

Technological Challenges in Hybrid Communications Systems

Program Solicitation

NSF 06-547



National Science Foundation

Directorate for Engineering
Division of Electrical and Communications Systems
Division of Chemical and Transport Systems
Division of Design and Manufacturing Innovation
Office of International Science and Engineering

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

June 06, 2006

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Technological Challenges in Hybrid Communications Systems

Synopsis of Program:

The National Science Foundation (NSF), through the Divisions of Electrical and Communications Systems, Chemical and Transport Systems, and Design and Manufacturing Innovations in the Directorate for Engineering, and the Office of International Science and Engineering, announces a solicitation on technological challenges in hybrid communications systems. This topic, with broad disciplinary research and educational activities, integrates wireless optical, and RF/microwave communications systems, for domain specific applications. The solicitation seeks proposals on novel concepts in hybrid communications systems including advanced photonic and wireless integrated circuits; new approaches and methodologies to develop architectures for hybrid networks; and new mathematical models to simulate the performance of components, interfaces, sub-systems, systems and interfaces to advance seamless integration of wireless optical and RF/microwave communications.

Cognizant Program Officer(s):

- Leda Lunardi, Program Director and Solicitation Coordinator, Directorate for Engineering, Division of Electrical & Communications Systems, 675 S, telephone: (703) 292-8339, fax: (703) 292-9147, email: llunardi@nsf.gov
- Jeanne E. Hudson, Senior Program Manager, Office of the Director, Office of International Science and Engineering, 935 N, telephone: (703) 292-8702, fax: (703) 292-9067, email: jhudson@nsf.gov
- Usha Varshney, Division Director, Directorate for Engineering, Division of Electrical & Communications Systems, 675 S, telephone: (703) 292-8339, fax: (703) 292-9147, email: uvarshne@nsf.gov
- Maria K Burka, Program Director, Directorate for Engineering, Division of Chemical & Transport Systems, 525 N, telephone: (703) 292-7030, fax: (703) 292-9054, email: mburka@nsf.gov
- Donald Senich, Senior Advisor and Program Director for Grant Opportunity for Academic Liaison with Industry (GOALI), Directorate for Engineering, Division of Design and Manufacturing Innovation, 550 S, telephone: (703) 292-7082, fax: (703) 292-9056, email: dsenich@nsf.gov

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

- 47.041 --- Engineering
- 47.079 --- International Science and Engineering (OISE)

Eligibility Information

• Organization Limit:

Proposals may only be submitted by U.S. academic institutions and nonprofit research organizations in support of single investigators or small interdisciplinary groups of up to three investigators.

• PI Eligibility Limit:

An individual may participate in only one proposal, whether as PI, co-PI, or non-senior personnel. Individuals considering the submission of a small group proposal should contact the solicitation coordinator prior to proposal submission to clarify the appropriateness of the contemplated group proposal.

- **Limit on Number of Proposals:** None Specified.

Award Information

- **Anticipated Type of Award:** Standard or Continuing Grant
- **Estimated Number of Awards:** 10 to 15
- **Anticipated Funding Amount:** \$3,850,000 in FY2006 pending availability of funds

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Full Proposal Preparation Instructions:** This solicitation contains information that supplements the standard 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 by NSF.
- **Indirect Cost (F&A) Limitations:** Not Applicable.
- **Other Budgetary Limitations:** Not Applicable.

C. Due Dates

- **Full Proposal Deadline Date(s)** (due by 5 p.m. submitter's local time):
June 06, 2006

Proposal Review Information

- **Merit Review Criteria:** National Science Board approved criteria apply.

Award Administration Information

- **Award Conditions:** Standard NSF award conditions apply.
- **Reporting Requirements:** Standard NSF reporting requirements apply.

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I. INTRODUCTION

Communications systems differ in their inherent physical infrastructure, thereby limiting their networks performance with tradeoffs in bandwidth, capacity, and size. In the current mobile-driven society, an ideal approach to eliminate and maximize the network's utilization would be to integrate different communications systems (wireless optical and RF/microwave) into a hybrid configuration.

