

Major Research Instrumentation (MRI) for Riverside Hall Structural Laboratory (Key Area 3: STEM Equipment and Infrastructure)

Abstract

Major instrumentation improvements to the CSUS structural testing laboratory are proposed which will significantly increase the research capacity of the lab while also benefiting the pedagogical presentation of the undergraduate structures lab class. The proposed hardware improvements complement the existing laboratory infrastructure with the objective to solidify the status of CSUS as a leader in state-of-the-art structural testing capabilities in the Northern California region. Advanced presentation, video-conference and instructional equipment will also be requested in the NSF-MRI proposal to allow for remote experimental viewing and participation capabilities with the dual purpose to assist undergraduate classroom discussions and presentations.

Scope and Objectives

The hallmark of the CSUS structural engineering testing facility is a 2200 square foot strong floor with accompanying 15 foot tall strong walls. The strong floor and walls are outfitted with tie down plates on a 3 foot grid which serves as connection points for experimental structural specimens. This system provides strong and stiff boundary conditions needed to test steel and concrete structures to failure. The applied forces are generated with hydraulic actuators controlled through a computational user interface while strains, displacements and forces are recorded with a separate data acquisition system. Thus, the size (or scale) of the experiments are limited by the strong floor/wall space, the capacity of the hydraulic actuators, and to some extent, the ability to measure and record the experimental results. At this time, upgrades to the existing laboratory space are not necessary, but the lab could be considerably improved by upgrading various pieces of testing equipment.

In this light, there is a prodigious opportunity to increase the versatility of the structural laboratory by investing in more advanced hydraulic actuators, testing apparatuses, and data acquisition equipment. Upgrades to structural testing equipment entail increasing the force, displacement and rate capacity of actuators, as well as the control system between the actuator and the user PC. Moreover, due to the interactive nature of the undergraduate structures laboratory class (CE113), the course is amenable to technologically advanced presentation methods such as a SMART Board and computer output monitors in various regions of the laboratory. This technology will also serve the dual purpose of increasing the communication ability of remote collaborators during research experiments at CSUS.

Finally, one focus of the author's research is large-scale finite element modeling of structural steel components during extreme loading (e.g., earthquake). For practical research applications, finite element models necessitate exact material calibration from small-scale tension and compression testing. Combined with this is a recent focus within NSF for multi-hazard research (i.e., earthquake loading followed by fire conditions) programs which investigate combined effects on structural systems. Thus, testing equipment for this type of research (to be located in the structures lab) will also be included in the MRI proposal to NSF. A tentative list of equipment is provided below totaling between \$400,000 and \$450,000.

- Large-scale MTS actuator
- SMART Board system, flat panel displays, video-conference and laboratory classroom upgrade
- New hydraulic accumulator system
- Servo-valve upgrades to existing actuators
- Material calibration MTS testing frame

- High-temperature MTS grips (-50°F to 350°F)
- High-temperature furnace
- High-temperature MTS extensometer with calibration
- MTS extensometer with calibration
- MTS clip-on gage with calibration
- Misc. measurement devices (accelerometers, LVDTs, thermocouples)

Anticipated Benefits to CSUS STEM Activities

The equipment listed above will significantly enhance the research capabilities of the structural testing laboratory at CSUS while directly benefiting the undergraduate lab curriculum. The classroom upgrade for the structures lab will have a dramatic affect on the presentation and discussion of difficult concepts which students struggle with during the class.

Funding Agency

National Science Foundation (NSF) Major Research Instrumentation (MRI) program; due date is mid to late January (see attached 2008 solicitation. Thus, the author requests release time (3 units) during the Fall 2009 semester to assemble the numerous quotes from venders and prepare the NSF project description.

Anticipated Support (Other Agencies): None

Major Research Instrumentation Program (MRI)

PROGRAM SOLICITATION NSF 09-502

REPLACES DOCUMENT(S):
NSF 08-503



National Science Foundation

Office of the Director
Office of Integrative Activities

Directorate for Biological Sciences

Directorate for Computer & Information Science & Engineering

Directorate for Education & Human Resources

Directorate for Engineering

Directorate for Geosciences

Directorate for Mathematical & Physical Sciences

Directorate for Social, Behavioral & Economic Sciences

Office of Polar Programs

Office of Cyberinfrastructure

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

January 22, 2009

Fourth Thursday in January, Annually Thereafter

REVISION NOTES

A revised version of the *NSF Proposal & Award Policies & Procedures Guide (PAPPG) NSF 09-1* was issued on October 1 2008 and is effective for proposals submitted on or after January 5 2009. Please be advised that the guidelines contained in *NSF 09-1* apply to proposals submitted in response to this funding opportunity. Proposers who opt to submit prior to January 5th 2009 must also follow the guidelines contained in *NSF 09-1*.

One of the most significant changes to the PAPPG is implementation of the mentoring provisions of the America COMPETES Act. Each proposal that requests funding to support postdoctoral researchers must include as a separate section within the 15-page project description a description of the mentoring activities that will be provided for such individuals. Proposals that do not include a separate section on mentoring activities within the Project Description will be returned without review (see the PAPP Guide Part I: *Grant Proposal Guide* Chapter II.C.2.d for further information).

