

Partnerships for Research and Education in Physics (PREP)

PROGRAM SOLICITATION

NSF 24-514

REPLACES DOCUMENT(S):

NSF 21-610



National Science Foundation
Directorate for Mathematical and Physical Sciences
Division of Physics

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

March 12, 2024

IMPORTANT INFORMATION AND REVISION NOTES

Potential partners for this program have been expanded to include not only Physics Frontiers Centers but also Division of Physics managed research-focused centers or institutes that can bring substantial research infrastructure to the partnership. For FY 2024 these include the Center for Bright Beams (CBB) Science and Technology Center, the Institute for Artificial Intelligence and Fundamental Interactions (IAIFI), the Institute for Research and Innovation in Software for High Energy Physics (IRIS-HEP), the Accelerated AI Algorithms for Data-Driven Discovery (A3D3) Institute and the Software-Tailored Architectures for Quantum codesign (STAQ) Center. Centers or institutes whose primary focus is the training of postdoctoral fellows or the facilitation of community activities are not eligible.

Any proposal submitted in response to this solicitation should be submitted in accordance with the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) that is in effect for the relevant due date to which the proposal is being submitted. The NSF PAPPG is regularly revised and it is the responsibility of the proposer to ensure that the proposal meets the requirements specified in this solicitation and the applicable version of the PAPPG. Submitting a proposal prior to a specified deadline does not negate this requirement.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Partnerships for Research and Education in Physics (PREP)

Synopsis of Program:

The NSF Division of Physics' Partnerships for Research and Education in Physics (PREP) program aims to enable and grow partnerships between minority-serving institutions and Division-supported Physics Frontiers Centers or eligible centers and institutes to increase the participation of members of traditionally underserved and underrepresented groups in physics through excellent research and education endeavors that advance physics research goals.

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.

- Kathleen V. McCloud, telephone: (703) 292-8236, email: kmcccloud@nsf.gov

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

- 47.049 --- Mathematical and Physical Sciences

Award Information

Anticipated Type of Award: Continuing Grant

Estimated Number of Awards: 6 to 10

Anticipated Funding Amount: \$4,000,000

In FY 2024 Awards are anticipated to be up to \$300,000 per year for up to 3 years pending the availability of funds and receipt of competitive proposals.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- The proposal must be submitted by an eligible minority-serving college or university not already listed as a key participant in the partnering center or institute. See "Eligible Institutions of Higher Education" in this program solicitation for a complete description.

Who May Serve as PI:

The Lead Principal Investigator must hold a faculty appointment at an eligible minority-serving college or university as defined in the "Eligible Institutions of Higher Education" section. A co-PI must be identified who is a Director of one of the eligible partnering centers or institutes included in the "Eligible Partners" section. Additional faculty from the lead institution or from the partnering center or institute may be listed as co-PIs. Funding for partnering institutions must be requested via subawards; separately submitted collaborative proposals will not be accepted.

Limit on Number of Proposals per Organization: 2

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

There are no restrictions or limits.

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 Research.gov: *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:**
Not Applicable

C. Due Dates

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

March 12, 2024

Proposal Review Information Criteria

Merit Review Criteria:

National Science Board approved criteria. Additional merit review criteria 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:

Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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I. INTRODUCTION

The National Science Foundation's vision of "a Nation that is the global leader in research and innovation" encompasses core values of research excellence, inclusion, and collaboration, as described in NSF's strategic plan (https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf22068&org=NSF). The NSF Division of Physics (PHY) supports a broad range of research across the intellectual frontiers of Physics. Solving the cutting-edge problems pursued by the Physics community requires engaging the nation's human talent and resources in their entirety and developing and supporting the diverse Physics workforce that is critical for continued progress in scientific discovery.

Both minority-serving colleges and universities, and Physics Frontiers Centers (PFCs) and eligible centers or institutes, represent rich resources for enhancing minority participation in STEM careers. In this context, underrepresented minorities include Blacks or African Americans, Hispanics or Latinos, American Indians, Alaska Natives, Native Hawaiians or other Pacific Islanders, and persons with disabilities. Partnerships with Physics Frontiers Centers and eligible centers or institutes, which house preeminent researchers and world-class scientific infrastructure, offer a singular opportunity for growing the contributions that minority-serving institutions make to the US physics enterprise.