Hybrid communications systems could provide increased data capacity while offering a seamless integration of an efficient and agile network with an embedded infrastructure network or vice-versa. Integration technologies include a combination of components, sub-system and system functions, chip-level assembly, and other schemes targeted to network applications. These technologies would take advantage of self-organizing networks functioning in sleep mode with low-power consumption and routing situations that require minimum wiring by exploiting the amalgamation of network alternatives such as satellites and mixed-mode systems under extreme or emergency situations. To accomplish the goal of hybrid integration of wireless optical and RF/Microwave communications, there is a need for packaging methodologies, new architectures and low power consumption strategies.

The creation of a strong scientific and technological base ranging from interface engineering to communication theory, and from circuit design and systems to manufacturing will become increasingly important to advance the frontiers of hybrid communications systems. This research will foster interaction among numerous disciplines that will impact the fields of electronics, photonics, electromagnetism, and communication systems. Consequently, there is a need to address the scientific issues and challenges associated with the underpinnings of systems integration in hybrid communications.

II. PROGRAM DESCRIPTION

This focused activity seeks forward-looking, high-risk/high-impact studies of novel engineering concepts in hybrid communications systems. Proposals are sought under this solicitation that address major advances in the state-of-the-art in hybrid communications with the goal of producing significant benefits to society. The research will be carried out by single

investigators or small inter-disciplinary groups with the objective of generating new concepts and approaches stimulated by interactions among diverse disciplines. Novel stand-alone concepts and breakthrough ideas are strongly encouraged. The focus of this solicitation is on hybrid communications systems, rather than disciplinary approaches in wireless optical communications or wireless/RF/microwave communications. Research should focus on critical, enabling engineering technologies for systems applications and long-term growth. Such research might include concepts for theoretical and experimental aspects of interface engineering, modeling and simulation, integration technologies, systems engineering, and network architectures. The initiative bridges science and technology by introducing new concepts, and has as its intent the promotion of evolution of thought and techniques that address issues ranging from fundamentals to applications. Proposals should discuss effective ways in which education and outreach activities are integrated within the research program to achieve the broader impacts of the proposed activity. Cooperation among academia, industry, and national laboratories is encouraged.

Given the worldwide expansion of research and education, **international collaborations** that advance hybrid communications goals and strengthen proposed project activities are encouraged. There is an opportunity for coordinated funding with colleagues from foreign institutions who will add value to the project. This program will support US-based scientists. Collaborators in institutions outside the US must seek funding from their respective funding organizations. International collaborations will be evaluated on the value that they add to the domestic research proposed and to the US S&T enterprise. NSF requires that proposals with international collaborations include the following: description of the collaboration; discussion of US and foreign contributions to the project; costs to travel to and work with foreign partners; costs for students to travel overseas for short or extended visits in foreign laboratories; foreign collaborators' biographical sketches (CVs); and documentation of their agreement to collaborate on the proposed project, as well as the means by which they will support their part of the work (<http://www.nsf.gov/OISE>).

Proposals involving industrial partnerships following the **Grant Opportunities for Academic Liaison with Industry** (GOALI, <http://www.nsf.gov/home/crssprgm/goali/>) guidelines are strongly encouraged.

Interested parties are encouraged to contact one of the cognizant Program Officers prior to submitting a proposal.

TOPICAL AREAS:

This solicitation will provide research support under four broadly defined topical areas. Specific areas include, but are not limited to, the following topics:

- **Interface Engineering for Hybrid Communications Systems**

Research proposals are invited that advance the engineering and fundamental understanding at the interface between optical and microwave hybrid systems. Proposals that address solutions to existing discontinuities in hybrid systems and their effect upon overall system performance are encouraged. Research proposals advancing the understanding of fundamental properties that elucidate advanced switching schemes and performance limitations are invited under this topic. Specific issues relating to new innovative technologies that enable higher speed for inter- and intra-chip signaling are of interest.