There have been a number of clarifications and updates, including the following:

- A list of common issues that may result in a proposal being **Returned without Review** has been added (see below). PIs are encouraged to look at this section carefully;
- A revised checklist has been incorporated to highlight issues that are frequently encountered with MRI submissions (Section V.B). PIs are encouraged to check this list carefully;
- A specific template has been provided that *must* be used when including statements of collaboration (Section V.A). Statements of collaboration beyond that specified, including letters of support/endorsement are not allowed and will be removed;
- Letters of Intent are no longer required (previously required for requests over \$2 million).
- Clarification of the definition of a "consortium" has been added, as has clarification on the role of consortia in placing equipment at a facility of another Federal agency or one of their Federally Funded Research and Development Centers, or FFRDCs (Section IV);
- Clarification on the scope of the MRI program, in particular elements of a project that the MRI Program will not support, has been added (Section II);
- Ph.D. granting institutions of higher education^[1] and non-degree granting organizations continue to be required to provide 30 percent cost-sharing. Effective FY 2009, cost-sharing for both acquisition **and** development proposals will be calculated

based on the total proposal project costs (Section V.B);

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

- Proposals describing activities that fall outside of the scope of those supported by the MRI program (Section II.A);
- Proposals describing activities that fall outside of the scope of those supported by NSF (Section II.B);
- Proposals that exceed an organization's submission limit (Section IV);
- Applicable proposals that do not adequately distinguish development efforts from acquisition or basic research efforts (Section II.A);
- Proposals that represent standard research projects that are appropriate for submission to regular NSF grants programs at NSF (Section II.A);
- 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);
- Proposals to place an instrument at a facility currently receiving funding through the NSF Major Research Equipment and Facilities Construction (MREFC) account (Section IV);
- Applicable proposals that do not indicate appropriate levels of cost-sharing (Line M of the budget in Fastlane), **and** that do not contain required documentation demonstrating organizational commitment (Sections V.A and V.B);
- 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) and by the Grant Proposal Guide (GPG);
- Proposals that do not conform to font, margin and page limitations;
- Proposals that do not separately address the Intellectual Merit and Broader Impacts review criteria in the Project Summary;
- Proposals that do not contain a Management Plan in the Project Description (Section V.A);
- Applicable proposals that do not contain Results from Prior MRI Support in the Project Description (Section V.A).

[1] Unless otherwise specified, the term "organization" refers to all categories of proposers. Universities and two- and four-year colleges (including community colleges) are also referred to as institutions of higher education.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Major Research Instrumentation Program (MRI)
Instrument Development and Acquisition

Synopsis of Program:

The Major Research Instrumentation Program (MRI) serves to increase access to shared scientific and engineering instruments for research and research training in our Nation's institutions of higher education, museums and science centers, and non-profit organizations. This program especially seeks to improve the quality and expand the scope of research and research training in science and engineering, by providing shared instrumentation that fosters the integration of research and education in research-intensive learning environments. Development and acquisition of research instrumentation for shared inter- and/or intra-organization use is encouraged, as are development efforts that leverage the strengths of private sector partners as appropriate for the goals of the MRI Program.

To accomplish these goals, the MRI program assists with the acquisition or development of shared research instrumentation that is, in general, too costly and/or not appropriate for support through other NSF programs. For the purposes of the MRI Program, proposals must be for *either* acquisition *or* development. Instruments are expected to be operational for regular research use by the end of the award period. A key recommendation of a 2006 National Academies report on "Advanced Research Instrumentation and Facilities" (ARIF) was that the NSF should expand the MRI program so that it includes "mid-scale" instrumentation whose capital costs are greater than \$2 million, but with costs that are not appropriate for NSF's Major Research Equipment and Facilities Construction account. The MRI program now accepts proposals requesting over \$2 million in NSF support (to the maximum request of \$4 million) for the **acquisition** of a **single** instrument. For proposals requesting \$2 million or less, investigators may seek support for instrument development or for acquisition of a single instrument, a large system of instruments, or multiple instruments that share a common or specific research focus.

Cognizant Program Officer(s):

- Randy Phelps, Staff Associate, telephone: (703) 292-8040, email: rphelps@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 --- Education and Human Resources
- 47.078 --- Office of Polar Programs
- 47.079 --- Office of International Science and Engineering
- 47.080 --- Office of Cyberinfrastructure

Award Information

Anticipated Type of Award: Standard Grant

Estimated Number of Awards: 235 including up to 8 "mid-scale" awards.

Anticipated Funding Amount: \$115,000,000 (Proposals submitted in response to this program solicitation will be competing for about \$115 million, pending availability of funds, in Fiscal Year 2009. Up to \$20 million of these funds will be available for the acquisition of single instruments costing between \$2 million - \$4 million, i.e., "mid-scale" instrumentation.)

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- See instructions on Proposal Limits and Additional Eligibility Information

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

Three (3) as described below.

1. To provide a balanced instrumentation award portfolio at diverse organizations, across varied research topics, and that serves to train and support a broadly inclusive science and engineering workforce across the entire nation, the MRI program requires that an organization may submit or be included as a funded subawardee/subcontractor[2] in no more than three MRI proposals. No more than two proposal submissions may be for instrument acquisition.
2. To promote instrumentation development, the MRI program continues to require that if an organization submits or is included as a funded subawardee/subcontractor in three MRI proposals, at least one of the three proposals must be for instrument development. NSF reserves the right to carefully examine development proposals to ensure that they meet the requirements for this proposal type (Section II), and that submission limits have not been exceeded.

Note: For the purposes of the MRI Program, proposals must be for either acquisition or development. Please see Section II: Program Description, for information on characteristics of acquisition and development proposals.

[2] An unfunded collaboration does not count against the submission limit.

Limit on Number of Proposals per PI:

None Specified

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Preliminary Proposal Submission:** Not Applicable
- **Full Proposal Preparation Instructions:** This solicitation contains information that supplements the standard NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full text of this solicitation for further information

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is Specialized. Please see the full text of this solicitation for further information.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full text of this solicitation for further information.

C. Due Dates

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

January 22, 2009

Proposal Review Information Criteria

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

Award Administration Information

Award Conditions: Standard NSF award conditions apply.