II. PROGRAM DESCRIPTION

The Partnerships for Research and Education in Physics (PREP) program aims to enable and grow formal partnerships between minority-serving institutions and the Physics Frontiers Centers and eligible centers or institutes to increase the participation of members of groups that are most underrepresented in physics through excellent research and education endeavors that advance physics research goals.

A PREP proposal must address research topics in the sub-fields of physics within the purview of the Division of Physics, as listed below. The collaborative effort by the participants from both partnering institutions should be based on common intellectual interests and complementary backgrounds, skills, and knowledge. Teams of faculty members with focused research activities are encouraged in order to maximize the potential impacts of the PREP partnership on all partners. A PREP proposal should define a vision for the partnership that simultaneously promotes research excellence and inclusiveness. In a partnership framework the role of each institutional partner should be explicit, and project goals to achieve the vision should be clearly defined and addressed. Anticipated challenges and expected outcomes in both research outcomes and increased diversity should be identified and addressed for all partners. Plans for student/faculty reciprocal exchange between partnering institutions are required. Project assessment and evaluation plans are encouraged to emphasize real gains for each partner in research, education and diversity relative to the beginning of the award.

An effective PREP partnership framework must include activities to leverage the full spectrum of diverse talent in physics, including activities that increase the recruitment, retention and degree-attainment for students from underrepresented groups, described as the "PREP pathway." The pathway may be addressed through a variety of strategies that effectively utilize research and education resources and depend on the level of support that the lead institution can provide. Examples include but are not limited to: workshops, technical meetings, curricular development, summer schools, outreach towards improving recruitment, student mentoring activities, faculty and student visits (both to and from all partners) and overall opportunities in science learning and training. The partnership is expected to develop capacity in at least one segment of the PREP pathway within the duration of the award, commensurate with the partnership's starting research and capacity levels. It is expected that these efforts will lead to an increased enrollment of underrepresented students in graduate school, a stronger research capacity at the minority-serving institution, and eventually, to a more diverse physics workforce at all levels (i.e., student, post doc, faculty, STEM career).

Successful PREPs are expected to:

- Engage in compelling scientific research. Partnerships must have a well-integrated research program with compelling intellectual merit. Research plans must demonstrate clear benefits from a collaborative approach with substantive intellectual engagement from all partners and well-defined research roles.
- Promote increased diversity in at least one segment of the recruitment, retention, degree-attaining pathway through research and training opportunities. Challenges and progress throughout the stages of recruitment, retention, and degree attainment are anticipated and addressed.
- Implement a partnership framework that successfully promotes and advances diversity and research excellence at both partnering institutions. Establish reciprocity through faculty and student exchanges as a core component of the partnership.
- Specify gains for each partner both in increased diversity and research output. Assessments of the gains in the component of the PREP pathway that a specific partnership is targeting are encouraged.

A PREP award may address any area of research supported by the NSF Division of Physics including experimental and theoretical research in the following major subfields of physics: Atomic, Molecular and Optical Physics; Elementary Particle Physics; Gravitational Physics; Nuclear Physics; Particle Astrophysics; Physics at the Information Frontier; Physics of Living Systems; Plasma Physics; and Quantum Information Science. Interdisciplinary projects at the interface between these physics areas and other disciplines and physics sub-fields may also be considered, although the bulk of the effort must fall within one of those areas within the purview of the Division of Physics. For a detailed description of the research supported by the PHY core programs visit <https://www.nsf.gov/phy>.

III. AWARD INFORMATION

NSF expects to make Continuing Grants. The estimated number of awards will be 6 to 10. Awards are anticipated to be effective in July 2024. The total anticipated funding amount in FY 2024 is approximately \$4,000,000. Awards are expected to be up to \$300,000 per year for up to 3 years. Estimated program budget, number of awards and average award size/duration are subject to the availability of funds and receipt of competitive proposals.

IV. ELIGIBILITY INFORMATION

Who May Submit Proposals:

Proposals may only be submitted by the following:

- The proposal must be submitted by an eligible minority-serving college or university not already listed as a key participant in the partnering center or institute. See "Eligible Institutions of Higher Education" in this program solicitation for a complete description.

Who May Serve as PI:

The Lead Principal Investigator must hold a faculty appointment at an eligible minority-serving college or university as defined in the "Eligible Institutions of Higher Education" section. A co-PI must be identified who is a Director of one of the eligible partnering centers or institutes included in the "Eligible Partners" section. Additional faculty from the lead institution or from the partnering center or institute may be listed as co-PIs. Funding for partnering institutions must be requested via subawards; separately

submitted collaborative proposals will not be accepted.

