

# Instrumentation for Materials Research - Major Instrumentation Projects (IMR-MIP)

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## PROGRAM SOLICITATION

NSF 10-552

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### DOCUMENT(S):

NSF 09-547

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**National Science Foundation**

Directorate for Mathematical & Physical Sciences  
Division of Materials Research

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

June 21, 2010

## IMPORTANT INFORMATION AND REVISION NOTES

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The Instrumentation for Materials Research - Major Instrumentation Projects program (IMR-MIP) has been modified to support three kinds of proposals: research and development (R&D), conceptual engineering and design (CED) and construction (CNST), all for the next generation of instruments at facilities for materials research. While all types of instrumentation are encouraged, in FY2010, there will be an emphasis on coherent light sources for R&D proposals.

Please be advised that the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) includes revised guidelines to implement the mentoring provisions of the America COMPETES Act (ACA) (Pub. L. No. 110-69, Aug. 9, 2007.) As specified in the ACA, each proposal that requests funding to support postdoctoral researchers must include a description of the mentoring activities that will be provided for such individuals. Proposals that do not comply with this requirement will be returned without review (see the PAPP Guide Part I: *Grant Proposal Guide* Chapter II for further information about the implementation of this new requirement).

The Division of Materials Research is committed to broadening participation of underrepresented groups within the materials research community. The IMR-MIP program requires an institutional, departmental or facility diversity strategic plan for broadening participation as part of a program-specific review criterion. Mid-scale construction proposals resulting from conceptual engineering design awards made prior to 2008 are required to include results on how the award enhanced participation of underrepresented groups in the Results of Prior Support section. Additional reporting requirements became effective in 2009. Further details are provided in the full solicitation.

## SUMMARY OF PROGRAM REQUIREMENTS

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### General Information

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**Program Title:**

Instrumentation for Materials Research - Major Instrumentation Projects (IMR-MIP)

**Synopsis of Program:**

The Instrumentation for Materials Research - Major Instrumentation Projects (IMR-MIP) program in the Division of Materials Research provides support for the design and construction of major instruments costing more than \$4 million but less than \$20 million. Such instruments may include, but are not limited to, key instrumentation for coherent light sources, neutron beam lines, synchrotron beam lines, high field magnets, and detectors. While all types of instrumentation are encouraged, in FY2010, there will be an emphasis on coherent light sources for R&D proposals. The program supports three types of awards: Research and Development (R&D) awards, Conceptual and Engineering Design (CED) awards, and Construction (CNST) awards. An R&D award will support the research and development of major instrumentation and address technical issues that are on the critical path of the engineering design of a major instrument. A CED award will enable the proposer to do the necessary engineering design of the instrument. A CNST proposal may only be submitted after a satisfactory engineering design of the instrument has been completed and has been approved by both the facility at which the instrument will be situated and by NSF. The program does not provide operating funds for projects it supports through this solicitation. Operational costs must be supported either by the facility or the institution at which the instrument is located. It is anticipated that about \$ 7-10 million may be available in FY 2010 for new Major Instrumentation Projects. Up to two R&D projects may be funded as a continuing grant or as a cooperative agreement for a maximum of five years at about \$1 to \$4 million a year. Up to two CED awards may be funded for up to 3 years through continuing or standard grant, each award for a total of up to \$ 2 million. Up to one CNST award may be funded through a cooperative agreement, for about \$1 to \$4 million per year for a maximum of 5 years.

## 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.

- Guebre X. Tessema, National Facilities (NAF) Program Director, 1080.06, telephone: (703) 292-4935, fax: (703) 292-9035, email: [gtessema@nsf.gov](mailto:gtessema@nsf.gov)
- Charles E. Bouldin, Program Director (IMR), NSF, 1080.12, telephone: (703) 292-4920, fax: (703) 292-9035, email: [cbouldin@nsf.gov](mailto:cbouldin@nsf.gov)

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

- 47.049 --- Mathematical and Physical Sciences

## Award Information

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**Anticipated Type of Award:** Standard Grant or Continuing Grant or Cooperative Agreement

**Estimated Number of Awards:** 2 to 5 (up to 2 R&D awards, up to 2 CED awards, and 1 CNST award)

**Anticipated Funding Amount:** 7,000,000 to 10,000,000 total in FY2010, contingent upon the quality of proposals received and the availability of funds.