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

TABLE OF CONTENTS

Summary of Program Requirements

- I. Introduction
- II. Program Description
- III. Award Information
- IV. Eligibility Information
- V. Proposal Preparation and Submission Instructions
 - A. Proposal Preparation Instructions
 - B. Budgetary Information
 - C. Due Dates
 - D. FastLane Requirements
- VI. NSF Proposal Processing and Review Procedures
 - A. NSF Merit Review Criteria
 - B. Review and Selection Process
- VII. Award Administration Information
 - A. Notification of the Award
 - B. Award Conditions
 - C. Reporting Requirements
- VIII. Agency Contacts
- IX. Other Information

I. INTRODUCTION

A. Program Goals

The Major Research Instrumentation (MRI) Program serves to increase access to shared scientific and engineering instruments for research and research training in our Nation's institutions of higher education, museums and science centers, and not-for-profit organizations. This program especially seeks to improve the quality and expand the scope of research and research training in science and engineering, by providing shared instrumentation that fosters the integration of research and education in research-intensive learning environments. Development and acquisition of research instrumentation for shared inter- and/or intra-organization use is encouraged, as are development efforts that leverage the strengths of private sector partners as appropriate to the goals of the MRI Program. The MRI Program is intended to assist with the acquisition or development of research instrumentation that is, in general, too costly and/or not appropriate for support through other NSF programs. Instruments are expected to be operational for regular research use by the end of the award period.

B. Recent History

In 2006, the National Academy of Sciences Committee on Advanced Research Instrumentation released a study, entitled "Advanced Research Instrumentation and Facilities (ARIF)" (http://books.nap.edu/catalog.php?record_id=11520), assessing the needs among academic and national laboratory researchers for mid-scale instrumentation, and exploring how the federal funding agencies could best meet these needs. One key recommendation was that NSF should increase the limit on the MRI Program in order to support the acquisition of instrumentation with capital costs greater than \$2 million but less than that appropriate for NSF's Major Research Equipment and Facilities Construction account. The America COMPETES Act of 2007 directs NSF to increase the award limit for MRI to \$4 million, and beginning in FY 2008, NSF increased the limit to \$4 million on MRI proposals for the **acquisition of single instruments**.

The same ARIF report noted a decline in instrumentation development efforts in academic settings. To foster these types of efforts, NSF continues to require that if an organization submits or is included as a funded

subawardee/subcontractor[2] in three MRI proposals, at least one of the three proposals must be for instrument development.

The America COMPETES Act of 2007 also directs NSF to require cost sharing in the MRI Program. Therefore, effective FY 2008, NSF began requiring (and continues to require) cost sharing on all MRI proposals, for both acquisition and development, from Ph.D.-granting institutions of higher education and non-degree granting organizations. No waivers will be allowed. NSF does not require cost sharing from non-Ph.D. granting institutions of higher education.

II. PROGRAM DESCRIPTION

A. General Information

1. MRI Program Purpose and Goals

The primary purpose of the MRI program is to facilitate scientific and engineering research and research training through the acquisition or development of research instrumentation. Therefore, the MRI program will not support the acquisition or development of instrumentation used primarily for standard science and engineering courses, or for general purpose instrumentation that does not have a common or specific research focus. Other uses of the instrumentation may serve to facilitate the broader impacts of the project.

Proposals to the MRI program should conform to one or more of its goals:

- Supporting the acquisition of major state-of-the-art instrumentation, thereby improving access to, and increased use of, modern research and research training instrumentation by scientists, engineers, and graduate and undergraduate students;
- Fostering the development of the next generation of instrumentation, resulting in new instruments that are more widely used, and/or open up new areas of research and research training;
- Enabling academic departments, disciplinary and cross-disciplinary units, and multi-organization collaborations to create well-equipped research environments that integrate research with education;
- Supporting the acquisition and development of instrumentation that contributes to, or takes advantage of, existing investments in cyberinfrastructure, while avoiding duplication of services already provisioned by NSF investments. Please consult the NSF document, "Cyberinfrastructure Vision for the 21st Century" (<http://www.nsf.gov/pubs/2007/nsf0728/index.jsp>) for further information;
- Promoting substantive and meaningful partnerships for instrument development between the academic and private sectors. Such partnerships have the potential to build capacity for instrument development in academic settings and to create new products with wide scientific and commercial impact.

2. MRI Program Scope

The MRI program assists in the acquisition or development of major research instrumentation that is, in general, too costly or not appropriate for support through other NSF programs. For the purposes of the MRI Program, proposals must be either for **acquisition** or **development**.

The MRI program will NOT support proposal requests for:

- General purpose equipment, including general purpose computers or assorted instruments that do not share a common or specific research or research training focus;
- Instrumentation used primarily for standard science and engineering courses. Other programs at NSF (e.g., the Course, Curriculum, and Laboratory Improvement program) provide funding for the development of exemplary courses and teaching practices, including instrumentation to support such projects;
- Renovation or modernization of research facilities, supporting equipment, and general purpose platforms. The term "research facilities" refers to the bricks-and-mortar physical plant in which sponsored or unsponsored research activities (including research training) takes place, including routine sustaining infrastructure (e.g., standard electrical and plumbing systems, standard computer networks, standard safety features), general purpose systems (e.g., HVAC and power systems, toxic waste removal systems, telecommunications equipment), and supporting equipment. The term "supporting equipment" refers to basic, durable components of a research facility that are integral to its operation (e.g., clean rooms, fume hoods, elevators, laboratory casework). The term "general purpose platform" refers to major fixed or non-fixed structures, vehicles, and/or environments that host an instrument, but do not otherwise contribute directly to data gathering.

Proposals requesting support that falls into these categories are considered to be inappropriate for the MRI program.

a. Instrument Acquisition

The academic research enterprise relies on the availability of modern instrumentation, much of which can be acquired with little/no modification from existing sources. MRI acquisition proposals are characterized by a demonstrated need for the purchase or upgrade of generally available, yet sophisticated, instruments with little or no modification for shared use among a group of researchers. Acquisition proposals

requesting \$2 million or less may be for a single instrument, a large system of instruments, or multiple instruments that share a common or specific research focus. The MRI program will consider requests for larger "mid-scale" (greater than \$2 million and less than or equal to \$4 million) proposals for the **acquisition of *single instruments only***.

