NSF 23-519: Major Research Instrumentation (MRI) Program:

Instrument Acquisition or Development

Program Solicitation

Document Information

Document History

- **Posted:** November 23, 2022
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Public comment: This program solicitation refers to Frequently Asked Questions (FAQs) NSF 23-155.

View the program page

National Science Foundation
Office of Integrative Activities
Directorate for Biological Sciences
Directorate for Computer and Information Science and Engineering
Directorate for STEM Education
Directorate for Engineering
Directorate for Geosciences
Directorate for Mathematical and Physical Sciences
Directorate for Social, Behavioral and Economic Sciences
Directorate for Technology, Innovation and Partnerships

Submission Window Date(s) (due by 5 p.m. submitter's local time):

January 16, 2023 - February 21, 2023

October 16, 2023 - November 15, 2023

October 15, 2024 - November 15, 2024

October 15, 2025 - November 14, 2025

October 15, 2026 - November 16, 2026

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Important Information And Revision Notes

Consistent with section 10320 of the "Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act of 2022" (42 U.S.C. 18998), cost-sharing requirements under section 7036(c) of the America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (America COMPETES) Act of 2007 (42 U.S.C. 1862o-14(c)) for new awards in the Major Research Instrumentation (MRI) Program are waived for a period of 5 years, beginning with the FY 2023 MRI competition.

The maximum funding a proposal can request from NSF remains $4 million. Since voluntary cost sharing is not permitted, the maximum total project cost of proposed new projects is also $4 million.

"Track 1" has been revised to include proposals that request funds from NSF greater than $100,000[1] and less than $1,400,000. "Track 2" has been revised to include proposals that request funds from NSF greater than or equal to $1,400,000 up to and including $4,000,000.

A new track has been added ("Track 3") to incorporate opportunities, consistent with section 10373 of the "CHIPS and Science Act of 2022" (42 U.S.C. 19083), for proposal requests that include the acquisition, development, installation, operation, and maintenance of equipment and instrumentation to reduce consumption of helium.

Each performing organization is limited to a maximum of three proposals in Tracks 1 and 2, with no more than two (2) submissions in Track 1 and no more than one (1) submission in Track 2. One (1) additional submission is permitted in the newly defined Track 3. ***As a result, it is now possible for an institution to submit up to four MRI proposals within these Track limits.*** Any MRI proposal may continue to request support for either the acquisition or development of a research instrument.

Consistent with section 10318(a)(6)(F) of the CHIPS and Science Act of 2022 (42 U.S.C. 18997(a)(6)(F)), MRI encourages proposals that facilitate U.S. leadership in microelectronics research and training.

Points of contact for MRI have been added within the research directorates (available on the MRI Program Website) to facilitate questions that are best addressed by subject-matter experts. General questions about the MRI Program and the recent waiver of the cost-sharing requirement should be addressed to mri@nsf.gov.

The windows for MRI proposal submissions for FY 2024 and beyond have changed to facilitate easier proposal selection and submission by institutions, and more efficient workflow within NSF. The submission window for the FY 2023 MRI competition is consistent with prior competitions.

Additional tables are required, both in the Supplementary Documents and also sent by email post-acceptance of a proposal submission, listing information needed to aid in recruitment of reviewers (See Sections V.A.6.g and V.A.8). *This is in addition to the required Collaborators and Other Affiliations Information form.*

Important Information

Proposals submitted in response to this program solicitation must be prepared and submitted via Research.gov or via Grants.gov and may not be prepared or submitted via FastLane.

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:

Major Research Instrumentation (MRI) Program
Instrument Acquisition or Development

Synopsis of Program:

The Major Research Instrumentation (MRI) Program (MRI Program Website) serves to increase access to multi-user scientific and engineering instrumentation for research and research training in our Nation's institutions of higher education and not-for-profit scientific/engineering research organizations. An MRI award supports the acquisition of a *multi-user* research instrument that is commercially available through direct purchase from a vendor, or for the personnel costs and equipment that are required for the development of an instrument with new capabilities, thereby advancing instrumentation capabilities and enhancing expertise for instrument design and fabrication at academic institutions. MRI instruments are, in general, too costly and/or not appropriate for support through other NSF programs.

MRI provides support to acquire critical research instrumentation without which advances in fundamental science and engineering research may not otherwise occur. MRI also provides support to obtain next-generation research instruments by developing instruments with new capabilities that open new opportunities to advance the frontiers in science and engineering research. Additionally, an MRI award is expected to enhance research training of students who will become the next generation of instrument users, designers and builders.

An MRI proposal may request from NSF up to $4 million for either acquisition or development of a research instrument. Each performing organization may submit in *revised* "Tracks" as defined below, with no more than two (2) submissions in Track 1 and no more than one (1) submission in Track 2. For the

newly defined Track 3, no more than one (1) submission per competition is permitted. ***As a result, it is now possible for an institution to submit up to four MRI proposals within the Track limits as described above.***

- Track 1: Track 1 MRI proposals are those that request funds from NSF greater than $100,000[1] and less than $1,400,000.
- Track 2: Track 2 MRI proposals are those that request funds from NSF greater than or equal to $1,400,000 up to and including $4,000,000.
- Track 3: Track 3 MRI proposals are those that request funds from NSF greater than or equal to $100,000[1] and less than or equal to $4,000,000 that include the purchase, installation, operation, and maintenance of equipment and instrumentation to conserve or reduce the consumption of helium. ***Institutions may submit no more than one Track 3 proposal. Submission of a Track 3 proposal does not impact limits that apply for Track 1 and Track 2 proposals.***

Cost sharing requirements for new awards in the MRI Program are waived for a period of 5 years beginning with the FY 2023 MRI competition. Institutional submission limits for Track 1, Track 2 and Track 3 proposals remain.

The MRI Program especially seeks broad representation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines. Proposals from women, underrepresented minorities, persons with disabilities and early-career PIs are encouraged, as are proposals that benefit early-career researchers and proposals with PIs from geographically under-served regions, including EPSCoR jurisdictions. Additionally, proposals are encouraged from under-resourced institutions, including from emerging research institutions, where MRI can significantly build capacity for research.

[1] Track 1 proposals requesting funds from NSF less than $100,000 will be accepted only from: a) eligible performing organizations requesting instrumentation supporting research in the disciplines of mathematics or social, behavioral and economic sciences; or b) non-Ph.D.-granting institutions of higher education requesting instrumentation supporting research in any NSF-supported disciplines.

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.

- Randy L. Phelps, Staff Associate, telephone: (703) 292-5049, email: mri@nsf.gov
- Jonathan Friedman, Program Director, telephone: (703) 292-7475, email: mri@nsf.gov

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

- 47.041 --- Engineering
- 47.049 --- Mathematical and Physical Sciences
- 47.050 --- Geosciences
- 47.070 --- Computer and Information Science and Engineering
- 47.074 --- Biological Sciences
- 47.075 --- Social Behavioral and Economic Sciences

- 47.076 --- STEM Education
- 47.079 --- Office of International Science and Engineering
- 47.083 --- Office of Integrative Activities (OIA)
- 47.084 --- NSF Technology, Innovation and Partnerships

Award Information

Anticipated Type of Award: Standard Grant

Estimated Number of Awards: 100

Approximately 100 awards are anticipated depending on the available budget and the number and quality of submissions.

Anticipated Funding Amount: $75,000,000

It is anticipated that approximately $75 million will be available for new awards, pending availability of funds and numbers/quality of proposals, with approximately 1/4 of the available MRI funding expected to support Track 2 awards. NSF strongly encourages MRI proposals that seek to develop next-generation research instruments that open new frontiers of research; therefore up to 1/3 of the MRI awards are expected to support instrument development in either track; within their submission limit, organizations are encouraged to submit proposals for innovative development projects.

Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Organizations that may apply for the MRI program:

  Submission Eligibility

  Proposals may only be submitted by organizations located in the United States, its territories or possessions, as follows. (Campuses or organizations that plan to submit a proposal through the sponsored projects office (SPO) of other campuses or organizations should contact NSF to discuss eligibility as early as possible and at least six weeks before submitting such a proposal.)

