

Approaches to Combat Terrorism (ACT)

Opportunities in Basic Research in the Mathematical and Physical Sciences with the Potential to Contribute to National Security

A Partnership Between The NSF Directorate of Mathematical and Physical Sciences and The Intelligence Community

Program Solicitation

NSF 03-569



National Science Foundation

Directorate for Mathematical and Physical Sciences

Division of Astronomical Sciences

Division of Chemistry

Division of Materials Research

Division of Mathematical Sciences

Division of Physics

Supplement, SGER and Workshop Proposal Deadline(s) (due by 5 p.m proposer's local time):

July 17, 2003

REVISIONS AND UPDATES

For ACT supplements, proposers should enter the phrase "**In response to NSF 03-569**" at the top of the Summary Of Proposed Work. Failure to submit this information may delay processing.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Approaches to Combat Terrorism (ACT)

Opportunities in Basic Research in the Mathematical and Physical Sciences with the Potential to Contribute to National Security

A Partnership Between The NSF Directorate of Mathematical and Physical Sciences and The Intelligence Community

Synopsis of Program:

The National Science Foundation's Directorate for Mathematical and Physical Sciences (MPS) and the Intelligence Community (IC) are coordinating efforts to identify bold new concepts in basic research and workforce development in the MPS disciplines with the potential to contribute to national security. This solicitation is intended to inform researchers in disciplines supported by the MPS Directorate--the Divisions of Astronomical Sciences, Chemistry, Materials Research, Mathematical Sciences, and Physics--that NSF welcomes requests for supplements to existing grants, proposals for Small Grants for Exploratory Research, and proposals for workshops that promote the objectives of this ACT pilot program.

Cognizant Program Officer(s):

- Eileen D. Friel, Executive Officer, Directorate for Mathematical & Physical Sciences, Division of Astronomical Sciences, 1045 S, telephone: (703) 292-4895, fax: (703) 292-9034, email: efriel@nsf.gov
- Vernon L. Pankonin, Program Director, Directorate for Mathematical & Physical Sciences, Division of Astronomical Sciences, 1045 S, telephone: (703) 292-4902, fax: (703) 292-9034, email: vpankoni@nsf.gov
- Janice M. Hicks, Program Director, Directorate for Mathematical & Physical Sciences, Division of Chemistry, 1055 S, telephone: (703) 292-4956, fax: (703) 292-9037, email: jhicks@nsf.gov
- Lynn Schneemeyer, Program Director, Directorate for Mathematical & Physical Sciences, Division of Chemistry, 1055 S, telephone: (703) 292-4945, fax: (703) 292-9037, email: lschneem@nsf.gov
- LaVerne D. Hess, Program Director (EM), Directorate for Mathematical & Physical Sciences, Division of Materials Research, 1065 N, telephone: (703) 292-4937, email: lhess@nsf.gov
- Hugh M. Van Horn, Senior Scientist/Program Director (NAF), Directorate for Mathematical & Physical Sciences, Division of Materials Research, 1065 N, telephone: (703) 292-4920, email: hvanhorn@nsf.gov
- Hans G. Kaper, Program Director, Directorate for Mathematical & Physical Sciences, Division of Mathematical Sciences, 1025 N, telephone: (703) 292-4879, fax: (703) 292-9032, email: hkaper@nsf.gov
- Michael H. Steuerwalt, Program Director, Directorate for Mathematical & Physical Sciences, Division of Mathematical Sciences, 1025 N, telephone: (703) 292-4860, fax: (703) 292-9032, email: msteuerw@nsf.gov
- Bradley D. Keister, Program Director, Directorate for Mathematical & Physical Sciences, Division of Physics, 1015 N, telephone: (703) 292-7377, fax: (703) 292-9078, email: bkeister@nsf.gov
- Thomas Lucatoro, Program Director, Directorate for Mathematical & Physical Sciences, Division of Physics, 1015 N, telephone: (703) 292-7373, email: tlucator@nsf.gov

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

- 47.049 --- Mathematical and Physical Sciences

Eligibility Information

- **Organization Limit:** None Specified.
- **PI Eligibility Limit:** None Specified.
- **Limit on Number of Proposals:** None Specified.

Award Information

- **Anticipated Type of Award:** Standard Grant
- **Estimated Number of Awards:** 35 to 50 - supplements, SGERs, and workshops will be supported
- **Anticipated Funding Amount:** \$3,500,000 in FY 2003, pending availability of funds

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Supplement, SGER and Workshop Instructions:** This solicitation contains information that deviates from 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.
- **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

- **Supplement, SGER and Workshop Proposal Deadline Date(s)** (due by 5 p.m proposer's local time):
July 17, 2003

Proposal Review Information

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

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I. INTRODUCTION

The National Science Foundation's charter states that the agency's mission is "to promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense". From the laser to computer hardware, from digital imaging and data mining to tools for sequencing biopathogens, basic research supported by NSF's MPS Directorate has led to breakthroughs in technology that have contributed substantially to our national security. This element of NSF's mission has assumed even greater significance since the attacks of September 11, 2001 and subsequent bioterrorism attacks.