Acquisition proposals must meet these guidelines to be considered for the MRI program.

b. Instrument Development

The academic research enterprise relies on new generations of sophisticated research instrumentation and NSF encourages individual investigators, and teams of researchers, to apply for instrument development support. Development proposals are characterized by a demonstrated need for new or upgraded instruments that can provide enhanced or potentially transformative use and performance, open up new areas of research and research training, and/or have potential as commercial products. "Performance" may include 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. Development of instrumentation that takes advantage of new opportunities enabled by investments in cyberinfrastructure is encouraged. Development proposals must describe the added performance of the new instrument and the expected impact on the broader research community. The MRI Program does not consider the acquisition of individual pieces of equipment simply combined in a new system, the mere purchase of an upgrade, or the development of enabling technologies, devices or products to constitute instrument development. The maximum request for instrument development remains at \$2 million.

Development proposals must meet these guidelines to be considered for the MRI program. NSF reserves the right to carefully examine development proposals to ensure that submission limits have not been exceeded, and that the proposed development program is not a standard research project that would otherwise be reviewed in the individual investigator programs.

B. Eligible Fields of Science and Engineering

Proposals for instrumentation will be considered for NSF-supported fields of science, mathematics, and engineering. Researchers using this instrumentation need not be supported by NSF or the Federal government.

The program will 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 Bioengineering research to aid persons with disabilities also is eligible.

III. AWARD INFORMATION

Proposals submitted in response to this program solicitation will be competing for about \$115 million in Fiscal Year 2009; up to \$20 million of these funds will be available for "mid-scale" instrument acquisition, pending availability of funds.

The maximum request is \$4 million for acquisition proposals or \$2 million for development proposals. Acquisition proposals over \$2 million must be for single instruments only. The minimum request is \$100,000; proposals requesting less than that will be considered only from non-Ph.D. granting institutions of higher education or from the disciplines of mathematical science or social, behavioral, and economic science at any eligible organization.

Proposers may request an award period up to three years for acquisition proposals and up to five years for development proposals. The anticipated earliest starting date is August 1st after submission.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- See instructions on Proposal Limits and Additional Eligibility Information

PI Limit:

None Specified

Limit on Number of Proposals per Organization:

Three (3) as described below.

1. To provide a balanced instrumentation award portfolio at diverse organizations, across varied research topics, and that serves to train and support a broadly inclusive science and engineering workforce across

the entire nation, the MRI program requires that an organization may submit or be included as a funded subawardee/subcontractor[2] in no more than three MRI proposals. No more than two proposal submissions may be for instrument acquisition.

2. To promote instrumentation development, the MRI program continues to require that if an organization submits or is included as a funded subawardee/subcontractor in three MRI proposals, at least one of the three proposals must be for instrument development. NSF reserves the right to carefully examine development proposals to ensure that they meet the requirements for this proposal type (Section II), and that submission limits have not been exceeded.

Note: For the purposes of the MRI Program, proposals must be for either acquisition or development. Please see Section II: Program Description, for information on characteristics of acquisition and development proposals.

[2] An unfunded collaboration does not count against the submission limit.

Limit on Number of Proposals per PI:

None Specified

Additional Eligibility Info:

Organizations that are eligible to submit proposals to NSF's MRI Program ("submission-eligible organizations") are divided into three categories: Ph.D. granting institutions of higher education, non-Ph.D. granting institutions of higher education, and non-degree granting organizations. For the purposes of the MRI program:

1. Ph.D. granting institutions of higher education are academic institutions that have produced more than 20 Ph.D.s or D.Sci.s in all NSF-supported fields of science, mathematics or engineering during the combined previous two academic years (please review NSF's Guide to Programs for NSF supported fields of science, mathematics and engineering: http://www.nsf.gov/funding/browse_all_funding.jsp).
2. Non-Ph.D. granting institutions of higher education (i.e., primarily bachelor and/or master degree granting academic institutions) are two- and four- year colleges and universities that have produced 20 or fewer Ph.D.s or D.Sci.s in all NSF-supported fields of science, mathematics, and engineering during the combined previous two academic years.
3. Non-degree granting organizations are independent not-for-profit organizations, museums and science centers, or consortia of organizations working in NSF-supported fields of science, mathematics, and engineering.

MRI proposals may be submitted by the following:

1. US colleges, universities and institutions of higher education located in the US, its territories and 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 institutions.
2. US independent museums and science centers located in the US, its territories and possessions. (These organizations must have an *independent* administrative structure, e.g., an office of sponsored research.)
3. US independent not-for-profit organizations located in the US, its territories and possessions. (Such an organization must have an *independent* administrative structure, e.g., an office of sponsored research, and have 501(c)(3) tax status).
4. To facilitate access to unique instrumentation for a broad user base, and to encourage collaboration and sharing of instrumentation, the MRI program has historically accepted proposals from consortia of organizations. MRI consortium proposals may be submitted as follows:
 - 4a. Legally incorporated not-for-profit consortia consisting of submission-eligible members may submit proposals on behalf of the consortium. Such a consortium is one with an independent administrative structure, e.g., an office of sponsored research, and 501(c)(3) status.
 - 4b. Other consortia may submit MRI proposals through a submission-eligible consortium member as described in items (1), (2) and (3) above. The cover sheet must clearly indicate the consortium nature of the proposal in the title, and it must identify a PI and co-PI(s) from at least 2 submission-eligible consortium organizations (i.e., for a consortium acquisition proposal, employees from 2 or more submission-eligible organizations must be identified as primary users; for a consortium development proposal, employees from 2 or more submission-eligible organizations must be active participants in the development effort). These proposals may also include partners that are not otherwise eligible to submit MRI proposals (e.g., government labs and US small businesses located in the US, its territories and possessions).
 - 4c. The MRI program accepts proposals for instrumentation to be located at a facility of another Federal agency or one of their Federally Funded Research and Development Centers (FFRDCs), **but only** through a submission-eligible organization as a consortium proposal that includes the facility/FFRDC as a non-lead partner. Such instruments must make unique contributions to the needs of researchers elsewhere or establish access to new multi-user facilities. The current list of FFRDCs can be found at: <http://www.nsf.gov/statistics/nsf05306/>. Note: The MRI Program will not accept proposals to place instruments at facilities receiving funding through the NSF Major Research Equipment and Facilities Construction (MREFC) account.
5. US small businesses located in the US, its territories and possessions are eligible for instrument development support as private sector partners with submitting organizations; they may not submit proposals as a lead organization.

