Research in Undergraduate Institutions (RUI)
Faculty Research Projects; Research Instrumentation Grants; and Research Opportunity Awards

PROGRAM ANNOUNCEMENT
NSF 00-144

National Science Foundation

Office of International and Integrative Activities

Directorate for Geosciences
    Division of Polar Programs

Directorate for Biological Sciences

Directorate for Education & Human Resources

Directorate for Engineering

Directorate for Mathematical & Physical Sciences

Directorate for Social, Behavioral & Economic Sciences

Directorate for Computer & Information Science & Engineering

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

Proposals Accepted Anytime

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Facilitating Research at Primarily Undergraduate Institutions:
Research in Undergraduate Institutions (RUI) and Research Opportunity Awards (ROA)

Synopsis of Program:

The Research in Undergraduate Institutions (RUI) activity supports research by faculty members of predominantly undergraduate institutions through the funding of (1) individual and collaborative research projects, (2) the purchase of shared-use research instrumentation, and (3) Research Opportunity Awards for work with NSF-supported investigators at other institutions. All NSF directorates participate in the RUI activity. RUI proposals are evaluated and funded by the NSF programs in the disciplinary areas of the proposed research. Eligible "predominantly undergraduate" institutions include U.S. two-year, four-year, masters-level, and small doctoral colleges and universities that (1) grant baccalaureate degrees in NSF-supported fields, or provide programs of instruction for students pursuing such degrees with institutional transfers (e.g., two-year schools), (2) have undergraduate enrollment exceeding graduate enrollment, and (3) award an average of no more than 10 Ph.D. or D.Sc. degrees per year in all NSF-supportable disciplines. Autonomous campuses in a system are considered independently, although they may be submitting their proposals through a central office. A Research Opportunity Award is usually funded as a supplement to the NSF grant of the host researcher, and the application is submitted by the host institution.

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.

- Richard J. Fragaszy, Program Director, ENG/EFRI, 545 S, telephone: (703) 292-8360, email: rfragasz@nsf.gov

- Jill L. Karsten, Program Director for Diversity and Education in GEO, GEO/OAD, 705 N, telephone: (703) 292-7718, fax: (703) 292-9042, email: jkarsten@nsf.gov

- Michael Mishkind, Program Director, BIO/IOS, 685, telephone: (703) 292-8413, email: mmishkin@nsf.gov

- Julie M. Palais, Glaciology Program Program Manager, GEO/PLR, 755 S, telephone: (703) 292-8033, fax: (703) 292-9079, email: jpalais@nsf.gov

- Edward Taylor, Program Director, MPS/DMS, 1025 N, telephone: (703) 292-4872, email: etaylor@nsf.gov

- Harriet G. Taylor, Program Director, CISE/CNS, 1175, telephone: (703) 292-8950, email: htaylor@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
- 47.079 --- International and Integrative Activities (IIA)
- 47.081 --- Office of Experimental Program to Stimulate Competitive Research

Award Information

Anticipated Type of Award: Standard Grant or Continuing Grant

Estimated Number of Awards: Varies across disciplinary research programs

Anticipated Funding Amount: $0 Varies across disciplinary research programs

Eligibility Information

Organization Limit:

Proposals may only be submitted by the following:

- See Section III of this announcement.

PI Limit:

See Section III of this announcement.

Limit on Number of Proposals per Organization:

None Specified

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 not required under this solicitation.

- **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)**:**

  Proposals Accepted Anytime

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: Standard NSF reporting requirements apply.