Limit on Number of Proposals per Organization: 2

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

There are no restrictions or limits.

Additional Eligibility Info:

Eligible Institutions of Higher Education

PREP Proposals may only be submitted by “Minority-Serving Institutions” (MSIs) as defined by the Department of Education (<https://www2.ed.gov/about/offices/list/ocr/edlite-minorityinst.html>). Eligibility as a minority-serving institution may be determined by reference to the Integrated Postsecondary Education Data System (IPEDS) of the US Department of Education National Center for Education Statistics (<http://nces.ed.gov/ipeds/>). Institutions of higher education that primarily serve populations of students with disabilities are also eligible to submit PREP proposals.

It is recognized that 2-year and 4-year Associate-granting colleges have important impacts in the matriculation of students from underrepresented groups. While 2-year and 4-year Associate degree-granting colleges are not eligible to submit a proposal under this solicitation, partnerships with a leading minority-serving institution are encouraged.

Each PREP proposal must be submitted in partnership with one or more Physics Frontiers Centers or eligible centers or institutes (eligible partners described below). The proposal might include a subaward to the PFC, center, or institute, consistent with the proposed partnership activities.

Proposers are strongly encouraged to contact the cognizant Program Directors with questions about the eligibility of proposing institutions.

Eligible Partners

Eligible partners include the PHY-supported Physics Frontiers Centers as listed at https://www.nsf.gov/mps/phy/pfc_program.jsp and other PHY-managed research-focused centers or institutes that can bring substantial research infrastructure to the partnership. For FY 2024 these include the Center for Bright Beams (CBB) Science and Technology Center, the Institute for Artificial Intelligence and Fundamental Interactions (IAIFI), the Institute for Research and Innovation in Software for High Energy Physics (IRIS-HEP), the Accelerated AI Algorithms for Data-Driven Discovery (A3D3) Institute and the Software-Tailored Architectures for Quantum codesign (STAQ) Center. Centers or institutes whose primary focus is the training of postdoctoral fellows or the facilitation of community activities are not eligible.

Proposers are strongly encouraged to contact the cognizant Program Directors with questions about eligibility of partner institutions.

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 Research.gov or Grants.gov.

- Full Proposals submitted via Research.gov: 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) 292-8134 or by e-mail from nsfpubs@nsf.gov. The Prepare New Proposal setup will prompt you for the program solicitation number.
- 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) 292-8134 or by e-mail from nsfpubs@nsf.gov.

See PAPPG Chapter II.D.2 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.

In addition to the guidance in the PAPPG and NSF Grants.gov Application Guide, the following items should be included and/or addressed in the proposal:

1. Project Description (limit 20 pages). This section should be completed according to the general guidelines detailed in the NSF PAPPG, including the requirement for a separate section labeled "Broader Impacts." In addition, it should include:

a. *List of Participants (limit 1 page).* Provide a list of participating faculty and/or scientific personnel from both the lead institution and from the partnering center or institute. List each faculty participant by full name, and her/his institutional and departmental affiliation. Note: For all faculty participants listed as Senior Personnel, a Biographical Sketch, Current and Pending Support and Collaborators and Other Affiliations information must be included in the corresponding sections of the proposal.

b. *Partnership Vision Statement (limit 1 page).* The ultimate goal of PREP is to increase diversity in Physics through the establishment of research and education partnerships between faculty at the minority-serving institution and faculty at the partnering center or institute. In this section of the proposal, the partnership framework and plans are succinctly described, and a clear and concise vision for the proposed partnership is provided by describing its overall research and education goals, along with the diversity objectives.

c. *Results from Prior NSF Support (limit 2 pages).* This section should be completed according to the general guidelines detailed in the NSF PAPPG, and should include both the intellectual merit and broader impacts of the prior support. Collaborative research and related activities funded by other agencies may also be included here.

d. *Research Description (limit 10 pages).* Provide a concise description of the research goals and intellectual focus of the partnership, and describe the planned research and education activities in sufficient detail to enable assessment of their scientific merit.