Prospective PIs may contact the cognizant MRI program officer regarding questions relating to 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

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Instructions: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the guidelines specified in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-PUBS (7827) or by e-mail from pubs@nsf.gov.

___1. Cover Sheet:

Select this program solicitation number from the pull down list. Where asked to identify the NSF Unit of Consideration, select the most appropriate Division within an NSF Directorate or the most appropriate Office to consider your proposal. "Major Research Instrumentation" will be automatically selected as the program for your proposal. Selection of more than one unit for consideration is encouraged for multi-/cross-/trans-disciplinary efforts (PIs are especially encouraged to submit a list of suggested reviewers, as a **Single-Copy Document**, for these types of proposals – see the GPG for additional information).

The project title must convey the primary purpose of the proposal, e.g., "MRI: Acquisition of ___", or "MRI: Development of ___". Consortium project titles must also be identified in the title: "MRI-Consortium: Acquisition of ___", or "MRI-Consortium: Development of ___".

NSF applications identify only a single PI and up to four co-PIs with those titles. For the purposes of the MRI program any other major participants may be indicated as "senior personnel", and they should be listed in the Proposal Budget, even if receiving no support.

___2. **Project Summary** (maximum length, 1 page). Describe the proposed major research instrumentation, the type of research and/or research training it will enable, and the activities that would result if NSF funds the project. Proposals that do not **separately** address both merit review criteria (**intellectual merit and broader impacts**) within the one-page Project Summary will be returned without review.

___3. **Project Description** (maximum length, 15 pages, including all figures and charts). *The project description must include subsections (a)-(d), and address the intellectual merits and broader impacts of the proposed effort.* Suggested lengths for individual subsections are provided for guidance only.

a. **Research Activities** (suggested length: 9 pages for instrument acquisition; 4 pages for instrument development). Describe the research and research training activities and projects that will be enabled with the desired instrumentation, and any sources that will support those activities and projects. In narrative or tabular form describe the personnel by research area, number, and type (e.g., senior personnel, postdoctoral fellows, graduate students, undergraduate students). 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 format.

This section **must** include Results from Prior NSF MRI Support if the PI or *any* of the co-PIs (i.e., personnel listed on the Cover Sheet) have participated in an NSF MRI award as a PI within the past five-year period. This section also should include information on the operations and maintenance, downtime and usage history on the previously funded instrument. Standard GPG reporting requirements for Results from Prior NSF Support should be followed if the PI or co-PIs have not participated as a PI in an NSF MRI award within the past five-year period, with preference given to a discussion of any instrumentation awards.

b. **Description of the Research Instrumentation and Needs** (Suggested length: 2 pages for instrument acquisition; 6 pages for instrument development).

- *Indicate in a single sentence the physical location of the proposed instrumentation.*

Acquisition proposals should include a technical description of the requested instrumentation, including manufacturer and model number where appropriate. The description of needs should be comprehensive enough to allow reviewers to evaluate the extent to which the equipment is essential and appropriate. The proposal should clearly explain why the requested equipment is needed given similar and/or related instrumentation at or near the performing organization. The existence nearby, and availability of comparable instrumentation should be outlined in the Facilities, Equipment & Other Resources - see Section 8 below.

For development proposals, present the rationale for the new instrumentation, the design concept, and the development strategy and methods in sufficient detail to allow for the evaluation of its technical 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. Provide appropriate preliminary results from existing equipment, or appropriate calculations and/or models to indicate the added utility or enhanced performance (e.g., sensitivity, capacity, stability, resolution, or signal-to-noise ratio) to be achieved by the new instrument. Justify the necessity and adequacy of the new instrumentation for the proposed research projects, with reference to instruments that are currently available.

c. **Impact on Research and Training Infrastructure** (suggested length: 2 pages). Describe how the instrumentation will contribute to meeting the research and research training goals and capabilities of the participating organizations (and the Nation as appropriate). For example, indicate how the instrumentation will attract researchers and students, particularly underrepresented groups and women pursuing advanced degrees in science and engineering, and improve the quality of research training. Discuss the potential impact of the instrument on the academic research infrastructure goals of the participating organizations. Describe how students will be involved and how their education will be enhanced by their involvement in the planned efforts. Any proposal requesting direct student support in operations and maintenance or development efforts must justify that 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. If the instrument will be physically located at other than the performing organization, this section must clearly identify and explain the need for an alternate location.

Proposals seeking to acquire "mid-scale" (greater than \$2 million and less than or equal to \$4 million) instruments must address the potential impact of the instrument at both the National level and on the research community of interest, by presenting concrete plans

for enabling access by external users (including those from non-Ph.D. and/or minority-serving institutions), and by describing the uniqueness of the requested instrumentation.

d. Management Plan (suggested length: 2 pages for instrument acquisition; 3 pages for instrument development). To be considered by the MRI program, all proposals **must** include a management plan, as outlined below.

Instrument acquisition proposals. Given the relatively high operation and maintenance costs of major research instrumentation, investigators seeking support for such instrumentation **must** provide detailed business and management plans with information on space, technical staffing for operation, maintenance and training of users, access for external users, and the sources of funding and plans for long-term operation and maintenance, i.e.:

- Describe the facility in which the instrument will be placed. Specify the organization's commitment regarding its housing, and the plans associated with instrument maintenance and operations (both during the award period and longer-term).
- Specify how and by whom the requested instrumentation will be operated. Any proposal requesting direct student involvement in operations and maintenance must justify both the need and appropriateness of this type of involvement.
- Describe the anticipated costs and the technical expertise needed to maintain and operate the instrument. If the expertise is not currently available, describe how it will be obtained.
- Describe procedures for allocating the instrument time, if appropriate, and describe plans for attracting and supporting new users. Include information on usage and downtime.

Sufficient detail should be given to enable reviewers to evaluate whether the project includes appropriate technical expertise and infrastructure to allow effective usage of the instrument by the end of the award period, as well as facilitate multi-user accessibility.