  1. Institutions of higher education (Ph.D.-granting and non-Ph.D.-granting), acting on behalf of their faculty members, that are accredited in and have their main campus in the United States, its territories or possessions. Distinct academic campuses (e.g., that award their own degrees, have independent administrative structures, admissions policies, alumni associations, etc.) within multi-campus systems qualify as separate submission-eligible institutions.

  2. Not-for-profit, non-degree-granting domestic U.S. organizations, acting on behalf of their employees, for example (but not limited to) independent museums and science centers, observatories, research laboratories and similar organizations that are directly associated with the Nation's research activities. These organizations must have an independent, permanent administrative organization (e.g., a sponsored projects office) located in the United States, its territories or possessions, and have 501(c)(3) tax status.

  3. To facilitate access to unique instrumentation for a broad user base of U.S. scientists and engineers, and to encourage collaboration and sharing of state-of-the-art instrumentation,

the MRI program accepts proposals from consortia of organizations. Consortium proposals may be submitted as follows:

3a. Legally incorporated, not-for-profit consortia that include two or more submission-eligible organizations as described in items (1) and (2) above may submit proposals on behalf of the consortium. The cover sheet must clearly indicate the consortium nature of the proposal in the title. Such a consortium is one with an independent administrative structure (e.g., a sponsored projects office) located in the United States, its territories or possessions and have 501(c)(3) status.

3b. Submission-eligible organizations as described in items (1) and (2) above may submit, as part of their limit, proposals on behalf of consortia. The cover sheet of such a proposal must a) clearly indicate the consortium nature of the proposal in the title, and b) it *must* identify both a PI and co-PI(s) from *at least two* MRI submission-eligible organizations (items 1 and/or 2 above) as lead investigators in the consortium. These consortium proposals may also include as partners other U.S. organizations that are not eligible to submit MRI proposals.

For-profit commercial organizations, especially U.S. small businesses with strong capabilities in scientific or engineering research or education, are eligible for instrument development support through subawards/subcontracts as private sector partners with submitting organizations; they may not submit proposals. Such partnerships must be substantive and meaningful, and build capacity for instrument development within MRI submission-eligible organization(s). Title to the resulting instrument should be retained by the MRI-eligible performing organization(s).

Prospective PIs may contact the cognizant MRI program officer regarding organizational eligibility, and for information on other NSF funding opportunities for instrumentation; see also Section IX for a list of related NSF programs for research instrumentation.

Organization Categories

All MRI-eligible organizations belong to one of the following three categories:

1. ***Ph.D.-granting institutions of higher education*** are accredited colleges and universities that have awarded more than 20 Ph.D. or D.Sc. degrees in NSF-supported fields during the combined previous two academic years. Additionally, any organization that awards Ph.D. or D.Sc. degrees in NSF-supported fields is considered to be a Ph.D.-granting institution if the only degrees it awards in NSF-supported fields are post-Bachelor's degrees.
2. ***Non-Ph.D.-granting institutions of higher education*** are accredited colleges and universities (including two-year community colleges) that award Associate's degrees, Bachelor's degrees, and/or Master's degrees in NSF-supported fields, and have awarded 20 or fewer Ph.D./D.Sc. degrees in all NSF-supported fields during the combined previous two academic years.
3. ***Non-degree-granting organizations*** are those that do not award Associate's degrees, Bachelor's degrees, Master's degrees, or Ph.Ds. or D.Sc. For the purposes of the MRI program, non-degree-granting organizations also include institutions of higher education that award all of their degrees outside of NSF-supported fields.

Who May Serve as PI:

There are no restrictions or limits.

The MRI Program especially seeks broad representation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines. Proposals from women, underrepresented minorities, persons with disabilities and early-career PIs are encouraged, as are proposals that benefit early-career

researchers and proposals with PIs from geographically under-served regions, including EPSCoR jurisdictions. Additionally, proposals with PIs from under-resourced institutions, including from emerging research institutions, where MRI can significantly build capacity for research., are encouraged.

Limit on Number of Proposals per Organization:

Two (2) in Track 1, one (1) in Track 2 and one (1) in Track 3 as described below. Potential PIs are advised to contact their sponsored projects office well in advance of the MRI submission window regarding processes used to select proposals for submission.

The MRI program requires that an MRI-eligible organization may, as a performing organization, submit or be included as a significantly funded[2] subawardee in no more than three MRI proposals in Tracks 1 and 2 as defined below, with no more than two (2) submissions in Track 1 and no more than one (1) submission in Track 2. One (1) additional submission is permitted in the newly defined Track 3. ***As a result, it is now possible for an institution to submit up to four MRI proposals within the Track limits described above.***

Any MRI proposal may request support for either the acquisition or development of a research instrument or an upgrade of an existing research instrument. Within their submission limit, NSF strongly encourages an organization to submit proposals for innovative development projects.

- Track 1: Track 1 MRI proposals are those that request funds from NSF greater than or equal to $100,000[1] and less than $1,400,000.
- Track 2: Track 2 MRI proposals are those that request funds from NSF greater than or equal to $1,400,000 up to and including $4,000,000.
- Track 3 MRI proposals are those that request funds from NSF greater than or equal to $100,000[1] and less than or equal to $4,000,000 for requests that include the purchase, installation, operation, and maintenance of equipment and instrumentation to reduce consumption of helium.

[2] An unfunded collaboration does not count against the submission limit. Inclusion as a funded subawardee on a development proposal at a level in excess of 20% of the total budget requested from NSF, or as a funded subawardee, when allowed, on any acquisition proposal, will be counted against an organization's proposal submission limit. Separately submitted linked collaborative proposals count against the submission limit of each of the submitting organizations. However, if a subaward to an organization in a *development proposal* is 20% or less of the proposal's total budget request from NSF, the subawardee's submission limit will not be affected. For subawards within a linked collaborative proposal, the 20% threshold applies to the budget request from NSF in the proposal containing the subaward(s), not to the combined budget request from NSF for the collaborative project.

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:**

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

C. Due Dates

- **Submission Window Date(s)** (due by 5 p.m. submitter's local time):

  January 16, 2023 - February 21, 2023

  October 16, 2023 - November 15, 2023

  October 15, 2024 - November 15, 2024

  October 15, 2025 - November 14, 2025

  October 15, 2026 - November 16, 2026

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:

Standard NSF award conditions apply.

Reporting Requirements:

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

I. Introduction

A. Program Goals

The goal of the Major Research Instrumentation (MRI) Program is to increase access to shared-use/multi-user instrumentation for scientific and engineering research and research training. MRI is intended to be a capacity-building

program that builds research capabilities across diverse institution types (institutions of higher education and not-for-profit scientific/engineering research organizations). MRI advances the National interest by providing U.S. organizations with instrumentation that opens new opportunities to advance the frontiers in science and engineering research and research training.

The MRI Program provides for state-of-the-art instruments through acquisition from vendors and development of next-generation research instruments that advance the state-of-the-art in science and engineering research. For development proposals the Program seeks to leverage the strengths of private sector partners to build instrument development capacity at MRI submission-eligible organizations.

MRI supports instrumentation across NSF's Directorates and Divisions. The Program focuses on *multi-user/shared instrumentation* that often supports research needs across disciplinary boundaries. The MRI Program is intended to provide flexibility to the research community to select the most appropriate NSF Division(s) to advance their shared-use instrumentation needs.

MRI encourages proposals that facilitate U.S. leadership in microelectronics research and training. Additionally, a separate Track has been added to MRI for proposal requests that include the acquisition, development, installation, operation, and maintenance of equipment and instrumentation to reduce consumption of helium.

B. Background Information

The America COMPETES Act (ACA) of 2007 (Public Law 110-69) establishes the maximum award limit for MRI proposals commensurate with the appropriated budget for the Program. For the current MRI competition, the maximum amount of an award under the Program is $4 million. Proposals that request funds from NSF in the range $100,000-$4 million will be accepted from all eligible organizations. Proposals that request funds from NSF less than $100,000 will be accepted only from all eligible organizations for the disciplines of mathematics or social, behavioral and economic sciences and from non-Ph.D.-granting institutions of higher education for all NSF-supported disciplines.