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I. INTRODUCTION

Predominantly undergraduate institutions play a critically important role in U.S. science and technology through their substantial contributions to research and education. NSF encourages research by faculty members of these institutions, both to ensure a broad national base for research and to help faculty members stay at the cutting edge of their disciplines. Such research not only contributes to basic knowledge in science and engineering, but also provides an opportunity for integration of the excitement of scientific discovery into undergraduate education. As the ultimate in inquiry-based learning, undergraduate research is a critical component of high-quality education in science, mathematics, and technology (SMET), providing a strong foundation for careers in science and engineering and for graduate study. A significant fraction of SMET professionals receive bachelor degrees from predominantly undergraduate institutions. NSF research programs provide support for research by faculty members of predominantly undergraduate institutions in three ways: 1. Funding of proposals submitted to the disciplinary programs through the Research in Undergraduate Institutions (RUI) activity for research by individual faculty members and groups of collaborating investigators, as described in this announcement. The RUI activity also provides support for shared-use instrumentation or other research tools. 2. Research Opportunity Awards (ROAs) to enable faculty members of predominantly undergraduate institutions to pursue research as visiting scientists with NSF-supported investigators at other institutions, as described herein. 3. Funding of research and instrumentation proposals submitted without the RUI designation to NSF disciplinary programs.Predominantly undergraduate institutions are defined in terms of the nature of the institution, not solely on the basis of highest degree offered. Included by the definition are two- and four-year colleges, masters-level institutions, and smaller doctoral institutions that, institution-wide, do not award an average of more than 10 doctoral degrees each year in science and engineering fields supported by NSF (see "Eligibility Information" below).

II. PROGRAM DESCRIPTION

This announcement replaces the previous *Research in Undergraduate Institutions* announcement (NSF 94-79) and the *Collaborative Research in Undergraduate Institutions* (C-RUI) announcement (NSF 99-11). C-RUI type activities are a feature of this announcement and are now integrated into NSF disciplinary programs.

A. Objectives and General Features of RUI

The specific objectives of RUI are to (1) support high-quality research by faculty members of predominantly undergraduate institutions, (2) strengthen the research environment in academic departments that are oriented primarily toward undergraduate instruction, and (3) promote the integration of research and education. The involvement of undergraduate students is an important feature of RUI, providing them with research-rich learning environments. However, the overriding purpose of RUI is the support of faculty research, which maintains faculty members' intellectual vibrancy in the classroom and research community. Proposals submitted through RUI are accepted in all fields of science and engineering supported by the Foundation, including research on learning and education. RUI is fully integrated into the regular disciplinary programs of the Foundation, and RUI proposals are evaluated and funded by NSF programs in the disciplinary areas of the proposed research. The Foundation's research programs are summarized in the NSF Guide to Programs located at http://www.nsf.gov/cgi-bin/getpub?nsf0065 on the NSF Web site. Many research projects do not fit neatly into a single NSF program, and NSF disciplinary programs often cooperate in the review of interdisciplinary research and shared-use equipment proposals.The principal difference between RUI proposals and "regular" NSF proposals is the additional requirement that **RUI proposals must include an RUI Impact Statement that describes the expected effects of the proposed research on the research and educational environment of the institution** (see Proposal Preparation). RUI proposals are evaluated in competition with all other proposals submitted to the Foundation in the same area of research, in accordance with the Foundation's standard merit review procedure for that discipline, using the standard NSF review criteria. However, special RUI reviewer instructions, calling attention to the Impact Statement and the special circumstances under which RUI investigators work, are supplied with the request for reviews. Potential applicants are encouraged to consult the NSF *Grant Proposal Guide* (GPG), which provides guidance on the kinds of activities for which NSF support may be requested as well as instructions for proposal preparation. The complete text of the GPG is available electronically on the NSF Web site at http://www.nsf.gov/pubs/2000/nsf002/start.htm. Prospective investigators with specific discipline-related questions are encouraged to contact the program officers in their respective disciplines. In particular, new investigators may find it helpful to

discuss their research plans with NSF disciplinary program officers before submitting a formal proposal to the Foundation. All NSF programs are described in detail on the NSF Web site, and the names and telephone numbers of program officers may be obtained from the Web site by clicking on "Directory and Staff."