Instrument development proposals. Given the often complex nature of instrument development efforts, investigators seeking support for such instrumentation **must** provide detailed management plans for the design, construction and commissioning phases of the project, including discussion of required personnel and anticipated costs in each phase of the project, risk mitigation, and knowledge transfer upon completion, i.e.:

- Describe the design, construction and commissioning phases of the project, including the work breakdown schedule of the project activities (i.e., activities broken into tasks). Include a description of parts and materials, the estimated deliverables, associated timelines and the anticipated cost of each activity.
- Describe the technical expertise that is needed, and that will be available, to execute each activity. Describe the organization of the project staff and methods of assessing performance. For each member of the team, 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.
- Assess the risks associated with each activity and describe potential methods for mitigating the risks, and for re-analyzing and modifying the project plan to keep it within scope, schedule and budget.
- Include 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 cost and likely success of the development effort.

___ 4. References Cited. The format must follow the guidelines as given in the GPG.

___ 5. Biographical Sketches. The proposal must include two-page 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 (see Section V.A.1) who are major users/developers of the relevant research instrumentation. If applicable, also provide a separate biographical sketch of the individual responsible for the management of the instrument. *These are the only Biographical Sketches that are allowed.* The format for biographical sketches **must** follow the guidelines as given in the GPG.

___ 6. Budget and Budget Justification. Provide yearly and cumulative budget pages, listing those eligible project costs that NSF is being asked to fund. The total requested amount represents NSF's contribution to the project and does not include the organization's cost sharing (when applicable). All budget requests (particularly those for operations and maintenance in acquisition proposals and personnel support in development proposals) must be well-justified and commensurate with the scale and complexity of the instrumentation and/or development effort. Cost-sharing, when required, should be shown explicitly in the proposal budget pages. The budget justification, which must not exceed three pages, should itemize and explain all eligible project costs, assigning each to either the NSF request or the organization's cost-sharing, and explaining the basis for all cost estimates. Specify the sources and amounts of eligible cost-sharing funds (see Section V.B below for further information on cost-sharing) and a projection of when they will be available. *Note that cost-sharing, when applicable, must occur during the award period.*

___ 7. 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 (see Section V.A.1).

___ 8. Facilities, Equipment, and Other Resources. Provide a listing of similar and/or related instrumentation at or near the performing organization as "Other Resources".

___ 9. Supplementary Documents.

Required:

a. Provide a statement from the sponsored research office classifying the *performing* organization as either non-Ph.D. granting, Ph.D. granting, or non-degree granting (as defined in Section IV).

b. If the proposal involves organizations other than the submitting organization, list all partners.

c. For proposals that include subawards/subcontracts, a statement from those sponsored research offices, acknowledging that this proposal is included in their submission limit, **must** be included. Otherwise, an organization may exceed its submission limit, with the result that the proposal including the subaward/subcontract will be returned without review.

d. A letter (one-page maximum) documenting the organization's commitment for required cost-sharing, if applicable, **must** be included.

e. When applicable: If a proposed effort involves a private sector partner, a statement, confirming the collaboration (as described

only within the proposal itself) **must** be included. See the format for collaboration statements below.

Encouraged:

- a. Include relevant, itemized vendor quotes.
- b. Include a letter (one-page maximum) documenting the organization's commitment for operation and maintenance.
- c. Statements from individuals confirming substantive collaboration efforts and/or usage of the instrument should be submitted, but they **must** follow *only* the format indicated below.

To: NSF MRI Coordinator

By signing below I acknowledge that I am listed as a collaborator and/or instrument user on this MRI proposal, entitled " proposal title ", with PI name as the Principal Investigator. I agree to perform 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: _____

Date: _____

The proposal body itself should document the nature and need for a collaboration, and/or describe the users and their need for the instrument. Statements of collaboration beyond that specified below, including letters of support/endorsement, are not allowed. Each statement must be signed by the designated collaborator/user. Any letters of collaboration that deviate from this phrasing will be removed from the proposal. Requests to collaborators for statements should be made by the PI well in advance of the proposal submission deadline, since 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 "Research in Undergraduate Institutions" (RUI) program are not allowed (the certification statement indicating the type of performing organization, as defined by the MRI program, is instead required for the MRI Program).
- c. Documentation that refers to other proposals being submitted by an organization (e.g., letters indicating which projects were selected through an internal competition) are not allowed.
- d. All other documentation not specifically required or encouraged above.

10. List of Suggested Reviewers (optional). 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.

NOTES:

1. Proposals containing items other than those required (or encouraged) above, and/or by the Grant Proposal Guide, may be returned without review.

2. The following information applies only for those MRI proposals that will be reviewed in the Office of Polar Programs:

The Office of Polar Programs (OPP) strongly encourages MRI proposals related to all aspects of polar research supported by the Foundation. For any proposals requiring access to the polar regions, investigators must contact appropriate OPP Science Program Officers (http://www.nsf.gov/staff/staff_list.jsp?org=OPP&from_org=OPP) for guidance about submitting information needed to assess logistical support requirements (if any); this (in coordination with the cognizant MRI program officer to ensure MRI compliance) should be done during the proposal development. Before submitting proposals requiring field support in the Arctic contact Patrick Haggerty (703-292-9082; phaggert@nsf.gov); for the Antarctic - Alexandra Isern (703-292-9080; aisern@nsf.gov). Proposers are reminded to identify the MRI Program Solicitation Number in the program solicitation block on the NSF Cover Sheet. Compliance with this requirement is critical to determining the relevant proposal processing and review guidelines. Failure to submit this information may delay processing.

Proposers are reminded to identify the program solicitation number (NSF 09-502) in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost Sharing: The proposed cost sharing must be shown on Line M on the proposal budget. Documentation of the availability of cost sharing must be included in the proposal. Only items which would be allowable under the applicable cost principles, if charged to the project, may be included as the awardee's contribution to cost sharing. Contributions may be made from any non-Federal source, including non-Federal grants or contracts, and may be cash or in-kind (see OMB Circular A-110, Section 23). It should be noted that contributions counted as cost-sharing toward projects of another Federal agency may not be counted towards meeting the specific cost-sharing requirements of the NSF award. All cost-sharing amounts are subject to audit. Failure to provide the level of cost-sharing reflected in the approved award budget may result in termination of the NSF award, disallowance of award costs and/or refund of award funds to NSF.