Cost sharing requirements for new awards in the MRI Program, previously established by the ACA, are waived for a period of 5 years beginning with the FY 2023 MRI competition. Institutional submission limits for Track 1, Track 2 and Track 3 proposals remain.

Inclusion of voluntary committed cost sharing is prohibited by National Science Board policy.

II. Program Description

A. General Information

MRI Program Scope

An MRI proposal may request support for the acquisition or development of a research instrument or components that when combined serve as an integrated research instrument. An MRI-supported instrument is intended to serve multiple users both in research and in the training of the next generation of instrument users and/or developers. MRI provides support to acquire critical research instrumentation without which advances in fundamental science and engineering research may not otherwise occur. MRI also provides support to develop next-generation research instruments that open new opportunities to advance the frontiers in science and engineering research.

MRI-supported instrumentation is, in general, too costly or not appropriate for support through other NSF programs. An instrument acquired or developed with support from the MRI Program is expected to be operational by the end of the award period to enable the research/research training activities committed to in the proposal.

The MRI Program does not typically fund common, general-purpose ancillary equipment that would normally be found in a laboratory and/or is relatively easily procured by the organization. The Program does not support research, education or outreach activities that are enabled by the requested instrumentation, nor does MRI support requests for multiple independent instruments. MRI also does not support instrumentation used primarily for science and engineering education courses and outreach, or enables research that is primarily outside of NSF-supported fields of science and

engineering; however the instrument's use in those activities may occur at a secondary level and serve as broader impacts.

The MRI Program welcomes substantive and meaningful partnerships for instrument development, including partnerships between the academic and private sectors. MRI proposals involving partnerships with applicability to other NSF investments are also encouraged. Such proposals are expected to create innovative advances with wide scientific or commercial impact. Investigations of commercial impact should not be included in MRI proposals but support for such investigations may be sought through, for example, the NSF's Innovation Corps (I-Corps) Team program (https://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504672); as MRI development projects mature, applications to this program are strongly encouraged.

An MRI research instrument need not be physically located in a conventional laboratory setting, nor does an instrument need to be "physical" at all. MRI continues to support distributed/networked instruments and cyberinstrumentation that is not appropriate for support through other NSF programs. MRI encourages proposals that facilitate U.S. leadership in microelectronics research and training.

MRI will accept requests that include the purchase, installation, operation, and maintenance of equipment and instrumentation to reduce consumption of helium. *Support for such requests will be limited to equipment and instrumentation that serve shared-use research instrumentation.* A request may be part of a Track 1 or Track 2 proposal (within the budgetary limits that apply to those tracks) or be requested separately as a "Track 3" proposal. Proposals in Track 1 and Track 2 that request support for instrumentation that require the use of helium must describe plans for the conservation and/or recovery and reuse of helium; plans to submit a separate Track 3 proposal are not sufficient to constitute such plans.

a. Instrument Acquisition

The science and engineering research enterprise relies on the availability of modern instrumentation, much of which can be acquired with little or no modification from existing sources, An MRI acquisition proposal is characterized by a purchase or upgrade of a generally available, yet sophisticated, instrument with little or no modification and risk. MRI does not support the lease/rental of a research instrument, but the purchase of a currently leased instrument at fair market value may be considered.

b. Instrument Development

Advancing the frontiers of science and engineering research also requires new generations of sophisticated research instrumentation with required capabilities that may not yet exist. NSF encourages individual investigators and teams of researchers to apply for instrument development support. A development proposal should demonstrate the need for a new or extensively upgraded instrument with new performance, enabling enhanced or potentially transformative research opportunities, open up new areas of research and research training and/or have potential as a commercial product. "Performance" may include, for example, accuracy, reliability, resolving power, throughput speed, sample capacity, flexibility of operation, breadth of application, user-friendliness, and/or new types of measurement or information gathering. MRI development efforts typically require longer timescales for completion than acquisition efforts, and involve design, construction, testing and commissioning such that the equipment cost may not represent the largest portion of the budget. A development proposal also tends to involve greater risk to complete, requiring a risk mitigation plan.

The MRI program does not consider the acquisition of components simply combined in a new system, the mere purchase of an upgrade, early-phase enabling technology development, or the development of devices, products or techniques/protocols to constitute instrument development. The purchase of a computer(s) and the subsequent porting of application-specific software also does not constitute instrument development. A development project should lead to a stable multi-user instrument at the end of the award period that will serve multiple researchers for an extended period of time.

A development proposal with a commercial partner(s) must be substantive, meaningful and build capacity for instrument development within MRI submission-eligible organizations; a proposal that "outsources" the development to the

commercial partner will be considered to be an acquisition proposal by the MRI program. A development proposal must describe the improved performance of the new instrument over existing options and the expected impact of this new instrument on the broader research community.

Additionally:

- **MREFC-related Proposals:** The MRI program will not accept proposals for an instrument that augments an NSF Major Research Equipment and Facilities Construction (MREFC) project unless the project is receiving operations funding outside of the MREFC account. A list of such facilities can be found at https://www.nsf.gov/bfa/lfo/.
- **FFRDC-related Proposals:** Proposals for the acquisition or development of an instrument involving another Federal agency or one of their Federally Funded Research and Development Centers (FFRDCs)[3] must be submitted as a consortium proposal by an MRI submission-eligible organization as described in item 3(b) under "Eligibility Information". In addition to at least two MRI submission-eligible organizations, the proposal must include the agency/FFRDC (or its managing organization) as a partner in the consortium, even if the role of the FFRDC in the project is solely to house the instrument. An instrument must make unique contributions to the needs of researchers within the consortium and/or establish access to new multi-user research capabilities. Preliminary inquiry to the cognizant MRI point of contact should be made before preparing a proposal for submission.

The MRI program will NOT support proposal requests that include the following:

- Construction, renovation or modernization of rooms, buildings or research facilities. This category refers to the space where sponsored or unsponsored research activities (including research training) occur, whether "bricks-and-mortar", mobile, or virtual;
- Large, specialized experimental facilities that are constructed with significant amounts of common building material using standard building techniques. In general instruments can be decoupled from the structure or environment that contains them;
- General purpose and supporting equipment; this category includes (but is not limited to) general purpose ancillary computers or laboratory instruments. Supporting equipment refers to basic, durable components of a research facility that are integral to its operation (e.g., fume hoods, elevators, laboratory casework, general-purpose computational or data storage systems). It also includes supporting facilities such as vehicle charging stations;
- Sustaining infrastructure and/or building systems. This category includes (but is not limited to) the installation of or upgrades to infrastructure related to the supply of power, ventilation, water or research gases, routine multi-purpose computer networks, standard safety features, and other general-purpose systems (e.g., toxic waste removal systems and telecommunications equipment.);
- General-purpose platforms or environment. This category may include (but is not limited to) general-purpose fixed or non-fixed structures as well as manned or unmanned vehicles, the purpose of which is to host, support or transport an instrument, which is not an integral part of the research instrument and/or which can be re-purposed for non-scientific uses.;
- Instrumentation used primarily for science and engineering education courses.

Proposals seeking support for the above items or activities are subject to return without review (if noncompliance is established prior to review) or decline (if noncompliance is established during the merit review process).

B. Eligible Fields of Science and Engineering

A proposal for a major research instrument should describe the types of research for which it will be used. These should be in fields of science, engineering, mathematics or education research that are typically supported by NSF programs[2]. However, as long as they are in such NSF-supported fields, the specific research projects for which the instrumentation will be used need not be funded by NSF or other agencies of the Federal government.

The MRI Program does not provide support for instrumentation to be used in medical education (such as medical school courses). Instrumentation intended for research with disease-related goals, including work on the etiology, diagnosis or treatment of physical or mental disease, abnormality, or malfunction in human beings or animals, is normally not supported. Instrumentation for research on animal models of such conditions or the development or testing of drugs or other procedures for their treatment also is not eligible for support. However, instrumentation for bioengineering research, with diagnosis- or treatment-related goals that applies engineering principles to problems in biology and medicine, while also advancing engineering knowledge, is eligible for support. Instrumentation for research in bioinformatics and biocomputing, or for bioengineering research to aid persons with disabilities, is also eligible.