## Eligibility Information

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### Organization Limit:

Proposals may only be submitted by the following:

- IMR-MIP Proposals may be submitted by colleges or universities in the United States. NSF does not normally support research or educational activities by scientists employed by other Federal agencies or Federally Funded Research and Development Centers (FFRDCs). However, a scientist, engineer, or educator who holds a joint appointment with a university and an FFRDC may submit proposals through the university. Such an individual may receive support if he/she is a faculty member of the university even if part of his/her salary is provided by the Federal agency. Under unusual circumstances, a Federal research laboratory or FFRDC may submit a proposal directly to NSF; for example, if such an institution provides unique capabilities which can be made available to members of the university community through an NSF award. NSF support will not be made available to support activities which are the normal responsibility of the Federal laboratory or FFRDC. Interested Principal Investigators (PIs) at a Federal laboratory or an FFRDC should contact the cognizant program officer named in this Solicitation before preparing a proposal in response to this Solicitation. Awards involving industrial laboratories are only made if the industrial laboratory partners with a university and all funds are awarded to the university partner, not the industrial laboratory.

### PI Limit:

None Specified

### Limit on Number of Proposals per Organization: 1

An institution may submit at most one IMR-MIP proposal in a given year, whether for Research and Development (R&D), Conceptual and Engineering Design (CED), or for Construction (CNST).

### Limit on Number of Proposals per PI: 1

A PI or co-PI may submit at most one IMR-MIP proposal in a given year, whether for R&D, for CED, or for CNST.

## Proposal Preparation and Submission Instructions

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### A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Preliminary Proposal Submission:** Not Applicable
- **Full Proposals:**
  - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. 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](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg).
  - 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: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=grantsgovguide](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide))

### B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required under this solicitation.
- **Indirect Cost (F&A) Limitations:** Not Applicable

Other Budgetary Limitations: Not Applicable

### C. Due Dates

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

June 21, 2010

## Proposal Review Information Criteria

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**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

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**Award Conditions:** Standard NSF award conditions apply.

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

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## I. INTRODUCTION

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Major user facilities at US universities and at US Federal Laboratories provide sophisticated instruments for materials preparation and characterization essential for researchers studying materials in a wide range of scientific disciplines, including physics, chemistry, biology, materials science, the geosciences, and engineering. These facilities provide unique research capabilities that can be located at only a few highly specialized sites in the Nation. They include, for example, facilities for neutron scattering, synchrotron radiation, high magnetic fields, and nanofabrication. Through the program described in this Solicitation, NSF intends to support R&D that is on the critical path of the engineering design of new instruments, as well as conceptual engineering design, and construction of a variety of mid-scale instruments that impact materials research at facilities. The program described in this solicitation supports R&D, conceptual engineering design and construction of instruments at facilities, but not construction of facilities. While all types of instrumentation are encouraged, in FY2010, there will be an emphasis on coherent light sources for R&D proposals.

For the purposes of this Solicitation, "mid-scale instruments" - also called "major instrumentation projects" - are those with construction costs greater than about \$4 million but less than \$20 million. The types of instruments include but are not limited to beamlines, high-field magnets, detectors, and sample preparation environments at major user facilities. Research and development (R&D) proposals may request support for R&D associated with technical issues on the critical path of the engineering design, construction and utilization of next generation instruments for materials research, education and training. Some of the aforementioned instruments may be developed in partnership with other federal agencies.

NSF has a key role to play in supporting the education and training of the future researchers who will develop instrumentation for these facilities and use them effectively for the advancement of science. Therefore, priority will be given to those proposals that involve students in the research and development, design, and construction of the instruments. Support for instruments costing less

than \$4 million is available through NSF's Major Research Instrumentation (MRI) Program.

This Program will:

- Increase the number and quality of mid-scale instruments available to the US research community in materials and related areas of science and engineering.
- Enable the training of the next generation of instrument scientists and engineers.
- Enable existing instruments to be upgraded as new technology becomes available.
- Enable a logical pathway for development of mid-scale instrumentation with rigorous peer review at critical phases.