Two sections must be included in the Research Description that address the following:

i. Define the research scope of the partnership. Both partners must define the common intellectual interests to build a scientific partnership. In this section, the purpose of the research, along with the foreseen challenges to accomplish it must be described. In addition, expected outcomes of the research effort must be provided.

ii. Describe the role and intellectual contribution of each faculty member associated with the PREP, both at the lead institution and at the partnering center or institute; briefly outline the resources available and plans to accomplish the research goals.

e. *Partnership Impacts (limit 5 pages).* Provide a concise description of the potential impacts of the partnership.

i. PREP partnerships present an opportunity for advancement for both partners in diversity and research capacity. In this section, the starting point of each institution should be described in terms of diversity and research capacity for all partners involved. Define the starting-point or current status in the recruitment/retention/degree attainment pathway.

ii. Describe the proposed strategy for increased recruitment, retainment, and degree attainment in the PREP pathway. Each partnership will identify which step(s) of the pathway will be tackled for the duration of the award. The proposed strategy is formed by either pre-existing or newly developed research and education elements within the partnership framework described in the section *Partnership Vision Statement*. Provide a brief description of such elements and how they will help advance diversity for both partners and address the PREP pathway. Include a description of the elements that will advance the research infrastructure at the minority-serving institution. Identify challenges and possible solutions.

iii. Impact of Partnership both on the minority-serving institution and the partnering center or institute. The PREP program is designed to bring benefits to both partners in both diversity and research output. Describe the potential outcomes of building the PREP pathway in the context of inclusive participation and diversity in physics researchers for both partners,

iv. Identify how gains from establishing the partnership framework and building the PREP pathway might extend more broadly and affect non-participants.

f. *Management Plan (limit 1 page).* Describe the plans for the administration of the PREP, including the functions of key personnel. Describe the plans for administering the collaborative programs with the Partner organization and how decisions will be made and implemented. Include an organizational chart. Specify personnel responsible for student mentoring at all sites.

2. References Cited. List only references cited in the Project Description. See the PAPPG for format instructions. Noncompliance with NSF guidelines may result in the proposal being returned without review.

3. Budget pages and budget justification. Complete budget according to the instructions in the PAPPG. Include budget pages for each year of support. A three-year cumulative budget will be automatically generated by the system. Provide a three-year summary budget justification that may not exceed a total of five pages. Provide separate budget pages for the lead institution and for each organization receiving a subaward. Provide a separate budget justification, up to five pages, for each subaward.

4. **Facilities, Equipment and Other Resources.** This section should be prepared in accordance with the PAPPG, and should provide an aggregated narrative description of the resources that the organizations will provide to the project, should it be funded. For purposes of this solicitation, resources such as space, faculty release time, faculty and staff positions, capital equipment, access to existing facilities, collaborations, and support for outreach efforts should be addressed, for both the lead institution and the partner.

5. Supplementary Documentation.

- **Letter(s) of Collaboration from Partner(s) (Limit of 2 pages).** The Director of the partnering center or institute must provide a detailed letter of collaboration that outlines the intellectual role of the partnering center or institute in the partnership, as well as the commitment, track record and future plans for inclusive participation of underrepresented groups in STEM. Include a plan for the continuation of the partnership in the event that PHY support to the partnering center or institute ends before the PREP award does.
- **Letter of Collaboration from Lead Institution (Limit of 2 pages).** A university official (Department Chair and/or Dean) from the lead institution must provide a letter of collaboration describing the support that will be provided by the host institution for the proposed activities. This should be narrative in nature and must not include any quantifiable financial information.
- **Statement of Eligibility (Limit 1 page).** An Authorized Organizational Representative from the lead institution must provide a statement certifying that the submitting institution is in compliance with the eligibility requirements of this solicitation (see "Eligible Institutions of Higher Education" section).

Please note that letters of recommendation for the PI or other letters of support for the project are not permitted.

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Budget Preparation Instructions:

The proposed budget can be up to \$300,000/year for up to a period of 3 years.

An annual PI meeting will be held for PREP grantees, including the co-PIs from the host institution and the co-PIs from the partnering center or institute. Travel to these PI meetings should be accounted for in the travel budget.

C. Due Dates

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

March 12, 2024

D. Research.gov/Grants.gov Requirements

For Proposals Submitted Via Research.gov:

To prepare and submit a proposal via Research.gov, see detailed technical instructions available at: https://www.research.gov/research-portal/appmanager/base/desktop?_nfpb=true&_pageLabel=research_node_display&_nodePath=/researchGov/Service/Desktop/ProposalPreparationandSubmission.html. For Research.gov user support, call the Research.gov Help Desk at 1-800-381-1532 or e-mail rgov@nsf.gov. The Research.gov Help Desk answers general technical questions related to the use of the Research.gov 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.

