or solar astrophysics, including the development of theory that guides their use or the interpretation of resulting data.

Fellows are expected to include educational activities in their fellowship plans, and candidates must each present a substantive, coherent program of educational activities as part of his/her proposal. Examples of such activities include teaching or co-teaching one course each year at the host institution or an academic institution with ties to their host institution, developing educational materials, or engaging in a significant program of outreach or public education. As a rough guideline, Fellows should plan to dedicate no less than 10% and no more than 25% of their time towards their educational activities; candidates should identify the anticipated time commitment for their proposed activities. Applicants are encouraged to discuss the proposed educational activities with their prospective host institution prior to proposal submission to ensure that their educational plan is consistent with opportunities and plans at the institution.

Candidates may propose to hold the fellowship at U.S. institutions of higher education, NSF-funded centers, facilities, institutes, or U.S. non-profit organizations with research and educational missions. Fellowship tenure is also allowed at international sites that are operated by U.S. organizations eligible for NSF funding, such as the Atacama Large Millimeter/submillimeter Array, Cerro Tololo InterAmerican Observatory, or Gemini South. Fellows are expected to be fully integrated into the research and educational activities of their host institution.

The fellowship candidate must present a coherent research and educational plan throughout the proposed duration of the fellowship. However, the applicant may propose to take the fellowship to more than one host institution. Changes of institution may be sequential, which permits moving from one institution to another during the duration of the fellowship. Holding the fellowship at two institutions simultaneously, for example at an NSF-funded national center and a nearby university, is also possible. In the event of proposing to hold the fellowship at more than one institution simultaneously, the candidate must identify a primary host institution. In any case, the justification of the choice of institution(s) must be made clearly and compellingly as related to the proposed research and education plans, the professional development of the Fellow, and the activities of the host institution(s).

III. AWARD INFORMATION

NSF anticipates awarding approximately 8-9 fellowships annually, depending on the quality of submissions and subject to the availability of funds.

A. Duration and Tenure

Support may be requested for up to 36 months at a level of \$100,000 per year. Interruptions in tenure of up to 12 months or extensions without additional cost to NSF require approval of the cognizant Program Officer. A no-cost extension may be requested to extend the Fellowship award in order to complete the goals of the Fellowship plans, but no supplemental funds will be provided for this purpose. Within the fellowship period, up to two months of the fellowship duration may be used for paid leave, including parental or family leave. The paid leave cannot be used to increase the level of the Fellow's salary support beyond 36 months. NSF enables career-life balance through a variety of mechanisms. For more information, please see <https://www.nsf.gov/career-life-balance/>. The total duration of the fellowship may not exceed 48 months. Fellowships cannot be renewed.

Successful applicants will be notified on or about 1 February following the proposal submission deadline. Those applicants selected to receive fellowships will be contacted by NSF and asked to provide additional information, such as completing acceptance forms and starting certificates, before starting their fellowship tenure. Successful applicants who have not completed the PhD at the time of application must provide certification of the completion of all PhD degree requirements before receiving funds from their fellowship award. Fellowship tenure must begin on or before October 1 of the award year. Normally fellowships will be held at institutions specified in the proposal, but under certain circumstances and with suitable justification, Fellows may transfer during the tenure of the fellowship to a new institution upon approval by NSF.

B. Stipend and Allowances

The annual fellowship amount of \$100,000 consists of two types of payments:

- (1) An annual stipend of \$69,000, paid directly to the Fellow on a monthly schedule.

(2) An annual fellowship allowance of \$31,000, paid directly to the Fellow and intended to cover costs of the fellowship, including:

- expenses directly related to the conduct of the proposed research and education activities, including but not limited to materials and supplies, equipment, computing resources, access to databases, travel, publication charges, and subscription fees.
- expenses in support of the Fellow, such as office space, general purpose supplies and use of equipment, facilities and other institutional resources.
- expenses in support of fringe benefits, including but not limited to individual or family health insurance provided through a group or individual plan, dental and/or vision insurance, disability insurance, retirement savings, dependent care, and moving expenses.