## II. PROGRAM DESCRIPTION

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The Instrumentation for Materials Research - Major Instrumentation Projects (IMR-MIP) Program supports the research and development of major instruments, and the design and construction of mid-scale instruments. Operation of the instruments built with these funds is to be provided from other sources (*i.e.*, other programs within NSF or non-NSF funds). Staffing and operating the instrument will remain the responsibility of the proposing institution. Proposals from university-based facilities are particularly encouraged.

The IMR-MIP program will consider three types of proposals:

1. Research and development (R&D) proposals may request support for R&D associated with technical issues on the critical path of the engineering design, construction and utilization of next generation instruments for materials research, education and training. Such instruments include, but are not limited to, future coherent light sources (CLS), X-ray and neutron beamlines, high-count rate detectors and advanced focusing techniques for neutrons and synchrotrons, neutron beam spin control techniques etc.

2. Conceptual and Engineering Design (CED) proposals may request support to develop concepts for mid-scale instruments to a level of maturity sufficient to determine whether such an instrument is ready for construction. Construction projects for which detailed engineering designs are needed are those with subsequent construction costs greater than about \$5 million. A successful CED proposal does not guarantee that the subsequent construction of the instrument will be funded.

3. Construction (CNST) proposals may request support for the construction of the instruments. In order to be considered for possible funding, CNST proposals *must* include a detailed engineering design, with a Work Breakdown Structure (WBS) to level 4 [see section V.A.c. below for definitions], together with a detailed cost estimate. This level of detail can be provided by a previous CED award or by a similar study funded through other sources (*e.g.*, institutional support, private funding). The WBS must meet the approval of both the facility at which the instrument will be located and NSF's National Facilities (NAF) Program Directors.

The scientific team that constructs such an instrument will be limited to use up to 25% of the total time available on that instrument, while at least 75% will be available for the facility to allocate to other users through a rigorous peer review process. To make sure that the facility is willing to entertain such a project, the Principal Investigators (PIs) of a CED or CNST proposal must attach to the proposal a letter from the facility director stipulating that if the PIs were successful in obtaining subsequent construction funding, the facility will allow construction and will staff and operate the equipment at the completion of construction phase.

It is not necessary that a PI has received an R&D or CED award from NSF prior to submitting a CNST proposal, as long as the documents necessary for a detailed NSF review have been provided.

Increasing the participation of a diverse community, including underrepresented groups in science and engineering, by creating opportunities and enabling their contributions is essential to the health and vitality of science and engineering. Underrepresented groups include women, minorities, and persons with disabilities<sup>1</sup>. NSF is committed to this principle of broadening participation, and deems it central to the activities that it considers and supports. This solicitation requires an institutional, departmental or facility strategic plan for broadening participation, and a proposal-specific plan explaining how the project supports the broader institutional plan.

<sup>1</sup>Women, Minorities, and Persons with Disabilities in Science and Engineering ([NSF 09-305](#))

## III. AWARD INFORMATION

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The IMR-MIP Program anticipates making one or two three- to- five-year R&D awards, to be funded as standard or continuing grants or as cooperative agreements as appropriate. Each award is anticipated to be about \$1 to 4 million a year. The program anticipates making one or two three-year CED awards in FY 2010; these will be funded through continuing or standard grants, each award for a total of up to \$ 2 million. The program expects to make one CNST award, funded through a cooperative agreement, for about \$1 million to \$4 million per year for up to five years.

## IV. ELIGIBILITY INFORMATION

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### Organization Limit:

Proposals may only be submitted by the following:

- IMR-MIP Proposals may be submitted by colleges or universities in the United States. NSF does not normally support research or educational activities by scientists employed by other Federal agencies or Federally Funded Research and Development Centers (FFRDCs). However, a scientist, engineer, or educator who holds a joint appointment with a university and an FFRDC may submit proposals through

the university. Such an individual may receive support if he/she is a faculty member of the university even if part of his/her salary is provided by the Federal agency. Under unusual circumstances, a Federal research laboratory or FFRDC may submit a proposal directly to NSF; for example, if such an institution provides unique capabilities which can be made available to members of the university community through an NSF award. NSF support will not be made available to support activities which are the normal responsibility of the Federal laboratory or FFRDC. Interested Principal Investigators (PIs) at a Federal laboratory or an FFRDC should contact the cognizant program officer named in this Solicitation before preparing a proposal in response to this Solicitation. Awards involving industrial laboratories are only made if the industrial laboratory partners with a university and all funds are awarded to the university partner, not the industrial laboratory.