For Proposals Submitted Via Grants.gov:

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: <https://www.grants.gov/web/grants/applicants.html>. In addition, the NSF Grants.gov Application Guide (see link in Section V.A) provides instructions regarding the technical 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: Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign

and submit the application to Grants.gov. The completed application will be transferred to Research.gov for further processing.

The NSF [Grants.gov Proposal Processing in Research.gov informational page](#) provides submission guidance to applicants and links to helpful resources including the NSF [Grants.gov Application Guide](#), [Grants.gov Proposal Processing in Research.gov how-to guide](#), and [Grants.gov Submitted Proposals Frequently Asked Questions](#). Grants.gov proposals must pass all NSF pre-check and post-check validations in order to be accepted by Research.gov at NSF.

When submitting via Grants.gov, NSF strongly recommends applicants initiate proposal submission at least five business days in advance of a deadline to allow adequate time to address NSF compliance errors and resubmissions by 5:00 p.m. submitting organization's local time on the deadline. Please note that some errors cannot be corrected in Grants.gov. Once a proposal passes pre-checks but fails any post-check, an applicant can only correct and submit the in-progress proposal in Research.gov.

Proposers that submitted via Research.gov may use Research.gov to verify the status of their submission to NSF. For proposers that submitted via Grants.gov, until an application has been received and validated by NSF, the Authorized Organizational Representative may check the status of an application on Grants.gov. After proposers have received an e-mail notification from NSF, Research.gov should be used to check the status of an application.

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 *Leading the World in Discovery and Innovation, STEM Talent Development and the Delivery of Benefits from Research - NSF Strategic Plan for Fiscal Years (FY) 2022 - 2026*. 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.D.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.D.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 other underrepresented groups 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

The PREP proposals will also be evaluated on the following:

- Intellectual merit of the research and the potential impacts of the research partnership for both the Lead Institution and the partnering center or institute.
- Goals and potential impacts of the proposed partnership on expanding the participation of underrepresented minorities in physics.
- Potential impacts of the plans to address components of the PREP Pathway. Improvements or amplification provided through this proposal of any existing programs that address elements of the PREP Pathway.
- Roles of the minority-serving institution and the center or institute in the partnership.
- Student/faculty exchange plan between partners as well as student mentoring.
- Adequacy of budget to the proposed activities.

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 proposers whether their proposals have been declined or recommended for funding within six months. Large or particularly complex proposals or proposals from new recipients 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 or the Division of Acquisition and Cooperative Support 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 an NSF Grants and Agreements Officer. 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) 292-8134 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=pappg.

Administrative and National Policy Requirements

Build America, Buy America

As expressed in Executive Order 14005, [Ensuring the Future is Made in All of America by All of America's Workers](#) (86 FR 7475), it is the policy of the executive branch to use terms and conditions of Federal financial assistance awards to maximize, consistent with law, the use of goods, products, and materials produced in, and services offered in, the United States.

Consistent with the requirements of the Build America, Buy America Act (Pub. L. 117-58, Division G, Title IX, Subtitle A, November 15, 2021), no funding made available through this funding opportunity may be obligated for an award unless all iron, steel, manufactured products, and construction materials used in the project are produced in the United States. For additional information, visit NSF's [Build America, Buy America](#) webpage.

Special Award Conditions:

A mid-award site visit may be conducted to review the progress of each PREP.

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=pappg.

Grantees may be asked to participate in program-wide assessment and evaluation activities which may include submitting additional information throughout the award period.

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:

- Kathleen V. McCloud, telephone: (703) 292-8236, email: kmcccloud@nsf.gov

For questions related to the use of NSF systems contact:

- NSF Help Desk: 1-800-381-1532
- [Research.gov](#) Help Desk e-mail: rgov@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 <https://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 (FASED) 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.F.7 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** (703) 292-5111
(NSF Information Center):
- **TDD (for the hearing-impaired):** (703) 292-5090
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Send an e-mail to: nspubs@nsf.gov
or telephone: (703) 292-8134
- **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 proposers 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 proposers 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 [System of Record Notices](#), NSF-50, "Principal Investigator/Proposal File and Associated Records," and NSF-51, "Reviewer/Proposal File and Associated Records." 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 3145-0058. Public reporting burden for this collection of information is estimated to average 120 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
Policy Office, Division of Institution and Award Support
Office of Budget, Finance, and Award Management
National Science Foundation
Alexandria, VA 22314

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