No additional appointment or fellowship may be held during the period of the fellowship. No other remuneration from any source may be accepted during the period of the fellowship without permission of the cognizant Program Officer.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- NSF Astronomy and Astrophysics Postdoctoral Fellowships are awards to individuals; proposals are submitted directly by the fellowship candidate to NSF. Each candidate must identify one or more sponsoring scientist(s) and host institution(s) at the time of proposal submission. Candidates may propose to hold the fellowship at:
 - U.S. institutions of higher education,
 - NSF-funded centers, facilities, or institutes,
 - U.S. non-profit organizations with research and educational missions, or
 - International sites that are operated by U.S. organizations eligible for NSF funding, such as the Atacama Large Millimeter/submillimeter Array, Cerro Tololo InterAmerican Observatory, or Gemini South.

National centers, facilities or institutes funded by other federal agencies, such as NASA or the U.S. Department of Energy, are ineligible as host institutions for the NSF AAPF Program.

Who May Serve as PI:

Fellowships are awarded to individuals. The fellowship candidate submits his or her proposal directly to NSF. See the Additional Eligibility Information section for further information about eligibility limitations.

Limit on Number of Proposals per Organization:

There are no restrictions or limits.

Limit on Number of Proposals per PI or Co-PI:

Each candidate may submit only one fellowship proposal per year.

Additional Eligibility Info:

An individual is eligible to submit a proposal to the NSF AAPF Program if all of the following criteria are met:

- The candidate is a citizen, national, or lawful permanent resident (Green Card Holder) of the United States.
- The candidate has earned the doctoral degree in an appropriate scientific field within five (5) years prior to the proposal deadline or will complete the doctoral degree by October 1 of the award year.
- The candidate has not participated in postdoctoral training for a combined full-time-equivalent duration of more than three (3) years prior to the proposal deadline.

Any individual who has not yet received the doctoral degree at the time of application must, in the event of being selected for an award, present evidence of having completed all academic requirements before beginning the fellowship at the host institution. Fellowship tenure must begin on or before October 1 of the award year.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and

submitted in accordance with the general guidelines contained in the NSF Proposal and Award Policies and Procedures Guide (PAPPG). The complete text of the PAPPG is available electronically on the NSF website at: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg. Paper copies of the PAPPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov. Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

See Chapter II.C.2 of the PAPPG for guidance on the required sections of a full research proposal submitted to NSF. Please note that the proposal preparation instructions provided in this program solicitation may deviate from the PAPPG instructions.

Application Preparation Instructions for Fellowships

Proposals submitted to the NSF Astronomy and Astrophysics Postdoctoral Fellowships program must be submitted electronically through either the NSF FastLane system or Grants.gov. Only one proposal is permitted per individual. A full proposal consists of many parts and requires input from the fellowship candidate, the proposed sponsoring scientist(s), and the proposed host institution(s). Candidates are advised to begin the proposal well in advance of the submission deadline and to submit as early as possible. Partially completed proposals may be saved for future completion and submission. The submission of incomplete or late proposals is not permitted.

Before starting proposal preparation, the applicant must be registered as an individual. To register as a new individual in FastLane go to: <https://www.fastlane.nsf.gov/cgi-bin/N1CheckROB>. To register as a new individual in Grants.gov go to: <http://www.grants.gov/web/grants/applicants/individual-registration.html>.

Fellowship proposals must be submitted by the Fellowship applicant, not by the applicant's current or proposed organizational Sponsored Projects Office (SPO). The applicant serves as his/her own SPO and Authorized Organizational Representative (AOR) for the purposes of any research administration functions in FastLane or Grants.gov.

Proposals must include all of the following items. *In cases where requirements given in this document differ from those given in the NSF Proposal and Award Policies and Procedures Guide (PAPPG) or the NSF Grants.gov Application Guide, this solicitation takes precedence.*

- NSF Cover Page.
- Information about Principal Investigators/Project Directors.
- Table of Contents. This form will be automatically generated by FastLane or Grants.gov.
- Project Summary, not more than one page in length, describing the candidate's research and education plan. The Overview section of the Project Summary must also identify:
 - the proposed sponsoring scientist(s) and
 - the proposed host institution(s).