**PI Limit:**

None Specified

**Limit on Number of Proposals per Organization: 1**

An institution may submit at most one IMR-MIP proposal in a given year, whether for Research and Development (R&D), Conceptual and Engineering Design (CED), or for Construction (CNST).

**Limit on Number of Proposals per PI: 1**

A PI or co-PI may submit at most one IMR-MIP proposal in a given year, whether for R&D, for CED, or for CNST.

## V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

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### A. Proposal Preparation Instructions

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

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF 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](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) 292-7827 or by e-mail from [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov). Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: ([http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=grantsgovguide](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [nsfpubs@nsf.gov](mailto: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 the NSF FastLane system. Chapter II, Section D.4 of the Grant Proposal Guide provides additional information on collaborative proposals.

The following special instructions deviate from the GPG guidelines. Proposals must contain the items listed below and adhere to the specified page limitations. *No additional information may be provided by links to web pages.* Proposals not meeting the GPG guidelines and the following instructions will be returned without review.

**Cover Sheet:** Select the program solicitation number from the pull down list. A single NSF Unit of Consideration will then automatically be entered. FastLane allows one Principal Investigator (PI) and at most four Co-PIs to be designated. Additional lead personnel should be designated as non co-PI Senior Personnel.

**Grants.gov Users -** The program solicitation number will be pre-populated by Grants.gov on the NSF Grant Application Cover Page. NSF allows one principal investigator/project director and a maximum of 4 co-principal investigators/project directors to be identified on a proposal. Instructions for entering additional senior project participants are included in Section V.5. of the NSF Grants.gov Application Guide.

**The title of the proposal should start with "IMR-MIP:".**

**Project Summary** (One-page limit): Provide a summary description of the proposed project including discussion of its objectives and key features in a manner that will be informative to a general technical audience. The project summary must separately address both NSF review criteria of intellectual merit and broader impacts of the proposed activity.

**Project Description:** The project description section contains the following items a through g, and is limited to a combined total length of 20 pages for CED and for R&D proposals, and 50 pages for CNST proposals, inclusive of tables, figures, or other graphical data.

a. **Introduction:** Describe briefly where the project "fits" on a national and international level. Limit: 1 page. This one-page item is included within the page limitation for the Project Description.

b. **Vision and Goals:** Describe the vision and goals for the proposed project, including its potential in enabling the nation's research and education infrastructure for materials science and engineering and its broader educational and societal impacts.

c. **Capabilities of the Project:**

1. Research and development proposals may request funds for R&D associated with key technologies on the critical path of the engineering design and construction of next generation instruments for research. The proposal must present a compelling scientific case for the need of the instrument, as well as a critical appraisal of existing and competing technologies. The proposal must discuss the national and international context for the R&D and, in particular, the proposal must show how the proposed R&D complements or is distinct from ongoing efforts worldwide.
2. Conceptual and Engineering Design (CED) proposals may request support to develop concepts for mid-scale projects to a level of maturity sufficient to determine whether such a project is ready for construction. Projects for which detailed engineering designs are needed are those with subsequent construction costs greater than \$5 million. The proposal should provide a brief but compelling scientific justification for the project; summarize the qualifications of the Principal Investigator and his or her collaborators, indicating their ability to complete a design with the necessary detail; and summarize the approach to be taken in completing the design. CED proposals for mid-scale instruments are expected to require funding up to about \$2 million in total. To ensure that the facility where the instrument would be located is willing to entertain such a project, the Principal Investigators of a CED proposal must attach a letter from the facility director stating that if they are successful in obtaining subsequent construction funding, the facility will staff and operate the project at the completion of construction through the operation phase.
3. Construction (CNST) proposals may request support for the construction of mid-scale projects. The proposal should begin with a compelling scientific case, justifying the need for the project; summarize the qualifications of the Principal Investigators for overseeing such a construction project; include a detailed engineering design, with a Work Breakdown Structure (WBS) to level 4 (*cf.*, reference <sup>(2)</sup>); provide detailed staffing estimates; indicate the scheduling of major aspects of the work; and provide a detailed estimate of the costs of the project. NSF does not allow separate budgeting for contingencies. However, the budget justification should contain discussion of contingencies where appropriate. Estimates for necessary materials, staffing, and other major cost drivers must be presented carefully enough so that the total cost of the project is sufficient to accommodate unanticipated problems. This level of detail can be provided by a previous CED award or by a similar study funded through other sources (*eg* institutional support, private funding). The CNST awards will be funded as Cooperative Agreements. To ensure that the facility is willing to entertain such a project, the Principal Investigators for a CNST proposal must attach a letter from the facility director stating that if they are successful in obtaining construction funding, the facility will staff and operate the equipment (detector, instrument, beam line, etc.) at the completion of construction through the operations phase.