C. Operations and Maintenance

Many major research instruments have long lifetimes and can be expensive to operate and maintain over that lifetime. Proposals should only be submitted by institutions that are willing to undertake the responsibility of maintaining and operating the instrument for the benefit of a community of users engaged in research and research training. Defraying the costs of operations and maintenance through user fees is permissible, but not required.

[3] The current list of FFRDCs can be found at: https://www.nsf.gov/statistics/ffrdclist/.

III. Award Information

Proposals submitted in response to this program solicitation will be competing for about $75 million, pending availability of funds and numbers/quality of proposals.

Requests for funds from NSF in the range $100,000-$4 million will be accepted from all eligible organizations. Track 1 requests from NSF less than $100,000 will be accepted only from: a) any eligible performing organization for the disciplines of mathematics or social, behavioral and economic sciences; and/or b) non-Ph.D.-granting institutions of higher education for all NSF-supported disciplines.

Proposers should request an award period of 36 months for all acquisition proposals and up to 60 months for development proposals. For all helium-related acquisition requests, proposers should request a 36-month project duration, while development requests should request a 60-month project duration; these durations will allow time for reporting of impacts and efficiencies gained. The anticipated earliest starting date for an award is six months after the proposal's submission.

IV. Eligibility Information

Who May Submit Proposals:

Proposals may only be submitted by the following:

- Organizations that may apply for the MRI program:

  Submission Eligibility

  Proposals may only be submitted by organizations located in the United States, its territories or possessions, as follows. (Campuses or organizations that plan to submit a proposal through the sponsored projects office (SPO) of other campuses or organizations should contact NSF to discuss eligibility as early as possible and at least six weeks before submitting such a proposal.)

1. Institutions of higher education (Ph.D.-granting and non-Ph.D.-granting), acting on behalf of their faculty members, that are accredited in and have their main campus in the United States, its territories or possessions. Distinct academic campuses (e.g., that award their own degrees, have independent administrative structures, admissions policies, alumni associations, etc.) within multi-campus systems qualify as separate submission-eligible institutions.

2. Not-for-profit, non-degree-granting domestic U.S. organizations, acting on behalf of their employees, for example (but not limited to) independent museums and science centers, observatories, research laboratories and similar organizations that are directly associated with the Nation's research activities. These organizations must have an independent, permanent administrative organization (e.g., a sponsored projects office) located in the United States, its territories or possessions, and have 501(c)(3) tax status.

3. To facilitate access to unique instrumentation for a broad user base of U.S. scientists and engineers, and to encourage collaboration and sharing of state-of-the-art instrumentation, the MRI program accepts proposals from consortia of organizations. Consortium proposals may be submitted as follows:

   3a. Legally incorporated, not-for-profit consortia that include two or more submission-eligible organizations as described in items (1) and (2) above may submit proposals on behalf of the consortium. The cover sheet must clearly indicate the consortium nature of the proposal in the title. Such a consortium is one with an independent administrative structure (e.g., a sponsored projects office) located in the United States, its territories or possessions and have 501(c)(3) status.

   3b. Submission-eligible organizations as described in items (1) and (2) above may submit, as part of their limit, proposals on behalf of consortia. The cover sheet of such a proposal must a) clearly indicate the consortium nature of the proposal in the title, and b) it *must identify* both a PI and co-PI(s) from *at least two* MRI submission-eligible organizations (items 1 and/or 2 above) as lead investigators in the consortium. These consortium proposals may also include as partners other U.S. organizations that are not eligible to submit MRI proposals.

For-profit commercial organizations, especially U.S. small businesses with strong capabilities in scientific or engineering research or education, are eligible for instrument development support through subawards/subcontracts as private sector partners with submitting organizations; they may not submit proposals. Such partnerships must be substantive and meaningful, and build capacity for instrument development within MRI submission-eligible organization(s). Title to the resulting instrument should be retained by the MRI-eligible performing organization(s).

Prospective PIs may contact the cognizant MRI program officer regarding organizational eligibility, and for information on other NSF funding opportunities for instrumentation; see also Section IX for a list of related NSF programs for research instrumentation.

Organization Categories

All MRI-eligible organizations belong to one of the following three categories:

1. ***Ph.D.-granting institutions of higher education*** are accredited colleges and universities that have awarded more than 20 Ph.D. or D.Sc. degrees in NSF-supported fields during the combined previous two academic years. Additionally, any organization that awards Ph.D. or D.Sc. degrees in NSF-supported fields is considered to be a Ph.D.-granting institution if the only degrees it awards in NSF-supported fields are post-Bachelor's degrees.

2. ***Non-Ph.D.-granting institutions of higher education*** are accredited colleges and universities (including two-year community colleges) that award Associate's degrees, Bachelor's degrees, and/or Master's degrees in NSF-supported fields, and have awarded 20 or fewer Ph.D./D.Sc. degrees in all NSF-supported fields during the combined previous two academic years.
3. ***Non-degree-granting organizations*** are those that do not award Associate's degrees, Bachelor's degrees, Master's degrees, or Ph.Ds. or D.Sc. For the purposes of the MRI program, non-degree-granting organizations also include institutions of higher education that award all of their degrees outside of NSF-supported fields.

Who May Serve as PI:

There are no restrictions or limits.

The MRI Program especially seeks broad representation of groups, institutions, and geographic regions that are underrepresented in STEM disciplines. Proposals from women, underrepresented minorities, persons with disabilities and early-career PIs are encouraged, as are proposals that benefit early-career researchers and proposals with PIs from geographically under-served regions, including EPSCoR jurisdictions. Additionally, proposals with PIs from under-resourced institutions, including from emerging research institutions, where MRI can significantly build capacity for research., are encouraged.

Limit on Number of Proposals per Organization:

Two (2) in Track 1, one (1) in Track 2 and one (1) in Track 3 as described below. Potential PIs are advised to contact their sponsored projects office well in advance of the MRI submission window regarding processes used to select proposals for submission.

The MRI program requires that an MRI-eligible organization may, as a performing organization, submit or be included as a significantly funded[2] subawardee in no more than three MRI proposals in Tracks 1 and 2 as defined below, with no more than two (2) submissions in Track 1 and no more than one (1) submission in Track 2. One (1) additional submission is permitted in the newly defined Track 3. ***As a result, it is now possible for an institution to submit up to four MRI proposals within the Track limits described above.***

Any MRI proposal may request support for either the acquisition or development of a research instrument or an upgrade of an existing research instrument. Within their submission limit, NSF strongly encourages an organization to submit proposals for innovative development projects.

- Track 1: Track 1 MRI proposals are those that request funds from NSF greater than or equal to $100,000[1] and less than $1,400,000.
- Track 2: Track 2 MRI proposals are those that request funds from NSF greater than or equal to $1,400,000 up to and including $4,000,000.
- Track 3 MRI proposals are those that request funds from NSF greater than or equal to $100,000[1] and less than or equal to $4,000,000 for requests that include the purchase, installation, operation, and maintenance of equipment and instrumentation to reduce consumption of helium.

[2] An unfunded collaboration does not count against the submission limit. Inclusion as a funded subawardee on a development proposal at a level in excess of 20% of the total budget requested from NSF, or as a funded subawardee, when allowed, on any acquisition proposal, will be counted against an

organization's proposal submission limit. Separately submitted linked collaborative proposals count against the submission limit of each of the submitting organizations. However, if a subaward to an organization in a *development proposal* is 20% or less of the proposal's total budget request from NSF, the subawardee's submission limit will not be affected. For subawards within a linked collaborative proposal, the 20% threshold applies to the budget request from NSF in the proposal containing the subaward(s), not to the combined budget request from NSF for the collaborative project.

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

There are no restrictions or limits.

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.

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via Research.gov. PAPPG Chapter II.E.3 provides additional information on collaborative proposals.

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.

Proposal Setup.

Search for and select this MRI program solicitation number in Step One of the Full Proposal wizard in Research.gov. In Step Two, Where to Apply, select the most appropriate Division within an NSF Directorate or the most appropriate Office to consider your proposal. "Major Research Instrumentation" will be automatically pre-populated as the program for your proposal. *Selection of more than one Directorate/Office and Division to consider the proposal may facilitate review of multi-/cross-/inter-/trans-disciplinary efforts when two or more research areas are significantly involved* (PIs are especially encouraged to submit a list of suggested reviewers, as a ***Single-Copy Document***, for these types of proposals - see the PAPPG for additional information).