Proposals for which the Project Summary does not clearly address in separate statements both NSF merit review criteria (Intellectual Merit and Broader Impacts) will be returned without review. See the Grant Proposal Guide instructions.

- Project Description, not to exceed ten (10) single-spaced pages, which must include the following information:
 - a coherent plan for research and education, articulated to a level of detail suitable to an NSF grant proposal;
 - a detailed justification for the choice of the host institution(s) that identifies collaborating scientist(s) and educational mentor(s), relates the proposed work to current research and educational efforts at the host institution(s), and describes available facilities and resources and the suitability of the host institution(s);
 - a description of the candidate's long-term career goals and the role of this postdoctoral experience in achieving them.
- References Cited. See the Grant Proposal Guide for format.
- Biographical Sketch, not to exceed two (2) pages. See the Grant Proposal Guide for format. **The Biographical Sketch must clearly include all information necessary to certify the candidate's eligibility, including identification of U.S. citizenship or permanent resident status, as well as all components described in the Grant Proposal Guide.** Do not include personally identifiable information such as birth date and/or place of birth.
- NSF Budget Page. The stipend and fellowship allowance should be entered in Participant Support Costs (Section F on the FastLane budget and Field E on the Grants.gov budget). Enter the \$69,000 stipend in F.1 (FastLane) or E.2 (Grants.gov) and the \$31,000 fellowship allowance in F.4 (FastLane) or E.5 (Grants.gov). Enter (1) as the Total Number of Participants. An annual budget page must be submitted for each of up to three years of fellowship support. A budget justification is not required for fellowship applicants.
- Current and Pending Support. Include current and planned applications to other fellowship programs.
- Facilities, Equipment and Other Resources, as applicable. See the Grant Proposal Guide.

- Data Management Plan, not to exceed two (2) pages, to be submitted as Supplementary Documentation. All proposals must include a supplementary document labeled "Data Management Plan" that describes plans for data management and sharing of the products of research, or asserts the absence of the need for such plans. See the Grant Proposal Guide and <https://www.nsf.gov/bfa/dias/policy/dmpdocs/ast.pdf>.
- Letter(s) of Commitment, as described below, to be submitted as Supplementary Documentation. The signed letter(s) should be scanned into Portable Document Format (PDF) and uploaded as supplementary documentation. No other supplementary documentation or appendices are permitted.

The candidate must include a letter of commitment from each prospective host institution, signed by both the department chair (or equivalent) and the proposed sponsoring scientist. Should the applicant propose to hold the fellowship concurrently or sequentially at more than one institution during the three-year tenure, letters of commitment must be provided for all institutions involved. Letters of commitment are also accepted from major institutional partners, such as educational centers or programs, that are critical for the conduct of the proposed work.

The letter(s) should certify:

- that the applicant's proposal has been read and approved by the proposed scientific mentor(s),
- that adequate facilities and support will be provided for the Fellow to accommodate the proposed research and/or education activities,
- that the Fellow's plan for teaching and/or education is aligned with the institution's educational plans and goals, including a description of how any proposed course or seminar will complement existing curricula, and
- that the Fellow will be fully integrated into the educational and research activities of the host institution.

The letter(s) should also include a discussion of:

- the role the proposed scientific and/or education mentor(s) will play in the professional development of the Fellow, and
- the opportunities for training and research at the host institution that will be of particular benefit to the Fellow.

The NSF AAPF program relies on reviewed research and education proposals rather than applications. **Letters of recommendation will not be considered. A letter of commitment should not reflect a letter of recommendation and should make *no subjective statements* regarding either the candidate or the proposed research and education plan.**

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

Award amounts are \$100,000 annually.