(2)"A work breakdown structure (WBS) contains a product-oriented grouping of project tasks that organizes and defines the total scope of the project. The WBS is a hierarchical framework that organizes and documents individual project components representing work to be accomplished, aggregating the smallest levels of detail into a unified project description. WBS integrates and relates all project work (cost, schedule and scope) and is used throughout the project management to identify and monitor project process. The project budget and contingency are defined by WBS element. A WBS dictionary describes the intended scope of each element, the basis of estimate for budget entries, and the methodology for calculating contingency for that element." NSF Large Facilities Manual [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf10012&org=NSF](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf10012&org=NSF)

d. **Education, Outreach, and Knowledge Transfer:** Describe how the project will involve graduate and undergraduate students, postdoctoral associates, and others. Describe how the project will involve underrepresented groups in science and engineering. Describe outreach plans intended to increase the external user base, and to reach scientific and engineering communities not traditionally involved in the types of research enabled by the project. Describe provisions for knowledge transfer to the broader science and technology communities. Describe how this work will engage the public.

e. **Mentoring Plan for Postdoctoral Researchers:** Proposals requesting support for postdoctoral researchers must include a description of the mentoring activities to be provided to such individuals.

f. **Broadening Participation:** This section must show how the proposed R&D, CED or CNST project supports the institutional, departmental or facility diversity plan, and must also articulate a diversity plan that is specific to the proposal for broadening participation of underrepresented groups. The proposal-specific diversity plan must be included in this section; the institutional, departmental or facility diversity plan must be *included as a supplementary document*.

g. **Management Structure:** Describe the management structure for the project. For large CNST projects this should include a discussion of how costs will be controlled, how the project will maintain the work schedule, how technical risks will be assessed and minimized, and the frequency of the institution's periodic project reviews.

**Biographical Sketches** (2-page limit each for PI and co-PIs; 1-page limit each for other participants): Provide a biographical sketch for each participant expected to have an important role in the project, including their titles and affiliations. The sketch should describe the individual's academic and professional history and may list five significant publications and other activities or accomplishments. In choosing what to include, emphasize information that will be helpful in understanding the strengths, qualifications, and specific impact the individual brings to the project.

**Budget:** Provide annual budgets for each year of the project. The FastLane or Grants.gov system will automatically fill out the cumulative multi-year budget.

**Budget Justification** (3-page limit): Justify the funds requested in the major budget categories for the project. Describe the proposed allocation of funds with sufficient clarity to show how resources will be utilized in carrying out the project.

**Facilities, Equipment, and Other Resources** (3-page limit): This section of the proposal will be used to assess the adequacy of the organizational resources available to perform the effort proposed. Provide details of existing or proposed resource commitments (see below) from other organizations, such as the government, industry, private foundations, and non-U.S. institutions. Describe only those resources that are directly applicable to the project.

**Supplementary Documentation:**

1. **Letters of Commitment:** Submit official supporting letters that verify resource commitments by each institution participating in the project. Specifically, and as appropriate, include a letter from the director of the facility at which the project is to be sited indicating that, if construction funding is approved, the facility will provide the requisite level of operations support. List and identify collaborations with industry, national laboratories, and other universities, including international collaborations.
2. **Plan for Broadening Participation:** Submit an institutional, departmental or facility strategic plan for broadening participation (maximum 3 pages) in the Supplementary Documents section of the proposal. While the plan format is not formally prescribed, it is recommended that the following applicable elements be included:
  - o **Leadership** - How the institution, department or facility addresses its responsibilities with respect to broadening

participation and practices good citizenship. (Examples: community outreach, role as a campus leader, diversity awareness training).