Note: NSF reserves the right to assign proposals to programs that are deemed by NSF to be the most appropriate for review. PI selection of a Division(s) for review is advisory to NSF.

In Step Three, the Equipment type of proposal should be selected.

The project title must be concise and convey the primary purpose of the proposal, e.g., "MRI: Track # Acquisition of ____," or "MRI: Track # Development of ____." Consortium project titles must also be identified in the title e.g., "MRI Consortium: Track # Acquisition of ___," or "MRI Consortium: Track # Development of ___." (Track # refers to submission of a Track 1, Track 2 or Track 3 proposal.)

Grants.gov Users: The program solicitation number will be pre-populated by Grants.gov on the NSF Grant Application Cover Page. Select "Major Research Instrumentation" as the program for your proposal. Please note that simultaneously submitted collaborative proposals must be submitted by Research.gov as Grants.gov does not currently support this functionality.

NSF proposals identify only a single PI and up to four co-PIs with those titles. For the purposes of the MRI program, other major participants may be designated as "Senior Personnel". Please see the NSF PAPPG for definitions of Senior Personnel.

PIs are reminded to consult the NSF PAPPG or the NSF Grants.gov Application Guide for guidance on the required sections of a full proposal submitted to NSF. The following instructions supplement or deviate from the guidance in the NSF PAPPG or the Grants.gov Application Guide.

1. Project Description (maximum length, 15 pages, including all figures and charts). The project description must include subsections (a)-(e), and address the intellectual merits and broader impacts of the proposed effort per NSF PAPPG guidelines. *Suggested lengths for individual subsections are provided for guidance only.*

a. Information about the Proposal.

a1. Instrument Location and Type (included at the top of and as part of the overall Project Description page limit).

- Indicate in a single separate line the physical location of the proposed instrument as follows, "Instrument Location: _____". **Note:** Instruments to be deployed in the field may require additional information to assess compliance with any applicable laws such as the National Environmental Policy Act, National Historic Preservation Act, and Endangered Species Act.

a2. *ONLY REQUIRED FOR DEVELOPMENT PROPOSALS:* Justification for submission as a Development proposal (suggested length: up to 1 page). Section II.A ("MRI Program Scope") describes characteristics of development proposals. In this subsection of the Project Description, when appropriate, you must justify the characteristics that qualify your proposal as a development proposal. Explicitly address as appropriate the questions below.

- What significant new capabilities, not available in an instrument provided by a vendor, will the new instrument provide?
- How will the end result of the effort be a stable shared-use research instrument, rather than technology development, a device, a product or a technique/protocol?
- Does the instrument development effort build capacity for instrument development activities within an MRI submission-eligible organization(s)?
- In what way does the instrument development require design and development work that must be undertaken or has been undertaken in-house, rather than through readily available/published designs found in the literature?
- To what extent does the instrument development require/benefit from a team of scientists/engineers/technicians that bring a variety of skills to the project?
- For what activities does the instrument development require a significant number of person-hours, more so than simple "assembly" of purchased parts?

- To what extent does the instrument development require time-frames for completion that are longer than are required for plug-and-play or assembled instruments?
- Does the instrument development require the use of a machine shop or a testbed to fabricate/test unique components?
- Does the instrument development effort involve risks in achieving the required specifications, and what is the risk mitigation plan?

Although all of the above may not be required to qualify for a development proposal, the more of these characteristics that apply, the more solidly the effort fits as a development effort (even if there is substantial acquisition of component parts). Reviewers and NSF staff will use this section to evaluate the merits of your proposal in meeting the goals for an MRI instrument development project.

b. Research Activities to be Enabled. The degree to which the planned uses of the proposed instrumentation constitute exciting, ground-breaking and/or transformative research is a significant factor in the merit review evaluation of MRI proposals. In this section, describe the specific research project(s) and research training activities that will be enabled and that drive the request for the desired instrumentation. Also describe current and potential funding sources that may support these activities and/or how the instrument will better enable future funding support. (Note: Researchers using MRI instrumentation need not be supported by NSF or the Federal government, but reviewers should understand how users of the instrument will support and disseminate their research.) In narrative and/or tabular form describe the personnel by research area, number, and type (e.g., senior personnel, postdoctoral fellows, graduate students, undergraduate students) anticipated to use benefit from the instrument. An in-depth discussion should include only those who will most actively use the instrumentation for research and research training on a regular basis. Other more minor users of the instrument, when applicable, should be described in a more condensed (e.g., table) format. Development proposals should identify researchers who intend to use the instrument once it has been developed and the research uses to which they will put it.

This section must also include "Results from Prior NSF Support" if the PI or any of the co-PIs have received NSF support as PIs or co-PIs in NSF awards (see required information in the PAPPG). **Preference should be given to MRI awards or other instrumentation awards.** When discussing MRI or instrumentation awards, this section should also include information on the operations and maintenance, downtime and usage history on the previously funded instrument. If the PI or co-PIs have not participated as PIs or co-PIs in NSF MRI or instrumentation awards, but have received other NSF funding during the reporting period, information on the most relevant funded award(s) is required.

c. Description of the Research Instrument and Needs (Suggested length: up to 2 pages for instrument acquisition; up to 5 pages for instrument development).

An acquisition proposal should include a technical description of the requested instrumentation and clearly explain how the planned research drives the instrumentation request. If applicable, the existence and availability of comparable instrumentation (e.g., at organizations in close geographical proximity, or otherwise accessible through collaborations or cyberinfrastructure) should be discussed and justification for the requested instrument should be made clear.

A proposal to develop an instrument must clearly explain how the planned research drives the needed instrument capabilities and make clear that those capabilities are not available through an instrument purchase. The proposal must succinctly present the design concept, the development strategy and project execution in sufficient detail to allow for the evaluation of the project's feasibility. Reviewers must be able to evaluate the expected capabilities of the instrument upon completion, and its likely availability for shared use at the end of the award period. If applicable, provide background results from existing equipment or appropriate calculations and/or models to indicate the expected added utility or enhanced performance to be achieved by the new instrument.

A proposal integrating components that when combined serve as a single research instrument must justify the request in the context of the MRI goal of providing support for individual research instruments, including requests that incorporate elements to reduce consumption of helium. The MRI Program does not typically fund common, general-purpose ancillary equipment that would normally be found in a laboratory and/or is relatively easily procured by the organization, nor does MRI support requests for multiple instruments.

Proposals involving large formalized collaborations (e.g., through a memorandum of understanding or other legal document) should include a one-page supplemental document from the collaboration describing the role, importance and priority of the requested instrument in the overall efforts being undertaken by the collaboration (see Section 9.b).

d. Broader Impacts (Including Impact on Research and Training Infrastructure). This section should provide a discussion of the broader impacts as a result of the acquisition or development of the instrument, including a description of how the instrument will serve to attract researchers and make a substantial improvement in the institution's capabilities to conduct leading-edge research. If appropriate, describe how the instrument will improve the quality of research training. Any proposal requesting direct student support in maintenance or development efforts must justify that involvement in terms of both project needs and the training of the next generation of instrumentalists (reviewers will be asked to evaluate the appropriateness of this type of involvement). Proposals should also address whether, and if so how well, the instrument will broaden the participation in science and engineering research by women, underrepresented minorities and persons with disabilities.

Institutional Commitment to Diversity and Inclusion - Using no more than one paragraph, describe indicators of institutional commitment to promoting diversity, equity, inclusion and accessibility (DEIA) within the awardee/subawardee institution(s). For example, if one or more institutional members of the project have a SEA Change Institutional Award (https://seachange.aaas.org/), the level of the award(s) could be provided; if an institution has or had an ADVANCE Institutional Transformation grant (https://beta.nsf.gov/funding/opportunities/advance-organizational-change-gender-equity-stem-academic-professions-advance), its impact could be summarized; if nothing similar applies, other institution-wide activities sponsored by the leadership of the institution could be described.