Representatives of the MPS community comprising its Advisory Committee addressed the critical role that MPS basic research plays in national security in the document, "Reinvestment Initiative in Science and Engineering", which may be found at <http://www.nsf.gov/mps/activities/acweb/may02/rise.pdf>. In May 2002, the MPS Advisory Committee issued a document that responds directly to the February 2001, Hart-Rudman Report, "Road Map for National Security: Imperative for Change". The MPS Advisory Committee's document entitled "Recommended MPS Response to the Hart-Rudman Report" is available at http://www.nsf.gov/mps/activities/acweb/may02/recommend_hartrudman_0502.pdf. In essence, the Advisory Committee urged the MPS Directorate to develop partnerships with appropriate agencies that can lead to joint programs through which the MPS scientific community can contribute to basic research and workforce development relevant to national security.

In response to the Advisory Committee's recommendations, the NSF and the Intelligence Community (IC) held a joint workshop on "Approaches to Combat Terrorism (ACT): Opportunities for Basic Research" in Chantilly, VA on November 19-21, 2002. Chaired by Ernest Moniz, Massachusetts Institute of Technology, and John Baldeschwieler, California Institute of Technology, the workshop brought together approximately 60 individuals from academic, industrial and government laboratories with representatives from NSF and the IC. The workshop report identifies representative areas where MPS basic research can make contributions, including energy sources, mathematical techniques, image reconstruction and analysis, sensors and detectors, and optical spectroscopies. While there is considerable activity currently supported by the MPS Directorate in these and related areas, the workshop revealed the need to embolden the MPS community to identify approaches with the potential to provide "quantum leaps" in technology through support of basic research. The workshop also identified the development of a scientific workforce trained in the MPS disciplines as critical to national security.

As a result of the workshop, the five Divisions comprising the MPS Directorate and the MPS Office of Multidisciplinary Activities (OMA) will join with the IC to support innovative basic research and workforce development projects that will enhance the MPS community's ability to contribute to national security. Reflecting the need for prompt action, the MPS Directorate and IC are initiating this ACT pilot program. This solicitation calls for requests for supplements to existing MPS grants, and for proposals for Small Grants for Exploratory Research (SGERs) and for workshops with the potential to contribute to national security.

II. PROGRAM DESCRIPTION

Informed by the aforementioned joint NSF-IC workshop, each of the five Divisions has identified basic research opportunities. Although listed below by Division, many of the areas are interdisciplinary. A prime example is power sources – advances in this area could be of major benefit to the IC. Power options beyond traditional battery systems are encouraged, including mechanical or other means. Practical hydrogen storage is a key need for practical implementation of hydrogen as a fuel for energy and power generation both in commercial and specialized IC activities. Efficient conversion of liquid fuels into usable energy and power is an ongoing IC need with high payoff possibilities. Similarly, improved methods for harvesting solar and electromagnetic energy from the IR through the visible and into the UV are needed. Methods to efficiently convert small temperature differences (less than 10 degrees Celsius) into usable

electric currents are of interest. Improved capabilities for modeling the energy conversion process, particularly at interfaces in both existing battery systems as well as newly developed energy conversion systems, are of interest. Other interdisciplinary examples include imaging, where objectives like sharpening and extrapolating images occur in many disciplinary contexts; and sensing, which might couple recognition, transduction, and signal processing elements. Interdisciplinary efforts are encouraged, including those involving participants whose area of expertise lies outside of the MPS disciplines, but must be led by a Principal Investigator from an MPS discipline and technically centered in areas supported by the MPS Directorate. A number of possible research areas are presented below. The examples provided are only meant to be illustrative and not exhaustive: Unanticipated approaches to enhancing national security are especially valuable.

Astronomical Sciences: Activities involving remote sensing and image reconstruction over the full spectral range are of interest. Advanced optical designs, including miniaturization, adaptive optics, and the measurement and characterization of atmospheric turbulence are all of relevance. Astronomy is well known for its sensitive detectors in radio frequencies. Their further use in personal security applications, surveillance, localization, and tracking are potential areas for development. The broad range of issues associated with image reconstruction and analysis -particularly the pursuit of techniques for management of vast datasets, the presentation and visualization of metadata and images, speeding real-time analysis and assuring the quality and reliability of detections - are all areas in which important contributions can be made. Needs exist in the area of spectroscopy, including the miniaturization of detectors and improvement of focal-plane arrays, particularly in the IR regime. Improvements in sensing and characterization of atmospheric and anthropogenic gases, including better real-time processing, and in the modeling of radiative transport are also of interest.