B. Single-Investigator and Collaborative Faculty Research Projects

All NSF directorates will consider RUI proposals for faculty research projects submitted by individual faculty members or groups of collaborating investigators. It is expected that the research will usually be carried out at the predominantly undergraduate institution, but there may be circumstances under which the principal research site must be another institution or a research facility, e.g., to provide access to critical instrumentation. Proposals for RUI faculty research projects may request support for salaries and wages, research assistantships, fringe benefits, travel, materials and supplies, publication costs and page charges, consultant services, essential equipment, field work, research at other institutions, and indirect costs. Eligible costs are discussed more fully in the GPG. While it is expected that research assistants usually will be undergraduate students, support for masters-degree students, full-time technicians or postdoctoral researchers may be appropriate to a particular project. Increasingly, advances in research depend on skills and knowledge that extend beyond traditional disciplinary boundaries, and often require the combined skills of several investigators with different expertise. Collaborations within disciplines or across disciplinary lines can enhance the pace and productivity of faculty research while affording students the opportunity to learn teamwork and acquire a broader range of research skills. A successful collaborative project will focus on a research problem that is best approached from broad perspectives. The core of a collaborative RUI research group will include two or more faculty members and several undergraduates from one or more predominantly undergraduate institutions. As appropriate, other personnel and collaborators at other types of institutions may be involved. Proposers should contact the NSF program officer in their discipline regarding the submission of a collaborative proposal to discuss details relevant to that NSF Directorate. In particular, limitations on requests for instrumentation and the possible requirement for a preproposal should be discussed.

C. Shared Research Instrumentation and Tools

Proposals may be submitted under RUI to all NSF research directorates for (1) purchasing or upgrading instrumentation or equipment needed for the research of several faculty members and/or (2) developing new instrumentation that will extend current capability in terms of sensitivity or resolution, or that will provide new or alternative techniques for detection and observation. Instrumentation/equipment requests may be for single items or multiple-component systems. For fields in which research depends heavily on the availability of information from expensive databases, multi-investigator RUI proposals requesting funding for access to such databases will be considered. Several directorates or divisions have formal programs to support multi-user instrumentation requests, and the specific guidelines for these programs should be consulted for details on dollar limitations, matching funds and other requirements before development of a proposal to be submitted through RUI. Requirements vary by program. Specialized instrumentation programs are listed in the section "Other Programs of Interest." Proposals for research instrumentation or equipment, or for database purchase or access, must describe the specific research project (or projects) to be conducted using the instrumentation or databases, state why the instrumentation is essential, and describe the impact of the project and the instrumentation on the department's research environment. While the description of individual research projects may be somewhat shorter than in a research proposal, sufficient detail must be provided for reviewers to judge the merit of the problems to be addressed and the methods proposed. The primary justification for requesting such instrumentation must be the research it will enable, but its use in the institution's instructional program is both expected and encouraged. Many NSF instrumentation programs require cost-sharing, up to one-half of the total cost, and submission under RUI does not exempt the institution from cost-sharing. Indirect costs are not allowed for grants solely for equipment.

D. Research Opportunity Awards

Research Opportunity Awards (ROAs) enable faculty members at predominantly undergraduate institutions to pursue research as visiting scientists with NSF-supported investigators at other institutions. These are usually funded as supplements to ongoing NSF research grants. However, they may be covered by rebudgeting funds already awarded or by inclusion in the original proposal to NSF by either the host or visiting researcher. A Research Opportunity Award is intended to increase the visitor's research capability and effectiveness, to improve research and teaching at his or her home institution, and to enhance the NSF-funded research of the host principal investigator (PI). Most frequently, ROA activities are summer experiences, but partial support of sabbaticals is sometimes provided. ROAs are made at the discretion of the program officer whose budget provides the funding. Except for major instrumentation or equipment, any item acceptable for inclusion under a regular grant proposal (as detailed in the NSF Grant Proposal Guide) may in principle be included in an ROA budget. However, most NSF programs limit support to moderate amounts, frequently including only the direct costs of participation (e.g., salary and fringe benefits for the visitor, travel costs, and essential supplies). Duration of support generally ranges from 2 to 12 months. Requests for ROAs are submitted to NSF by the host institution. Faculty members interested in becoming ROA visiting researchers make their own arrangements with NSF-supported investigators or with researchers who are in the process of applying to NSF for research support. Alternatively, the PI of an ongoing NSF research grant may initiate an ROA collaboration. Potential host researchers may be identified through the search of award abstracts on the NSF Web site. The prospective visiting ROA researcher and the NSF-supported PI at the host institution should work together to develop a research plan and budget. The nature of the research responsibility, the duration of the ROA visit, the nature of the visitor's appointment, the rate of pay, and other arrangements with respect to employment, are matters to be negotiated between the host institution, the PI, the prospective visiting scientist, and his/her home institution, as the proposal is developed.