Note: Proposals requesting over $1.4 million (Track 2) should address the potential impact of the instrument on the research community of interest at the regional or national level. For large multi-user instruments that enable usage beyond a single institution, concrete plans for enabling access by external users (including those from non-Ph.D. and/or minority-serving institutions) through physical or virtual access should be presented, and the uniqueness of the requested instrument should also be described.

e. Management Plan (suggested length: up to 2 pages for instrument acquisition; up to 5 pages for instrument development). Given the often-high costs and complexities of operating, maintaining and scheduling major research instrumentation, investigators ***must*** provide detailed business/management plans. These should include:

For both instrument acquisition and development proposals.

- A description of the space or the facility in which the instrument will be placed.
- A description of how and by whom the requested instrumentation will be operated and maintained over the expected lifetime of the instrument. Inclusion of a letter documenting the performing organization's commitment to ensuring successful operations and maintenance over the expected lifetime of the instrument is required as a supplemental document. If the expertise is not currently available, describe how it will be obtained.
- A description of procedures for allocating the instrument time, if appropriate, and plans for attracting and supporting new users. Include information on anticipated usage and downtime.

Sufficient detail should be given to enable reviewers to evaluate whether the appropriate technical expertise and infrastructure to allow effective usage of the instrument will be available, and whether effective multi-user accessibility will be available.

For instrument development proposals only. Given the often-complex nature of instrument development efforts, investigators seeking development support ***must*** provide detailed information about project management of the design, construction and commissioning phases of the project, including discussion of the required personnel and anticipated costs in each phase of the project (including risk mitigation and knowledge transfer upon completion). Elements recommended for inclusion are:

- A description of the design, construction and commissioning phases of the project, including a high-level work breakdown structure for project activities. Include a description of parts and materials, deliverables and estimated

schedules and costs for each phase of the project as appropriate.

- A description of the technical expertise that is needed, and that will be available, to execute each project activity. As appropriate, describe the organization of the project team. For each member, include a description of the responsibilities and explain why a given position is necessary for the completion of the design and construction of the new instrument.
- An assessment of the risks associated with each activity and a description of potential methods for mitigating the risks, and of methods for re-analyzing and modifying the project plan to keep it within scope, schedule and budget.
- Plans for making the instrument design readily available to other researchers, for example by means of publications, by transferring the technology to other U.S. academic, industrial, or government laboratories, and/or by commercializing the instrument.

Sufficient detail should be provided to allow reviewers to analyze the likely success, cost and benefit of the development effort.

Note: Proposals for the acquisition or development of an instrument to be located at an organization other than, or away from, the submitting organization must describe the rationale for performance of all or part of the project at the specified location(s) and provide, if appropriate, a (one-page maximum) supplementary document providing the host organization's commitment to house the instrument. For the purposes of this solicitation, use of instruments at NSF's Antarctic facilities is considered to be field deployment and a supplementary document from the host facility is not required.

For helium-related requests only: MRI will accept requests that include the acquisition, development, installation, operation, and maintenance of equipment and instrumentation to reduce consumption of helium. Consistent with the goals of the MRI Program, support for such requests will be limited to equipment and instrumentation that serve shared-use research instrumentation. Such a request may be part of a Track 1 or Track 2 proposal (within the budgetary limits that apply to those tracks) or be requested separately as a "Track 3" proposal. ***Proposals in Track 1 and Track 2 that request support for an instrument that requires the use of helium must describe plans for the conservation, and/or recovery and reuse of helium; Plans to submit a separate Track 3 proposal are not sufficient for this purpose.*** Additionally,

- For all helium-related requests, current and/or anticipated helium expenses and use projections with and without recovery systems installed should be described in the proposal.
- For all helium-related acquisition requests, proposers should request a 36-month project duration, while development requests should request a 60-month project duration. These durations will allow time for reporting of impacts and efficiencies gained.
- For all helium-related requests, vendor quotations for helium conservation/recovery systems should be included in the "Other Supplementary Documents" section of the proposal.
- For all helium-related requests, current or planned shared-usage statistics and metrics should be provided in the proposal.
- For Track 3 proposals, the title of the proposal should begin with "MRI: Acquisition of Helium Recovery Equipment:" or "MRI: Development of helium Recovery Equipment:" Please note that if submitting via Research.gov, the system will automatically prepend the title with "Equipment".

2. Budget and Budget Justification. Provide standard yearly and cumulative budget pages as described in the PAPPG. For the purposes of this solicitation, the Total Project Cost is considered to be the amount requested from NSF (Line L). All budget items, including those for maintenance in acquisition proposals and personnel support in development proposals must be well-justified in the Budget Justification and commensurate with the scale and complexity of the instrument and/or development effort. The budget justification must explain the basis of the cost estimates, consistent with their allowability under the MRI solicitation. *Inclusion of voluntary committed cost sharing is prohibited.*

See Section V.B. for further budgetary information.

Budgets for Acquisition Proposals. **For acquisition proposals, at least 70% of the Total Project Cost must consist of items that can be included on the Equipment line of the NSF budget form (Line D).** Historically, the fraction of the Total Project Cost for MRI acquisition proposals devoted to equipment has been much higher than 70%, on average, and institutions are encouraged to continue to use acquisition awards for equipment and for the commissioning and maintenance required to keep that equipment operational during the MRI award period.

3. Facilities, Equipment, and Other Resources. Along with information as described in the PAPPG, provide a listing of similar and/or related instrumentation at or near the performing organization as "Other Resources."

4. Senior Personnel Documents.

a. Biographical Sketches. The proposal must include biographical sketches of the PI and any Co-PI(s) (i.e., those personnel listed on the Cover Sheet), as well as any designated Senior Personnel. Other individuals who will be minor users or developers of the relevant research instrumentation may be described in the Project Description but should not include a biographical sketch. If appropriate, a separate Biographical Sketch of the individual most responsible for the management of the instrument should be included in the Other Personnel Biographical Information section of Research.gov (or as a Supplementary Documenting Grants.gov) if that person is not a PI, Co-PI or among the Senior Personnel. *These are the only Biographical Sketches that are allowed.* The format for biographical sketches must follow standard PAPPG guidelines.

b. Current and Pending Support. Provide a listing for only the PI and Co-PIs (i.e., those listed on the cover sheet), as well as designated senior personnel.

c. Collaborators & Other Affiliations (COA) information specified in the PAPPG should be submitted using the instructions and spreadsheet template found at https://www.nsf.gov/bfa/dias/policy/coa.jsp.

5. Data Management Plan. *All* proposals must include in no more than two pages a "Data Management Plan". MRI provides for the acquisition or development of an instrument but does not support the research that is enabled. However, a plan for managing data that will be generated by the instrument is required so that users, as needed, can more easily meet NSF's data management requirements. Please see the PAPPG for further information.

6. Special Information & Supplementary Documentation. Combine all supplementary documents into a single PDF in the order of appearance indicated below, with the first page containing the included list of documents. Upload this PDF into the Other Supplementary Documents section of the proposal.

Required:

a. **For all proposals:** For each organization receiving funds, provide ***on institutional letterhead from each sponsored projects office***, the following statement classifying the organization(s) as either non-Ph.D.-granting, Ph.D.-granting, or non-degree-granting (as defined in Section IV). Statements ***must*** follow *only* the format indicated below.

To: NSF MRI Coordinator

By signing below I certify that _____(*organization*)_____ is classified as _____(*select one: non-Ph.D.-granting /Ph.D.-granting /non-degree-granting*)_____ as defined in Section IV of the MRI solicitation.