- **Modeling and Simulation of Integrative and Hybrid Communications Systems**

Proposals are invited that address robust mathematical modeling and diagnostic tools to enable simulation of sub-system and system performance. Proposals are also invited in the area of efficient coding, novel modulation techniques, and mathematical tools to achieve better spectral efficiency or to study the limitations of hybrid communications systems.

- **Integration of Hybrid Communications Systems**

Proposals involving technologies that facilitate the integration of hybrid RF/Microwave and Photonic Integrated Circuits (MPICs) at the board level with improved performance, reduced component size, and new functionality are encouraged.

- **Systems Engineering and Network Architectures for Hybrid Communications**

Research proposals that investigate new and novel architectures for hybrid systems are encouraged. Research in this area includes reconfigurable self-organizing hybrid network schemes for seamless transitions between RF/Microwave and optical-guided wave as well as RF-to-free space optics that exploit network possibilities such as satellites, fiber optic backbone and mixed-mode systems, among others. Proposals involving new concepts and design methodologies are also encouraged, such as the creation of

new schemes for the integration of sub-systems' and systems' architectures for various operational environments including extreme or emergency situations. Other areas of interest include high-speed memory access for rate conversion, multi-gigabit per second hybrid systems for multiple mobile users, and advanced channel coding techniques in hybrid systems.

III. ELIGIBILITY INFORMATION

Proposals may only be submitted by U.S. academic institutions and nonprofit research organizations in support of single investigators or small interdisciplinary groups of up to three investigators.

An individual may participate in only one proposal, whether as PI, co-PI, or non-senior personnel. Individuals considering the submission of a small group proposal should contact the solicitation coordination prior to proposal submission to clarify the appropriateness of the contemplated group proposal.

There is no limit on the number of proposals an eligible organization may submit.

IV. AWARD INFORMATION

Awards up to \$300,000 for one or two investigators and up to \$450,000 for a small interdisciplinary group up to three investigators, for a duration up to three years are anticipated, pending on the availability of funds.

- Anticipated Type of Award: Standard or Continuing Grant
- Estimated Number of Awards: 10 to 15
- Anticipated Funding Amount: \$3,850,000 in FY2006 pending availability of funds

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Instructions:

Proposals submitted in response to this program announcement/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. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

The following instructions supplement the NSF *Grant Proposal Guide* (GPG):

NSF requires that proposals with international collaborations include the following: description of the collaboration; discussion of US and foreign contributions to the project; costs to travel to and work with foreign partners; costs for students to travel overseas for short or extended visits in foreign laboratories; foreign collaborators' biographical sketches (CVs); and documentation of their agreement to collaborate on the proposed project, as well as the means by which they will support their part of the work (<http://www.nsf.gov/OISE>).

Proposals involving industrial partnerships following the **Grant Opportunities for Academic Liaison with Industry** (GOALI, <http://www.nsf.gov/home/crssprgm/goali/>) guidelines are strongly encouraged.

Interested parties are encouraged to contact one of the cognizant Program Officers prior to submitting a proposal.

Proposers are reminded to identify the program announcement/solicitation number (06-547) in the program announcement/solicitation block on the proposal Cover Sheet. 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 by NSF in proposals submitted under this Program Solicitation.

C. Due Dates

Proposals must be submitted by the following date(s):

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

June 06, 2006

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this announcement/solicitation through the FastLane system. Detailed instructions for proposal 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. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program announcement/solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this announcement/solicitation.

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. Proposers are no longer required to provide a paper copy of the signed Proposal Cover Sheet to NSF. Further instructions regarding this process are available on the FastLane Website at: <http://www.fastlane.nsf.gov>

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

The National Science Board approved revised criteria for evaluating proposals at its meeting on March 28, 1997 ([NSB 97-72](#)). All NSF proposals are evaluated through use of the two merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

On July 8, 2002, the NSF Director issued [Important Notice 127](#), Implementation of new Grant Proposal Guide Requirements Related to the Broader Impacts Criterion. This Important Notice reinforces the importance of addressing both criteria in the preparation and review of all proposals submitted to NSF. NSF continues to strengthen its internal processes to ensure that both of the merit review criteria are addressed when making funding decisions.