III. AWARD INFORMATION

Awards for faculty research projects will usually be for a period of 3 years, whereas awards for shared-use major instrumentation are usually for a period of 1 to 2 years. In recent years, the annual award size of individual investigator RUI projects has ranged from approximately $10,000 to over $100,000. Awards for collaborative proposals are expected to be at a higher level, depending on the number of faculty and co-workers involved. Many factors, including the nature of the project, number of investigators, and duration, affect the size. In general, the budget should be appropriate to the scope of the project. The size of shared-use instrumentation awards depends primarily on the cost of the instrumentation (with institutional cost-sharing usually required). Consultation with the cognizant NSF disciplinary program officer is strongly encouraged to determine if the proposed budget is within the appropriate funding range for the particular program and circumstances.

No specific funds are set aside for proposals submitted under this announcement. However, the Foundation invested approximately $26 million in RUI research projects in Fiscal Year 1999.

IV. ELIGIBILITY INFORMATION

Organization Limit:

Proposals may only be submitted by the following:

- See Section III of this announcement.

PI Limit:

See Section III of this announcement.

Limit on Number of Proposals per Organization:

None Specified

Limit on Number of Proposals per PI:

None Specified

Additional Eligibility Info:

Eligibility to submit a RUI proposal has institutional and departmental criteria, both of which must be met. A representative of the institution submitting an RUI proposal signs a Certification of RUI Eligibility included in the Supplementary Documentation section of the proposal.

A. Eligible "predominantly undergraduate" institutions include U.S. two-year, four-year, masters-level, and small doctoral colleges and universities. Eligible institutions (1) grant baccalaureate degrees in NSF-supported fields, or provide programs of instruction for students pursuing such degrees with institutional transfers (e.g., two-year schools); (2) have undergraduate enrollment exceeding graduate enrollment; and (3) award no more than an average of 10 Ph.D. and/or D.Sc. degrees per year in all disciplines that NSF supports, averaged over 2 to 5 years preceding proposal submission. Proposals involving more than one academic institution are acceptable, but one predominantly undergraduate institution must have overall management responsibility. Collaborations between predominantly undergraduate institutions and other institutions may be proposed; however, most of the researchers must be at predominantly undergraduate institutions. *Autonomous campuses in a system are considered independently, although they may be submitting their proposals through a central office. It is therefore very important that the predominantly undergraduate campus be identified as the performing organization on the proposal cover sheet.*

B. Eligible departments (principal investigators) (1) must offer courses that qualify for bachelor's degree credit in NSF-supportable fields and (2) may offer master's degrees, but may not award a doctorate or offer doctoral courses and supervise doctoral research, even though the Ph.D. is not technically awarded by that campus. The principal investigator for a RUI proposal must be employed by, or have a commitment to be employed by, an eligible home institution (i.e., a predominantly undergraduate institution) at the time the proposal is submitted. In addition, the principal investigator must be from an eligible (i.e., non-doctoral) department. Co-principal investigators may be from other institutions, or from doctoral departments.Because RUI proposals are handled by the disciplinary program officers in conjunction with all other proposals in the same research area, duplicate submission of the same proposal through RUI and without the RUI designation is not permitted. However, an investigator may submit a different proposal for support of another project while a proposal is pending. The Directorate for Biological Sciences will not accept proposals that are duplicates of proposals being submitted to another Federal agency for simultaneous consideration, except for proposals from beginning investigators. The *Grant Proposal Guide* should be consulted for definitions and exceptions to this rule. The GPG also should be consulted regarding limitations on the kinds of research that NSF supports. See "General" on page 1 of the GPG.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Preparation Instructions: Proposals submitted in response to this program announcement 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 nsfpubs@nsf.gov.The NSF FastLane system should be used for submission of all proposals under the RUI activity. Some NSF directorates also require the submission of supplemental requests via FastLane, including ROA supplemental request. Preproposals are not required for unsolicited RUI proposals. If submitting a proposal under a special solicitation that requires preproposals, follow the instructions in that solicitation. Include a Certification of RUI Eligibility as described under "Supplementary Documentation" below.