- *Strategic planning* - How the institution, department or facility sets strategic directions, determines key action plans, and assesses quality of its processes (e.g., recruitment, hiring, promotion, and retention) with regard to broadening participation. (Example: identifying any past patterns or current practices that have been obstacles to broadening participation and how to alter them).
- *Statistics and analysis* - How the institution, department or facility collects, uses, and analyzes data to inform and update the strategic planning with respect to broadening participation. (Example: assessing changes in participation of underrepresented groups as undergraduate majors in disciplines relevant to material research.)
- *Human resource focus* - How the institution, department or facility enables its faculty, staff, and students to develop their full potential and how this population is aligned with the institution's, department's or facility's objectives with regard to broadening participation. (Examples: leadership training, family-friendly policies, mentoring for promotion, skill set training, other resources.)
- *Results* - How the institution, department or facility performs and improves with respect to the involvement of underrepresented groups. (Example: implementing changes in recruitment practices or tenure committee compositions).

## B. Budgetary Information

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**Cost Sharing:** Cost sharing is not required under this solicitation.

## C. Due Dates

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

June 21, 2010

## D. FastLane/Grants.gov Requirements

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- **For Proposals Submitted Via FastLane:**

Detailed technical instructions regarding the technical aspects of preparation and submission via FastLane are available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail [fastlane@nsf.gov](mailto: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>.

- **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: [http://www07.grants.gov/applicants/app\\_help\\_reso.jsp](http://www07.grants.gov/applicants/app_help_reso.jsp). In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: [support@grants.gov](mailto: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 the NSF FastLane system for further processing.

## VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

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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

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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>.

Mentoring activities provided to postdoctoral researchers supported on the project, as described in a one-page supplementary document, will be evaluated under the Broader Impacts criterion.

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:**

Reviewers will thus be asked, in addition to the intellectual merit and broader impacts criteria, to address the following additional criteria:

For all proposals:

How does the proposed mid-scale instrumentation support the institutional, departmental or facility activities for diversity or the diversity strategic plan for broadening participation? Will participation by underrepresented groups be enhanced by the instrumentation?

For R&D proposals:

- What are the unique capabilities of the proposed new instrument?
- What is the breadth of science and technology that have a critical need for the instrument?
- Is the proposed R&D on the critical path of the engineering design of the proposed new instrument? What are the strengths and weaknesses of the technical details and justifications of the R&D project?
- Are current and potential partners identified and what is the proposed level and scope of partnership?
- What are the national and international implications and the availability of national and international partners including their contributions?
- How good is the management structure of the proposed R&D effort, including the qualifications and involvement of key personnel?
- Is the budget justification, including the basis for the cost-estimate for construction of the instrument being proposed, complete and appropriate?

For CED proposals:

- Is the scientific justification for the proposed project sufficiently strong to justify the preparation of a detailed engineering design?
- Do the Principal Investigator and his or her collaborators have the capabilities to complete a design with the necessary detail?
- Is the approach to be taken in completing the design appropriate, and is it likely to produce an engineering design containing sufficient detail to form the basis for a decision on construction? Is any research and development component proposed appropriate and necessary for the development of the CED?
- Is an adequate management structure described to oversee the construction of a mid-scale instrument should the CED proposal be funded?
- Has the facility director indicated that, if construction funding is approved, the facility will staff and operate the project at the completion of construction through the operation phase

For CNST proposal

- Is the scientific justification for the proposed project sufficiently strong to justify construction?
- Do the Principal Investigator and his or her collaborators have the capabilities to oversee construction?
- Is the engineering design sufficiently detailed, with a Work Breakdown Structure (WBS) to level 4?

Are the staffing, scheduling, and cost estimates sufficiently detailed to provide confidence that the project can be completed on schedule and within the estimated budget? In particular, have these estimates been made with sufficient care so that the total cost of the project is expected to be sufficient to accommodate unanticipated problems?

- Is a management structure in place to oversee the instrument construction from start to finish? Have contingency plans been established to overcome unexpected technical risks? Is the time to completion reasonable? Has adequate attention been given to possible delays from suppliers?