- a. **General Information:** Ph.D. granting institutions of higher education and non-degree granting organizations are required to provide 30 percent cost-sharing. No exceptions will be made. Cost-sharing is not required on proposals from non-Ph.D. granting institutions of higher education.

b. Calculating Cost-share Amounts

The following sections explain how to calculate the cost-sharing requirements for your MRI proposal, how to enter your cost-sharing amount and requested amount in the proposal budget, and what costs may be included in your cost-sharing.

Effective FY 2009, for **both** acquisition and development proposals, Ph.D. granting institutions of higher education and non-degree granting organizations are required to cost share at a level of 30% of the total proposal project cost. Non-Ph.D. granting institutions of higher education are not required to cost-share. To calculate cost sharing:

- Add all eligible project costs (see Section V.B above) reflected in your proposal to determine the total proposal project cost. This total includes the amount requested of NSF and any proposed cost-sharing, if applicable.
- Calculate 30 percent of your total proposal project cost. This is the cost-share amount. This is the amount to be shown on Line M of the proposal budget in Fastlane.
- For Fastlane, all proposal budget entries in the column titled "Funds Requested by Proposer", and summed on Line L, will account for 70 percent of the total proposal project cost, reflecting only those costs that are requested from NSF.
- The total proposal project cost is reflected in the sum of Line L and Line M on FastLane budget.

Note: Manufacturers' discounts are strongly encouraged for reducing project cost but they may not be designated as cost sharing.

Other Budgetary Limitations:

Eligible Project Costs

The amount of the NSF request should be based on the net price of the instrumentation, including all academic discounts and other special purchase arrangements.

a. Acquisition proposals: Eligible project costs are limited to instrument purchase, installation, commissioning, and calibration, and the direct and indirect costs of operation, maintenance, and other appropriate technical support during the award period. Salary support, including fringe benefits and indirect costs, is allowed *only* for personnel directly involved in the operation and maintenance of the instrument. Any proposal requesting direct student support in operations and maintenance must justify the involvement in terms of both instrument needs and training the next generation of instrumentalists – reviewers will be asked to evaluate the appropriateness of this type of involvement. Training costs that are directly related to proper operations and maintenance are eligible, but expenses associated with the training of users are not allowed. Support for research to be conducted with the instrument, outreach, and publication costs are not allowed, nor is travel associated with conferences and/or collaborations.

b. Development proposals: Eligible project costs are limited to parts and materials needed for the construction of the instrument, commissioning costs (including relevant operations and maintenance expenses), as well as 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 project co-workers 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 cost of the new technology. Support for research to be conducted using the instrument *after* development, along with operations and maintenance, is not allowed. Travel costs that are integral to the development work are eligible expenses, but travel associated with conferences and training is not allowed.

Checklist

___ Is the subject matter appropriate for the MRI program? Refer to Section II.A for General Information on the MRI Program.

___ Is the subject matter appropriate for NSF? Refer to Section II.B: Eligible Fields of Science and Engineering.

___ Is the performing organization adhering to the three proposal limit? If the organization participates as a lead or subawardee/subcontractor on three proposals, is at least one a development proposal? Refer to Section IV.

___ Are font sizes and margins consistent with the Grant Proposal Guide?

___ Cover Sheet: Is the proposal properly identified as "MRI:Acquisition", "MRI:Development", "MRI-Consortium:Acquisition", or "MRI-Consortium:Development" on the Cover Sheet? If the instrument is to be placed at a facility of another Federal agency or one of their FFRDCs, has the proposal been properly structured and identified as a Consortium proposal? Refer to Section V.A: Full Proposal Preparation Instructions.

___ Project Summary: Is the Project Summary 1 page or less in length, and does it separately address both Intellectual Merit and Broader Impacts? Refer to Section V.A: Full Proposal Preparation Instructions.

___ Project Description: Is the Project Description 15 pages or less in length, and does it also address both Intellectual Merit and Broader Impacts? Are Results from Prior MRI Support, if applicable, *properly* addressed? Has the location of the instrument been identified and explained? Has an adequate management plan been included in a separate section? Refer to Section V.A: Full Proposal Preparation Instructions.

___ Budget: Are all of the items in the budget eligible costs (Refer to Section V.B on Budgetary Information)? Is the magnitude of the budget request consistent with the solicitation and the proposed project? If the budget is greater than \$2 million (and less than or equal to \$4 million) is this a request for the acquisition of a single instrument? Is a subaward/subcontract included as part of the proposal? If yes, has the amount of the subaward/subcontract been included in the Budget Pages, and has a separate subaward/subcontract budget been included? Is there a statement from the subawardee/subcontractor sponsored research office certifying that this proposal is included in the organization's proposal limit?

___ Is cost-sharing required? If yes, is there a letter (one-page maximum) of commitment from the organization, included in the supplemental documentation, confirming the source and availability of funds? Is the amount of the cost-sharing listed on the Budget Pages in FastLane?

___ Supplemental Documents: Is the format of any supplemental documentation followed? Has all required supplemental documentation been included? Is there a statement indicating the type of performing organization (Ph.D.-granting institution of higher education, non Ph.D.-granting institution of higher education, or non degree-granting organization)? Have all subawardees/subcontractors (if applicable) included statements acknowledging that this proposal is included in their submission limit? Has any unallowed documentation been included? Refer to Section V.A: Proposal Preparation Instructions.

C. Due Dates

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

January 22, 2009

Fourth Thursday in January, Annually Thereafter

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this program solicitation through use of the NSF FastLane system. Detailed instructions regarding the technical aspects of proposal preparation and submission via FastLane are available at: <http://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the [Grant Proposal Guide](#) for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: <https://www.fastlane.nsf.gov/fastlane.jsp>.

VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

Proposals received by NSF are assigned to the appropriate NSF program where they will be reviewed if they meet NSF proposal preparation requirements. 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 who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with the 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.

A. NSF Merit Review Criteria

All NSF proposals are evaluated through use of the two National Science Board (NSB)-approved merit review criteria: intellectual merit and the broader impacts of the proposed effort. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two NSB-approved merit review criteria are listed below. The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which the reviewer is qualified to make judgements.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF website at: <http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf>.

NSF staff also will give careful consideration to the following in making funding decisions:

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- 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.

Additional Review Criteria:

In addition to the evaluation criteria stated above, MRI Program reviewers will assess the following:

Instrument Acquisition Proposals.

- The extent of shared use of the instrumentation for research and/or research training.
- Whether the management plan includes sufficient infrastructure and technical expertise to allow effective usage of the instrument; and provides the organization's commitments for operations and maintenance.
- Whether the request for operations and maintenance is justified and reasonable in magnitude. If direct support for student involvement in operations and maintenance is requested, reviewers will be asked to evaluate the involvement in terms of both instrument needs and training the next generation of instrumentalists.
- Plans for using the new or enhanced research capability in teaching, training or learning.
- In addition, for mid-scale instrument acquisition proposals: the impact of the instrumentation at the state or national level, and the detailed plans for funding of operation and maintenance.

Instrument Development Proposals:

- The adequacy of the management plan. Does the plan have a realistic, detailed schedule? Are mechanisms in place to 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.
- 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?

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 formulate a recommendation to either support or decline each proposal. 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 is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, 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.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and 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.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

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

B. Award Conditions

An NSF award consists of: (1) the award letter, 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 letter; (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 letter. 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 http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag.

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 at least 90 days before the end of the current budget period. (Some programs or awards require more frequent project reports). Within 90 days after expiration of a grant, the PI also is required to submit a final project report.

Failure to provide the required annual or final project reports will delay NSF review and processing of any future funding increments as well as any pending proposals for that PI. 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 FastLane, for preparation and submission of annual and final project reports. Such reports provide information on activities and findings, project participants (individual and organizational) publications; and, other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system. Submission of the report via FastLane constitutes certification by the PI that the contents of the report are accurate and complete.

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;
- Changes in sources and/or scheduling of cost-sharing;
- 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;
- Changes in sources and/or scheduling of cost-sharing;
- Description of setbacks and resulting change of plans; and
- Modifications in timeline.

VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Randy Phelps, Staff Associate, telephone: (703) 292-8040, email: rphelps@nsf.gov

For questions related to the use of FastLane, contact:

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

Additional contact information for NSF's Major Research Instrumentation Program is as follows:

Office of Integrative Activities
Major Research Instrumentation Program
National Science Foundation, Room 1270
4201 Wilson Boulevard
Arlington, VA 22230
(703) 292-8040

E-Mail: mri@nsf.gov

IX. OTHER INFORMATION

The NSF Website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this Website by potential proposers is strongly encouraged. In addition, MyNSF (formerly the Custom News Service) 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 Regional 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. MyNSF also is available on NSF's Website at <http://www.nsf.gov/mynsf/>.

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

RELATED NSF PROGRAMS FOR RESEARCH INSTRUMENTATION

Program Title	Brochure
BIO: Improvements in Facilities, Communications, and Equipment at Biological Field Stations and Marine Laboratories (FSML)	NSF 05-550
BIO: Instrument Development for Biological Research (IDBR)	NSF 08-566
CISE/CNS: Computing Research Infrastructure (CRI)	NSF 08-570
ENG: Small Business Innovation Research and Small Business Technology Transfer Programs Phase I (SBIR/STTR)	NSF 08-548
GEO/ATM: Atmospheric Sciences Mid-Size Infrastructure Opportunity	NSF 07-602
GEO/ATM: Graduate Student and Optical Instrumentation Support Related to the Advanced Modular Incoherent Scatter Radar (AMISR)	NSF 05-564
GEO/EAR: Earth Sciences: Instrumentation and Facilities (EAR/IF)	NSF 07-553
GEO/OCE: Oceanographic Centers and Facilities: Oceanographic Instrumentation	NSF PD 98-5410
GEO/OCE: Oceanographic Technology and Interdisciplinary Coordination Program (OTIC)	NSF PD 98-1680
MPS/AST: Advanced Technologies and Instrumentation (ATI)	No Publication Number
MPS/CHE: Chemistry Research Instrumentation and Facilities: Departmental Multi-User Instrumentation (CRIF:MU)	NSF 08-539
MPS/CHE: Chemistry Research Instrumentation and Facilities: Instrumentation Development (CRIF:ID)	NSF 04-534
MPS/CHE: Chemistry Research Instrumentation and Facilities: Cyberinfrastructure and Research Facilities (CRIF:CRF)	NSF 08-504
MPS/DMR: Instrumentation for Materials Research	NSF 07-600
MPS/DMR: Instrumentation for Materials Research - Major Instrumentation Projects (IMR-MIP)	NSF 05-513
MPS/DMS: Scientific Computing Research Environment for the Mathematical Sciences (SCREMS)	NSF 07-502
Crosscutting: Cyberinfrastructure for Environmental Observatories: Prototype Systems to Address Cross-Cutting Needs (CEO:P)	NSF 06-505
Crosscutting: High Performance Computing System Acquisition: Towards a Petascale Computing Environment for Science and Engineering	NSF 08-573

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 40,000 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 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 provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 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 <http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **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: pubs@nsf.gov
or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

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

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton
Reports Clearance Officer
Division of Administrative Services
National Science Foundation
Arlington, VA 22230

[Policies and Important Links](#) | [Privacy](#) | [FOIA](#) | [Help](#) | [Contact NSF](#) | [Contact Web Master](#) | [SiteMap](#)



The National Science Foundation, 4201 Wilson Boulevard, Arlington, Virginia 22230, USA
Tel: (703) 292-5111, FIRS: (800) 877-8339 | TDD: (800) 281-8749

Last Updated:
11/07/06
[Text Only](#)