REQUESTS FOR RESEARCH OPPORTUNITY AWARDS A formal request for an ROA supplement must be made by the host institution of the NSF-supported PI who wishes to employ a faculty member from another institution under an ROA collaboration. If funds for the ROA are to be generated by rearranging the project budget of an ongoing award without changing the scope of the project, notification of the NSF program officer is the only requirement. Arrangements for supplemental ROA support to an existing award should be discussed with the cognizant disciplinary program officer and tentative approval obtained prior to submission of the request. The formal ROA request letter from the funded principal investigator must be endorsed by the grantee organization and submitted via FastLane as a supplement at least 3 months before funds will be needed. It must include a description of the arrangements and the work to be performed by the ROA visitor, a statement of the contribution of this work to the NSF-supported project and to the visitor's future research and home organization, a budget with appropriate explanatory information, and a biographical sketch of the visitor. This same information should be supplied for a Research Opportunity Award that is incorporated into a new research proposal.

RESEARCH AND INSTRUMENTATION PROPOSALSRUI proposals for shared instrumentation should be prepared using any special guidelines for the program to which the proposal will be submitted. Otherwise, research and instrumentation proposals responding to this program announcement must be prepared and submitted in accordance with the general guidelines contained in

the GPG.

RUI proposals differ from other proposals primarily in that they must contain (1) a Certification of RUI Eligibility and (2) a separate RUI Impact Statement (see below). Proposals must be submitted via the NSF FastLane System. See the "FastLane Requirements" section below and the "Instructions for Preparing and Submitting a Standard Proposal via FastLane" located at https://www.fastlane.nsf.gov/a1/newstan.htm.

Cover Sheet. So that your proposal is properly identified and directed, please follow these instruction for NSF Form 1207, "Cover Sheet for Proposal to the National Science Foundation." From the pulldown menu for the program announcement/solicitation block, select the number for this RUI announcement. From the ensuing screen, select the Division and Program to which the proposal should be directed. Include the acronym "RUI" in the title of the proposal entered on the Cover Sheet, e.g. "RUI: Metabolic Cycles in Arctic Ruminants." If the proposal is being submitted in response to a specific Foundation-level solicitation, such as Information Technology Research or Biocomplexity, include the appropriate acronym in the title also and identify the solicitation in the Project Summary. Follow instructions in the solicitation to identify the Division and Program to which the proposal should be directed.

Project Description. Proposers should pay particular attention to the Project Description, which is the principal part of the proposal. It is a detailed statement of the work to be undertaken and should include:

- A section entitled "Results from Prior NSF Support" (if any of the participating faculty members has held an NSF award for research or instrumentation within the last 5 years). If more than one NSF award is involved, this section should describe the project most relevant to the proposed new project. This section must describe the earlier project and its outcomes in sufficient detail to allow reviewers to judge the scientific value of the results achieved in the previous NSF-supported project. Brief discussions of the outcomes of several projects may be appropriate to a collaborative proposal. This part of the project description must not exceed five pages.

- Objectives for the work and its expected significance; relation to the present state of knowledge and to work in progress in the field; description of the general plan of the work, including experimental methods and analysis and, if appropriate, plans for archival materials or data-sharing. This description must contain sufficient detail to allow the reviewers to assess the scientific merit of the project.

- For collaborative proposals, the thematic basis of the collaboration(s) underlying the research project and a description of the expected contribution of each of the faculty members to the proposed research project. Collaborative proposals are expected to include (1) a strong research activity whose scientific merit is clearly enhanced by development of the collaboration, (2) a project theme that takes advantage of the strengths of the particular institution(s), justifying the nature of the research in that context, and (3) a research plan that enhances the research productivity of all faculty and student investigators involved.

- A description of how student involvement in the research project and in the presentation of research results will be fostered; how the research will be integrated with the students' education; how the equipment, if requested, will enhance the research; and educational uses planned for the instrumentation.

Faculty participants in research and instrumentation proposals are encouraged to include in their "Biographical Sketches" publications with undergraduate co-authors (with student names labeled by an asterisk).