Budget Preparation Instructions:

The award amount is fixed for all fellowships, based on the award duration. The stipend and fellowship allowance should be entered in Participant Support Costs (Section F on the FastLane budget and Field E on the Grants.gov budget). Enter the \$69,000 stipend in F.1 (FastLane) or E.2 (Grants.gov) and the \$31,000 fellowship allowance in F.4 (FastLane) or E.5 (Grants.gov). Enter (1) as the Total Number of Participants. An annual budget page must be submitted for each of up to three years of fellowship support. A budget justification is not required for fellowship applicants.

C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. submitter's local time):
 - October 12, 2016
 - Second Wednesday in October, Annually Thereafter
 - October 11, 2017
 - Second Wednesday in October, Annually Thereafter

D. FastLane/Grants.gov Requirements

For Proposals Submitted Via FastLane:

Before starting proposal preparation, the applicant must be registered as an individual. To register as a new individual in FastLane go to: <https://www.fastlane.nsf.gov/cgi-bin/N1CheckROB>. Detailed technical instructions regarding the technical aspects of preparation and submission via FastLane are available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

Submitting the Proposal: Fellowship proposals must be submitted by the Fellowship applicant, not by the applicant's current or proposed organizational Sponsored Projects Office (SPO). The applicant serves as his/her own SPO and Authorized Organizational Representative (AOR) for the purposes of any research administration functions in FastLane. As such, the applicant, serving as the SPO/AOR must electronically sign and submit the proposal using the Sign and Submit button in FastLane. The applicant is signing on his/her own behalf and by signing the application NSF is in no way inferring that the applicant has assumed organizational status. Further instructions regarding this process are available on the FastLane Website at: <https://www.fastlane.nsf.gov/fastlane.jsp>.

For Proposals Submitted Via Grants.gov:

Before starting proposal preparation, the applicant must be registered as an individual. To register as a new individual in Grants.gov go to: <http://www.grants.gov/web/grants/applicants/individual-registration.html>. Once registered, the applicant can then apply for grant opportunities which indicate "Individual" eligibility on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: <http://www.grants.gov/web/grants/applicants.html>. In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: support@grants.gov. The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

Submitting the Proposal: Fellowship proposals must be submitted by the Fellowship applicant, not by the applicant's current or proposed organizational Sponsored Projects Office (SPO). Once all documents have been completed, the applicant must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The applicant must then sign and submit the application to Grants.gov. The completed application will be transferred to the NSF FastLane system for further processing.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program for acknowledgement and, if they meet NSF requirements, for review. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF either as *ad hoc* reviewers, panelists, or both, who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal. In addition, Program Officers may obtain comments from site visits before recommending final action on proposals. Senior NSF staff further review recommendations for awards. A flowchart that depicts the entire NSF proposal and award process (and associated timeline) is included in PAPPG Exhibit III-1.

A comprehensive description of the Foundation's merit review process is available on the NSF website at: https://www.nsf.gov/bfa/dias/policy/merit_review/.

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Investing in Science, Engineering, and Education for the Nation's Future: NSF Strategic Plan for 2014-2018*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the strategic objectives in support of NSF's mission is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions must recruit, train, and prepare a diverse STEM workforce to advance the frontiers of science and participate in the U.S. technology-based economy. NSF's contribution to the national innovation ecosystem is to provide cutting-edge research under the guidance of the Nation's most creative scientists and engineers. NSF also supports development of a strong science, technology, engineering, and mathematics (STEM) workforce by investing in building the knowledge that informs improvements in STEM teaching and learning.

NSF's mission calls for the broadening of opportunities and expanding participation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines, which is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These "Broader Impacts" may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. **Both** criteria are to be given **full consideration** during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. (PAPPG Chapter II.C.2.d(i). contains additional information for use by proposers in development of the Project Description section of the proposal). Reviewers are strongly encouraged to review the criteria, including PAPPG Chapter II.C.2.d(i), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to
 - a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
 - b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impacts may be accomplished through the research itself, through the activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. NSF values the advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes. Such outcomes include, but are not limited to: full participation of women, persons with disabilities, and underrepresented minorities in science, technology, engineering, and mathematics (STEM); improved STEM education and educator development at any level; increased public scientific literacy and public engagement with science and technology; improved well-being of individuals in society; development of a diverse, globally competitive STEM workforce; increased partnerships between academia, industry, and others; improved national security; increased economic competitiveness of the United States; and enhanced infrastructure for research and education.