NSF will endeavor to inform proposers promptly whether or not they have been selected to participate in a "reverse site visit." A reverse site visit consists of a review where the Principal Investigator and his/her associates come to NSF to make a presentation to a review panel. This notification is intended to allow at least one month to prepare for the review. Proposers submitting proposals should receive notice of the outcome of the review within six months following proposal submission. For those proposals selected for a "reverse site visit," a summary narrative of the evaluation and recommendations resulting from the initial ad hoc mail review will be provided to the PI and to the panel conducting the "reverse site visit review."

After programmatic approval has been obtained, 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 grants (for CED and R&D awards) or Cooperative Agreements (for CNST awards).

## B. Review and Selection Process

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

There are four "Critical Decisions" (CDs) for CED and CNST projects seeking funding through the IMR-MIP program: CD-1, the need for the project; CD-2, approval of the project baseline; CD-3, authorization to begin construction; and CD-4, readiness to begin operations. For a CED proposal, the decision to recommend an award is equivalent to CD-1, acceptance of the justification for the proposed project. This decision will be based upon *ad hoc mail* review of CED proposals and, if deemed necessary, culminating in a reverse site visit. With the support of a CED award, the Principal Investigator (PI) embarks upon the development of a detailed engineering design and a project baseline, including a Work Breakdown Structure (WBS) complete to Level 4 (as defined in standard project-management references, e.g., reference 3). These documents form the basis for a CNST proposal. It is not necessary that a PI have received a CED award from NSF prior to submitting a CNST proposal, as long as the documents necessary for a detailed review have been provided and meet both the facility and NSF approval. Support for R&D can be made at any stage, and does not constitute a critical decision.

The review of CNST and R&D proposals will involve *ad hoc* mail review which will be followed by a "reverse site visit" for meritorious proposals. For CNST proposals, for each of the major elements of the WBS, reviews will include a detailed evaluation of the costs, schedule, personnel estimates, technical risks, and project management. The WBS must be sufficiently detailed to provide confidence that the project can be completed on time and within the estimated budget. The purpose of this review is to assure NSF that the project is feasible and well managed, that there is a mechanism for addressing any technical risks involved, and that the costs are well controlled. A recommendation to fund a CNST award essentially constitutes CD-2 and CD-3 for the project. Not all CED awards are expected to result in successful CNST proposals.

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, or receipt 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

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### A. Notification of the Award

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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

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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](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 [nsfpubs@nsf.gov](mailto: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 *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=aag](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag).

## C. Reporting Requirements

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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, 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 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 project outcomes report 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.

In addition to the mandatory annual project reports, post-award oversight will consist of annual project reviews. For CED and R&D awards, the PIs for each active award will be required to present a detailed progress report to NSF. In addition, oversight of R&D awards may involve a site visit review to the project location with an external review committee to evaluate progress achieved. For the CNST awards, the annual project reviews will involve a site visit to the project location with an external review committee which will evaluate costs, schedule, project management, and assess technical risks for each of the major elements of the work breakdown schedule. The purpose of the CNST review is to provide NSF with continuing assurance that the project is well managed, that technical risks are being addressed effectively, that costs are well controlled, and the project is on schedule. NSF will terminate CNST projects that experience unacceptable cost overruns or delays.

## VIII. AGENCY CONTACTS

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*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:

- Guebre X. Tessema, National Facilities (NAF) Program Director, 1080.06, telephone: (703) 292-4935, fax: (703) 292-9035, email: [gtessema@nsf.gov](mailto:gtessema@nsf.gov)
- Charles E. Bouldin, Program Director (IMR), NSF, 1080.12, telephone: (703) 292-4920, fax: (703) 292-9035, email: [cbouldin@nsf.gov](mailto:cbouldin@nsf.gov)

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: [fastlane@nsf.gov](mailto:fastlane@nsf.gov).

For questions relating to Grants.gov contact:

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

## IX. OTHER INFORMATION

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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, National Science Foundation Update is a free e-mail subscription service 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 when new publications are issued that match their identified interests. Users can subscribe to this service by clicking the "Get NSF Updates by Email" link on the [NSF web site](#).

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>.

## ABOUT THE NATIONAL SCIENCE FOUNDATION

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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: [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov)
  - or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

## PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

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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

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