Supplementary Documentation

Impact Statement. All RUI proposals must include a RUI Impact Statement (maximum length 5 pages). The statement is an opportunity to provide information that a reviewer will find helpful in assessing the likely impact of the proposed research activity on the research environment of the predominantly undergraduate institutions(s), on the career(s) of the faculty participants, and on the ability of the involved department(s) to prepare students for entry into advanced-degree programs and/or careers in science and engineering. An enhanced departmental environment may be reflected in direct student training in research and in increased involvement of the faculty in competitive research, which in turn leads to improved student preparation. It may also be reflected in curricular impact and faculty development. The RUI Impact Statement should highlight the record of the department(s) and institution(s) in educating undergraduates for science and engineering careers; the plans to attract qualified undergraduate students to the project, including the criteria for their selection; provisions that will increase the participation of groups underrepresented in science and engineering; and any plans for measuring the effect of participation in the project on the participating students both during and after their undergraduate years. Also of interest is the anticipated contribution of new research tools (instrumentation, databases, etc.) to both educational and research opportunities for students and faculty. The Impact Statement may include information on factors affecting research productivity such as teaching loads, availability (or lack) of support personnel, nature of experimental and computational facilities, and features of the student population. It may also describe institutional support for research activity by faculty and students and the anticipated impact of that support on the proposed project.

Certification of RUI Eligibility. The following Certification, executed by an Authorized Institutional Representative, must be provided in RUI proposals. The signed Certification should be scanned and included in the proposal as Supplementary Documentation. Institutions are allowed some leeway in the period over which the number of doctorates is averaged, in order to avoid negative effects of short-term anomalies in the number of doctorates awarded.

----------------------- Certification of RUI Eligibility -------------------------------

"By submission of this proposal, the institution hereby certifies that the originating and managing institution is an institution that offers courses leading to a bachelor's or master's degree, but has awarded an average of no more that 10 doctoral degrees per year in NSF-supported disciplines over the 2-to-5-year period preceding proposal submission." Authorized Institutional Representative

Authorized Institutional Representative:_____
Typed Name and Title:_____
Signature:_____ Date:_____

Letters of Commitment. Signed letters of commitment, documenting the proposed collaborative arrangements of significance to the project, should be scanned and included in the proposal as supplementary documentation. Such letters are relevant when collaborators are not employees of the awardee institution or when the project depends on access to facilities or instrumentation at other institutions. Letters of endorsement are not permitted.

Proposers are reminded to identify the program announcement number (NSF 00-144) in the program announcement 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: Cost sharing is not required under this announcement.

Other Budgetary Limitations: Cost-sharing is required by most of the NSF instrumentation programs and may be required by specific program solicitations. Except for proposals submitted to such programs, cost-sharing is not required for proposals submitted under this announcement.

C. Due Dates

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

     Proposals Accepted Anytime

Many NSF programs have deadlines or target dates to allow time for consideration by review panels that meet periodically. Proposals must be submitted by the investigator's home institution in accordance with the target dates or deadlines, if any, of the NSF disciplinary program in the proposed research area. To confirm a date, refer to the program's page on the NSF Web site (http://www.nsf.gov/) or to the NSF E-Bulletin, at http://www.nsf.gov/home/ebulletin/. Inquiries about deadlines may be made also to the appropriate research program officer. Such inquiries are especially important for shared-use instrumentation proposals, which are sometimes funded cooperatively by two or more programs, depending upon the disciplinary mix of the users. Some programs require the submission of preliminary proposals prior to the submission of full proposals, with due dates posted on program Web sites and in the NSF E-Bulletin.

D. FastLane Requirements

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

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

Proposers should also be aware of core strategies that are essential to the fulfillment of NSF's mission, as articulated in *Empowering the Nation Through Discovery and Innovation: NSF Strategic Plan for Fiscal Years (FY) 2011-2016*. These strategies are integrated in the program planning and implementation process, of which proposal review is one part. NSF's mission is particularly well-implemented through the integration of research and education and broadening participation in NSF programs, projects, and activities.

One of the core strategies in support of NSF's mission is to foster integration of research and education through the programs, projects and activities it supports at academic and research institutions. These institutions 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 variety of learning perspectives.

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

A. Merit Review Principles and Criteria

The National Science Foundation strives to invest in a robust and diverse portfolio of projects that creates new knowledge and enables breakthroughs in understanding across all areas of science and engineering research and education. To identify which projects to support, NSF relies on a merit review process that incorporates consideration of both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission "to promote the progress of science; to advance the

national health, prosperity, and welfare; to secure the national defense; and for other purposes." NSF makes every effort to conduct a fair, competitive, transparent merit review process for the selection of projects.