In an effort to increase compliance with these requirements, the January 2002 issuance of the GPG incorporated revised proposal preparation guidelines relating to the development of the Project Summary and Project Description. Chapter II of the GPG specifies that Principal Investigators (PIs) must address both merit review criteria in separate statements within the one-page Project Summary. This chapter also reiterates that broader impacts resulting from the proposed project must be addressed in the Project Description and described as an integral part of the narrative.

Effective October 1, 2002, NSF will return without review proposals that do not separately address both merit review criteria within the Project Summary. It is believed that these changes to NSF proposal preparation and processing guidelines will more clearly articulate the importance of broader impacts to NSF-funded projects.

The two National Science Board approved merit review criteria are listed below (see the [Grant Proposal Guide](#) Chapter III.A for further information). 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 he/she is qualified to make judgments.

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 and original 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?

NSF staff 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.

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by Ad Hoc 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.

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 Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

NSF is striving to be able to tell proposers whether their proposals have been declined or recommended for funding within six months. The time interval begins on the closing date of an announcement/solicitation, or the date of proposal receipt, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

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 Division 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.A. 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 (NSF-GC-1); * or Federal Demonstration Partnership (FDP) Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

Consistent with the requirements of OMB Circular A-16, *Coordination of Geographic Information and Related Spatial Data Activities*, and the Federal Geographic Data Committee, all NSF awards that result in relevant geospatial data must be submitted to Geospatial One-Stop in accordance with the guidelines provided at: www.geodata.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpm. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Website at <http://www.gpo.gov/>.

*These documents may be accessed electronically on NSF's Website at <http://www.nsf.gov/awards/managing/>. Paper copies of these documents may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for the PI and all Co-PIs. 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. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, 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.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding this program should be made to:

- Leda Lunardi, Program Director and Solicitation Coordinator, Directorate for Engineering, Division of Electrical & Communications Systems, 675 S, telephone: (703) 292-8339, fax: (703) 292-9147, email: llunardi@nsf.gov
- Jeanne E. Hudson, Senior Program Manager, Office of the Director, Office of International Science and Engineering, 935 N, telephone: (703) 292-8702, fax: (703) 292-9067, email: jhudson@nsf.gov
- Usha Varshney, Division Director, Directorate for Engineering, Division of Electrical & Communications Systems, 675 S, telephone: (703) 292-8339, fax: (703) 292-9147, email: uvarshne@nsf.gov
- Maria K Burka, Program Director, Directorate for Engineering, Division of Chemical & Transport Systems, 525 N, telephone: (703) 292-7030, fax: (703) 292-9054, email: mburka@nsf.gov
- Donald Senich, Senior Advisor and Program Director for Grant Opportunity for Academic Liaison with Industry (GOALI), Directorate for Engineering, Division of Design and Manufacturing Innovation, 550 S, telephone: (703) 292-7082, fax: (703) 292-9056, email: dsenich@nsf.gov

For questions related to the use of FastLane, contact:

- Gwendolyn Owens, Administrative Manager, Directorate for Engineering, Division of Electrical & Communications Systems, 675 S, telephone: (703) 292-8339, fax: (703) 292-9147, email: gowens@nsf.gov

IX. OTHER PROGRAMS OF INTEREST

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at <http://www.nsf.gov/cgi-bin/getpub?gp>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF *E-Bulletin*, which is updated daily on the NSF Website at <http://www.nsf.gov/home/ebulletin>, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's *MyNSF News Service* (<http://www.nsf.gov/mynsf/>) to be notified of new funding opportunities that become available.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF, although some programs may have special requirements that limit eligibility.

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the GPG Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230

- **For General Information** (NSF Information Center): (703) 292-5111

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

- **To Order Publications or Forms:**

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

or telephone: (703) 292-7827

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

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; 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 applicant 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 needing information as part of the review process or in order to coordinate programs; 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," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). 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 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 this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Division of Administrative Services, National Science Foundation, Arlington, VA 22230.

OMB control number: 3145-0058.

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