Proposers are reminded that reviewers will also be asked to review the Data Management Plan and the Postdoctoral Researcher Mentoring Plan, as appropriate.

Additional Solicitation Specific Review Criteria

In addition to the above criteria, the following factors will be used in the evaluation process:

- Qualifications of the applicant and his/her potential for continued professional growth and leadership in the field;
- Qualifications and suitability of the proposed host institution(s) and the scientific and educational collaborations proposed; and
- Prospective benefits to the applicant, the scientific discipline, and the activities of the host institution(s).

B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review.

Reviewers will be asked to evaluate proposals using two National Science Board approved merit review criteria and, if applicable, additional program specific criteria. A summary rating and accompanying narrative will generally be completed and submitted by each reviewer and/or panel. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF strives to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new awardees may require additional review and processing time. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director acts upon the Program Officer's recommendation.

After programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications. After an administrative review has occurred, Grants and Agreements Officers perform the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

Once an award or declination decision has been made, Principal Investigators are provided feedback about their proposals. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers or any reviewer-identifying information, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award notice, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award notice; (4) the applicable award conditions, such as Grant General Conditions (GC-1)*; or Research Terms and Conditions* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award notice. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

*These documents may be accessed electronically on NSF's Website at https://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from nsfpubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=papppg.

Special Award Conditions:

All awards are made subject to the general provisions in the brochure entitled "Information for Astronomy and Astrophysics Postdoctoral Fellows", which will be sent via e-mail to the successful applicants.

The Fellow is responsible for making all arrangements for affiliation with the proposed fellowship institution(s). The Fellow must also arrange for a staff member, usually a professor or staff scientist, at the fellowship institution to serve as the Fellow's sponsoring scientist.

Normally fellowships will be held at institutions specified in the proposal, but under certain circumstances and with suitable justification, Fellows may transfer during the tenure of the fellowship to a new institution upon approval by NSF.

No additional appointment or fellowship may be held during the fellowship tenure.

No other remuneration from any source may be accepted during the fellowship tenure without permission from the cognizant Program Officer.

Any major change in the program of research or education from that proposed at the time of application, and any change in tenure or in the institution(s) with which a Fellow is associated, requires prior NSF approval and must be requested and fully justified in writing by the Fellow.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer no later than 90 days prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). No later than 120 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report, will delay NSF review and processing of any future funding increments as well as any pending proposals for all identified PIs and co-PIs on a given award. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

More comprehensive information on NSF Reporting Requirements and other important information on the administration of NSF awards is contained in the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) Chapter VII, available electronically on the NSF Website at https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappp.

VIII. AGENCY CONTACTS

Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.

General inquiries regarding this program should be made to:

- Harshal Gupta, W9154, telephone: (703) 292-5039, email: hgupta@nsf.gov
- Diana Phan, W9161, telephone: (703) 292-7866, email: dphan@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: support@grants.gov.

IX. OTHER INFORMATION

The NSF website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this website by potential proposers is strongly encouraged. In addition, "NSF Update" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF [Grants Conferences](#). Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "NSF Update" also is available on [NSF's website](#).

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this mechanism. Further information on Grants.gov may be obtained at <http://www.grants.gov>.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as

amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 55,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Arctic and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See the *NSF Proposal & Award Policies & Procedures Guide* Chapter II.E.6 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <https://www.nsf.gov>

- **Location:** 2415 Eisenhower Avenue, Alexandria, VA 22314
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
 - Send an e-mail to: nsfpubs@nsf.gov
 - or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, *NSF-50*, "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and *NSF-51*, "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0023. Public reporting burden for this collection of information is estimated to average 12 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Office of the General Counsel
National Science Foundation

Alexandria, VA 22314

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