1. Merit Review Principles

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

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

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

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

2. Merit Review Criteria

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

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

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

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

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

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

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

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

Additional Solicitation Specific Review Criteria

Specific to RUI and ROA Each request for an ROA supplement is judged on its own merits and is handled on an ad hoc basis by the supervising program officer for the existing award. Consideration is given to the capability of the investigators, the technical soundness of the proposed effort, the contribution of the ROA activity to the ongoing research project, and its potential impact upon the ROA visitor and the visitor's institution. RUI proposals are evaluated in competition with all other proposals submitted to the Foundation in the same area of research, in accordance with the Foundation's standard merit review procedure for that discipline, using the standard NSF review criteria. The reviewers of RUI proposals usually include several individuals from predominantly undergraduate institutions with relevant expertise, but also researchers from other institutions who are experts in the particular research area. Special RUI reviewer instructions are supplied with the request for reviews, calling attention to the Impact Statement and the special circumstances under which RUI investigators work, which may affect the scope of the project. Reviewers are also asked to recognize that the publication rate of investigators and the pace of their research may be slower at a predominantly undergraduate institution than at a major research university because of heavier teaching loads and limited availability of support personnel, facilities and equipment, as well as the involvement of undergraduates, rather than graduate students, in the research activities. The description of the environment in which the principal investigator works should be so written as to permit the

reviewers to take such factors into account. Reviewers will look for indications of impacts such as: increased faculty involvement in the mainstream of research; direct student experience in research; acquisition of research instrumentation that will improve faculty and student research opportunities; and enhanced departmental ability to prepare students for entry into graduate study or scientific and engineering careers, as well as to provide a research-enriched learning environment for all students. Evaluation of research instrumentation proposals may consider such additional factors as the criticality of the instrumentation for the research proposed, the expected extent of usage of the instrumentation and the number of investigators and students benefiting, and the institution's commitment for operation and maintenance.

B. Review and Selection Process

Proposals submitted in response to this program announcement 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, 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

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 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.

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 prior to the end of the current budget period. (Some programs or awards require submission of more frequent project reports). Within 90 days following expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

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

PIs are required to use NSF's electronic project-reporting system, available through Research.gov, for preparation and submission of annual and final project reports. Such reports provide information on accomplishments, project participants (individual and organizational), publications, and other specific products and impacts of the project. Submission of the report via Research.gov constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report also must

be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

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

VIII. AGENCY CONTACTS

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

General inquiries regarding this program should be made to:

- Richard J. Fragaszy, Program Director, ENG/EFRI, 545 S, telephone: (703) 292-8360, email: rfragasz@nsf.gov

- Jill L. Karsten, Program Director for Diversity and Education in GEO, GEO/OAD, 705 N, telephone: (703) 292-7718, fax: (703) 292-9042, email: jkarsten@nsf.gov

- Michael Mishkind, Program Director, BIO/IOS, 685, telephone: (703) 292-8413, email: mmishkin@nsf.gov

- Julie M. Palais, Glaciology Program Program Manager, GEO/PLR, 755 S, telephone: (703) 292-8033, fax: (703) 292-9079, email: jpalais@nsf.gov

- Edward Taylor, Program Director, MPS/DMS, 1025 N, telephone: (703) 292-4872, email: etaylor@nsf.gov

- Harriet G. Taylor, Program Director, CISE/CNS, 1175, telephone: (703) 292-8950, email: htaylor@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@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, "My NSF" is an information-delivery system designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Grants Conferences. Subscribers are informed through e-mail or the user's Web browser each time new publications are issued that match their identified interests. "My NSF" 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.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

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

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

Facilitation Awards for Scientists and Engineers with Disabilities 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**   (703) 292-5111
  (NSF Information Center)**:**

- **TDD (for the hearing-impaired):**   (703) 292-5090

- **To Order Publications or Forms:**

  Send an e-mail to: nsfpubs@nsf.gov

  or telephone: (703) 292-7827

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

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

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

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. 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
Office of the General Counsel
National Science Foundation
Arlington, VA 22230

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Last Updated:
11/07/06
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