Signed: _____ Print Name:_____

Title of Signatory:_____

Date: _____

Each proposal must contain this statement(s). No other letter(s)/statement(s) classifying or describing the institution type(s) will be permitted.

b. **For all proposals:** Include a letter documenting the performing institution's commitment to ensuring successful operations and maintenance over the expected lifetime of the instrument. This letter (two-page maximum) must also list the MRI awards made to the organization with a start date in the previous five calendar years and briefly describe the status of the instrumentation obtained from each award.

c. **When applicable:** Proposals that include subawards (except for development proposals with subawards to institutions that do not exceed 20% of the total amount requested from NSF) must include a statement from each subawardee's sponsored projects office acknowledging that this proposal is included as part of the subawardee institution's submission limit. Otherwise, an organization may exceed its submission limit, *with the result that the proposal including the subaward may be returned without review*.

d. **When applicable:** If a proposed effort involves a private sector partner or other organization serving as a partner (*as opposed to an individual(s)*), or a large formalized collaboration (e.g., through a memorandum of understanding or other legal document), a letter (one page maximum) confirming their participation must be included. In particular, proposals involving large formalized collaborations are encouraged to have the collaboration utilize this letter to document the role, importance and priority of the requested instrument in the overall efforts being undertaken by the collaboration.

e. **When applicable:** Proposals for the acquisition or development of an instrument to be located at an organization other than the performing organization must provide a (one-page maximum) supplementary document stating the host organization's commitment to house the instrument. *For the purposes of this solicitation, use of instruments at NSF's Antarctic facilities is considered to be field deployment and a supplementary document from the host facility is not required.*

f. **For all proposals.** Inclusion of representative, itemized vendor quotes is required for all MRI proposals. Although a proposal might reference and have a quote(s) for a specific make and model, the proposer is reminded that his/her organization's approved procurement processes must be utilized in the event of an award, to establish the appropriate item(s) to be purchased and ensure that applicable procurement standards are utilized. (See 2 CFR 215.40-48 for guidance for institutions of higher education and other non-profit organizations).

g. **For all proposals.** As 1). a PDF file in the Supplementary Documents section, and 2). in a two-tab Excel spreadsheet (one tab for 6.g.a. and one tab for 6.g.b) and delivered by email as described in step 8, below, provide the following:

   a. List of all project personnel, organized alphabetically who have a role in the project. Use the following format: last name, first name, middle initial, institution/organization.

   b. If the proposal involves organizations other than the performing organization, include a separate list, in alphabetical order, of all institutions and organizations with which project personnel are affiliated. Designate for each an appropriate category: Institution of Higher Education, National Laboratory, Federal Government, Industry, Non-Governmental Organization, State/Local Government, or International organization.

Encouraged:

a. **For all proposals.** Statements from ***individuals***, on institutional letterhead, confirming *substantive* collaboration efforts and/or usage of the instrument may be submitted, but they ***must*** follow *only* the format indicated below. Note: Minor users of an instrument need not be included by name in the proposal nor need to provide statements of planned usage.

To: NSF MRI Coordinator

By signing below I acknowledge that I am listed as a collaborator and/or major user of the instrument on this MRI proposal, entitled "_____(*proposal title)*_____," with _____(*PI name)*_____ as the Principal Investigator. I agree to undertake the tasks assigned to me, as described in the proposal, and I commit to provide or make available the resources therein designated to me.

Signed: _____ Print Name:_____

Date: _____ Institution:_____

The proposal body itself should describe the nature and need for a collaboration, and/or describe the major users and their need for the instrument. Statements of collaboration beyond that specified above, including letters of support/endorsement, are not allowed. Each statement must be signed by the designated collaborator/user. PI requests to collaborators for these statements should be made well in advance of the proposal submission deadline since, if they are to be included, they must be included at the time of the proposal submission.

Not Allowed:

a. Statements of collaboration beyond that specified above, including letters of support/endorsement, are not allowed.

b. *Impact Statements and Eligibility Statements from the NSF "Facilitating Research at Primarily Undergraduate Institutions (RUI/ROA)" program are not allowed.* The certification statement indicating the type of performing organization, as defined by the MRI program, is instead required for all MRI proposals.

c. Documentation that refers to other proposals being submitted by an organization (e.g., letters indicating which projects were selected through an internal competition) is not allowed.

d. Other documentation not specifically required or encouraged above is not allowed.

7. Single Copy Documents.

Required:

a. The following information applies only for those MRI proposals that will be reviewed in the Office of Polar Programs: PIs proposing infrastructure intended for use in the Antarctic are required to consult with the NSF Office of Polar Programs (OPP) to discuss the timing and feasibility of their project. For projects requiring logistical support in the Arctic region, please consult with the NSF Arctic Research Support and Logistics (RSL) Program to discuss any support requirements (see: https://www.nsf.gov/geo/opp/arctic/res_log_sup.jsp). Documentation in the form of email correspondence must be provided as a Single Copy Document. Failure to do so may result in a proposal being returned without review.

Encouraged:

b. List of Suggested Reviewers. Proposers are encouraged to submit a list of suggested reviewers (including affiliation) whom they believe are especially well qualified to review the proposal as a "Single-Copy Document"; *this is especially encouraged for multi-/inter-/trans-disciplinary proposals.* Proposers may also list persons they would prefer not review the proposal, indicating why. Please see the PAPPG for additional information.

8. Required Information to be submitted to NSF via email. The proposer is required to send, by email, to MRImailbox@nsf.gov a spreadsheet containing the information in 6.g.a and 6.g.b in the form of an Excel two-tab spreadsheet. *The information must be sent immediately after the proposal is submitted.* The email subject line should be principal investigator's last name followed by the proposal number provided upon acceptance by NSF. The Excel spreadsheet should be named in the same manner (principal investigator's last name followed by the proposal number).

B. Budgetary Information

Cost Sharing:

Inclusion of voluntary committed cost sharing is prohibited.

Other Budgetary Limitations:

Eligible Project Costs

Funds requested from NSF must be used for eligible project costs, as described below.

The *Total Project Cost* should be based on the net price of the instrumentation, taking into account all academic discounts and other special purchase arrangements.

a. Acquisition proposals: Within the *Total Project Cost* (see Section V.A.6), eligible project costs are limited to the cost of the instrument, shipping, installation, commissioning, and calibration, the direct and indirect costs of maintenance, and of appropriate technical support (including training) to operate the instrument during the award period. They should be commensurate with the scale and scope of the instrumentation. Salary support, including fringe benefits and indirect costs, is considered an eligible cost *only* for personnel directly involved in maintaining the instrument or providing appropriate technical support to operate the instrument. Any proposal including students or post-doctoral associates in operations and maintenance should justify the involvement in terms of both instrument needs and the training the next generation of instrumentalists; reviewers will be asked to evaluate the appropriateness of this type of involvement. Travel costs associated with training for operations and maintenance may be an eligible expense but must be well-justified. Publication costs are *not* eligible costs for acquisition proposals. MRI support for research, research training, or education/outreach to be conducted using the instrument *after* commissioning is also not allowed.

For acquisition proposals, at least 70% of the Total Project Cost must consist of items that can be included on the Equipment line of the NSF budget form (Line D).

b. Development proposals: Within the *Total Project Cost* (see Section V.A.6), eligible project costs are limited to parts and materials needed for the construction of the instrument, commissioning costs, and the direct and indirect costs associated with support of personnel engaged strictly in the instrument development effort. Requests for personnel support must include a description of the responsibilities of the individuals involved and explain why a given position is necessary for the completion of the design, construction and commissioning of the new instrument. Any proposal requesting direct student support in development efforts must justify the involvement in terms of both project needs and training the next generation of instrumentalists; reviewers will be asked to evaluate the appropriateness of this type of involvement. Sufficient detail should be given to allow reviewers to analyze the costs and risks of the new instrument. Travel costs that are integral to the development work are eligible expenses. For development proposals, publication costs associated with the dissemination of information about the design and capabilities of the instrument are eligible costs. Support for research, research training, or education to be conducted using the instrument *after* commissioning, along with operations and maintenance, is not allowed.

Note: A Data Management Plan is required for MRI proposals. The intent is to ensure that MRI awards facilitate NSF policy on the dissemination and sharing of research results by NSF-funded researchers who are expected to share with other researchers, at no more than incremental cost and within a reasonable amount of time, the primary data, samples, physical collections, software, curriculum materials, and other supporting materials created or gathered in the course of work under NSF grants. As a result MRI budgets may include incremental costs associated with the implementation of this plan.

Proposals must meet administrative and technical requirements to be accepted for the MRI competition. The following are some key reasons for Return without Review:

- Proposals that exceed an organization's submission limit (Section IV).
- Proposals with budgets requests that fall outside of allowable MRI limits (Section I).
- Proposals that do not contain, as supplemental documents, a signed statement from each sponsored projects office (including subawardees) classifying the performing organization as either non-Ph.D.-granting, Ph.D.-granting, or non-degree-granting; see Section IV for definitions of organization type as used by the MRI program.
- Proposals describing activities that fall outside of the scope of those supported by the MRI program (Section II).
- Proposals describing activities that fall outside of the scope of those supported by NSF (Section II).
- Proposals that do not conform to font, margin and page limitations.
- Proposals that do not contain an Overview and separate statements on Intellectual Merit and Broader Impacts in the Project Summary, or a section on Broader Impacts in the Project Description.
- Applicable proposals that do not clearly justify submission as development proposals.
- Proposals that do not contain a Management Plan in the Project Description (Section V.A).
- Proposals that do not contain "Results from Prior MRI Support" or (if there is no Prior MRI Support) results from other NSF support in the Project Description (Section V.A). Both the Intellectual Merits and Broader Impacts must be addressed.
- Proposals requesting funding to support postdoctoral researchers that do not include a Mentoring Plan describing activities that will be provided for such individuals. The Mentoring Plan must not exceed one page.
- Applicable proposals to place an instrument at a facility of another Federal agency or one of their FFRDCs that are not submitted by consortia (Section IV).
- Applicable proposals for instruments that augment the scope of an NSF Major Research Equipment and Facilities Construction (MREFC) project that is not receiving operations funding outside of the MREFC account (Section IV).
- Proposals that do not contain required supplemental documentation, or that contain supplemental documentation other than those required and/or encouraged by the MRI program (as prescribed in Section V.A).

C. Due Dates

- **Submission Window Date(s)** (due by 5 p.m. submitter's local time):

  January 16, 2023 - February 21, 2023

  October 16, 2023 - November 15, 2023

  October 15, 2024 - November 15, 2024

  October 15, 2025 - November 14, 2025

  October 15, 2026 - November 16, 2026

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/ProposalPreparationa
For Research.gov user support, call the Research.gov Help Desk at 1-800-673-6188 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.

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

Within the evaluation criteria stated above, reviewers will assess the following:

All Proposals:

- The extent to which the proposed project will make a substantial improvement in the organization's capabilities to conduct leading-edge research, to provide research experiences for undergraduate students using leading-edge capabilities, and to broaden the participation in science and engineering research (especially as lead PIs) by women, underrepresented minorities, persons with disabilities and/or early-career investigators.

Instrument Acquisition Proposals:

- The extent to which the instrument is used for multi-user, shared-use research and/or research training.

- Whether the management plan demonstrates sufficient commitment and technical expertise for effective scheduling and usage of the instrument.
- The organization's commitment to ensuring successful operations and maintenance over the expected lifetime of the instrument.
- Whether the research to be enabled is compelling and justifies the instrument request.
- Whether the budget request is appropriate and well justified.
- if student involvement is in the form of direct support for operations and maintenance of the instrument, reviewers will be asked to evaluate the involvement in terms of both instrument needs and the training of the next generation of instrumentalists.
- For instrument acquisition proposals of $1.4 million or above (Track 2), the potential impact of the instrument on the research community of interest at the regional or national level, if appropriate.

Instrument Development Proposals:

- The appropriateness of submission as a development proposal.
- The need for development of a new instrument. Will the proposed instrument enable enhanced performance over existing instruments, or new types of measurement or information gathering? Is there a strong need for the new instrument in the larger user community to advance new frontiers of research?
- The adequacy of the project's management plan. Does the plan have a realistic schedule that is described in sufficient detail to be assessed? Are mechanisms described to mitigate and deal with potential risks?
- The availability of appropriate technical expertise to design and construct the instrument. If direct support for student involvement in development efforts is requested, reviewers will be asked to evaluate the involvement in terms of both project needs and training the next generation of instrumentalists.
- The appropriateness of the cost of the new technology.

Note: The reviewing Program(s), at their discretion, may request additional technical and/or managerial review/information as part of the merit review process.

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 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.

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.

The following topics should be addressed in all MRI annual and final project reports:

For Instrument Acquisition Proposals:

- Status of order, delivery, and installation;
- Brief description of research projects that were enabled by the instrument;
- Number of students with hands-on experience, to include demographic information (indicate undergraduate or graduate, gender, ethnicity/race, disability, major). Note: provide percentages for demographic data; do NOT identify specific students by ethnicity, race or disability status;
- A list of the research groups granted access and the titles of the research and institutional affiliation, to include both on-campus and outside users;
- Data on usage and downtime;
- A short description of the management plan, noting deviations from the plan as described in the proposal;
- Description of setbacks and resulting change of plans; and
- Information on broader impacts activities to date.

For Instrument Development Proposals:

- Status of development effort to date;
- Number of student participants, to include demographic information (indicate undergraduate or graduate, gender, ethnicity/race, disability, major). Note: provide percentages for demographic data; do NOT identify specific students by ethnicity, race or disability status;
- Information on broader impacts activities to date;
- New industrial partnerships;
- Technology transfer (e.g., design and/or instrument);
- A short description of the management plan, noting deviations from the plan as described in the proposal;
- Description of setbacks and resulting change of plans; and
- Modifications in timeline.

For helium-related Proposals:

- Current and anticipated helium expenses and use projections with and without recovery systems installed, including impacts and efficiencies gained;
- The volume and price of helium purchased;
- Changes in pricing and availability of helium;
- Any supply disruptions impacting the availability of helium.

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:

- Randy L. Phelps, Staff Associate, telephone: (703) 292-5049, email: mri@nsf.gov
- Jonathan Friedman, Program Director, telephone: (703) 292-7475, email: mri@nsf.gov

For questions related to the use of NSF systems contact:

- NSF Help Desk: 1-800-673-6188
- 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.

Primary Contacts

Randy L. Phelps	OD/OIA	(703) 292-5049	mri@nsf.gov
Jonathan Friedman	OD/OIA	(703) 292-7475	mri@nsf.gov

Additional MRI Program Contacts

BIO	DBI	De Belle, Steven	jcdebell@nsf.gov
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GEO	EAR	Frassetto, Andy	afrasset@nsf.gov
GEO	OCE	Binkley, Kandace S.	kbinkley@nsf.gov
GEO	OPP	Rack, Frank R.	frack@nsf.gov
MPS	AST	Peck, Alison	apeck@nsf.gov
MPS	CHE	Whitmer, Tanya	twhitmer@nsf.gov
MPS	CHE	Greenlief, Michael	mgreenli@nsf.gov
MPS	DMR	Omar Diallo, Souleymane	somardia@nsf.gov
MPS	DMR	Tessema, Guebre	gtessema@nsf.gov
MPS	DMR	Ying, Charles	CYING@nsf.gov
MPS	DMS	Bartoszynski, Tomek	tbartosz@nsf.gov
MPS	PHY	McCloud, Kathy	kmccloud@nsf.gov
SBE	BCS	Yellen, John E.	jyellen@nsf.gov

General information for the MRI Program is available as follows:

Office of Integrative Activities (OIA)
Major Research Instrumentation Program
National Science Foundation
2415 Eisenhower Ave.
Alexandria, VA 22314

E-Mail: mri@nsf.gov

OIA MRI Website: https://www.nsf.gov/od/oia/programs/mri

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.

OTHER NSF PROGRAMS RELATED TO RESEARCH INSTRUMENTATION (*current at the time of publication)*

CROSSCUTTING: Improvements in Facilities, Communications, and Equipment at Biological Field Stations and Marine Laboratories (FSML)

CROSSCUTTING: High Performance Computing System Acquisition: Continuing the Building of a More Inclusive Computing Environment for Science and Engineering

CISE/CNS: CISE Community Research Infrastructure (CCRI)

GEO/EAR: Earth Sciences: Instrumentation and Facilities (EAR/IF)

GEO/OCE: Oceanographic Facilities and Equipment Support

GEO/OCE: Oceanographic Technology and Interdisciplinary Coordination Program (OTIC)

MPS/AST: Mid-Scale Innovations Program (MSIP)

MPS/CHE: Chemical Measurement and Imaging (CMI)

MPS/DMR: Materials Innovation Platforms (MIP)

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** (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) 292-8134
- **To Locate NSF Employees:** (703) 292-5111

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