Chemistry: New types of energy conversion schemes and catalysts are of considerable interest. Innovations involving high-energy fuels, electrode materials, and membranes and their incorporation into batteries and fuel cells could lead to useful new technologies and applications, including those that involve miniaturization. New types of energy delivery systems may be derived from biological, nuclear, and photochemical sources. Hybrid organic/inorganic nanotechnology might be applied to increase charge storage and to make needed electrochemical cell components and connections. Theory, modeling, and simulation studies can contribute greatly to improving IC capabilities in each of these areas. Spectroscopic advances that could be beneficial include greater understanding and use of terahertz spectroscopy, combinations of spectroscopic signatures of chemical and biological agents and explosives, and improved sources and detectors. Future sensors might be founded on new sensing principles, such as those used by insects. Efforts in molecular electronics could make possible simultaneous recognition and signal transduction in single molecular complexes. Instrumentation advances could have a profound impact, since miniaturization and cost-reduction of, e.g., mass spectrometers and nuclear magnetic resonance instruments could substantially broaden their usefulness in security applications. The ability to detect and characterize trace quantities of chemical species is essential. Schemes for persistent, non-contact, wide-area sensing technologies to identify trace quantities is vital to the IC. Both active and passive methods of interrogating effluents should be considered.

Materials Research: Sensor materials, including those for identification, detection and source location of chemicals, biological species, and radiation, are of interest. Quantum or classical solid state and single-molecule technology for encryption and signal processing have considerable promise for enhancing security, as do materials for energy storage and conversion, including photovoltaics, batteries, fuel cells, thermoelectrics and hybrid materials. Novel nanoscale materials such as quantum dots and nanowires may afford revolutionary performance for portable electronic and photonic components and for devices, communications, and instrumentation. Adaptive or 'smart' materials could provide enhanced surveillance capabilities and human protection.

Mathematical Sciences: Important areas of opportunity are analysis and information synthesis from multiple, large datasets; image recognition and analysis; signal processing for speech; and mathematical modeling of new materials, processes, and devices, often under novel constraints. Key issues in every area are mathematical techniques to represent, manipulate, and analyze data, and effective models, algorithms, and implementations. Analysis and information synthesis involves problems of uncertainty, data fusion, feature extraction, data synopsis and metadata, partial disclosure, and high dimensionality. Image recognition and analysis involves the same issues with the complication that the data are images. Other problems include feature detection, landmarks and registration and characterization of natural images. Data presentation is a critical issue, especially of metadata and in processes that require human mediation. The analysis and design of robust systems in communications, transport, and security is critical. Other important areas include new mathematical approaches to materials, processes, and devices such as fuel cells, miniature mass spectrometers, and other sensors; optimization problems such as the choice of placement and components in sensor arrays; mathematical epidemiology; and multiscale models of complicated diffusion and transport processes.

Physics: Several large Physics Division Programs are involved in basic research that might have applicability to improved detection methods and other intelligence needs. As examples, the Laser Interferometer Gravitational-Wave Observatory that is being commissioned has developed laser techniques to observe motion at the level of 1/1000 of a proton diameter. The Global Grid permits unprecedented rates of data transmission. Quantum information research may provide new strategies for ultra-secure communication and code breaking. Laser technology at the frontiers of peak power and programmed pulses could lead to coherent control and remote characterization of materials. Advances in particle accelerator and neutron generator capabilities may provide new avenues for remote characterization via portability and/or increased intensity. Next-generation gamma-ray detectors for nuclear physics can provide remote

nuclear spectra of both conventional and radioactive materials from extremely weak signals. New applicable particle detector technologies include smart detectors having pre-processing capabilities to retain only important information (such as are being studied through detector research and development at Fermilab), and new gamma-ray tracking detectors that can provide much greater characterization of radioactive materials. Large-scale simulation software for nuclear and particle physics experiments can aid in building realistic detection devices. Networks of astrophysical observatories could track projectiles; and neutrino detectors may also detect nuclear detonations through the earth. Research in complex systems by mathematical physicists may also prove valuable in national security contexts.

Scientific Workforce: An important cross-MPS theme is the development of the scientific workforce. Research proposals that have the potential to contribute to the long-range goal of increasing our workforce capabilities and public understanding of science associated with national security are encouraged. Instrumentation provides an example of a strategy for achieving this goal: Ruggedized, miniaturized and inexpensive versions of scientific instruments would not only make them more practical for security uses, but would have the dual benefit of making them more accessible to schools and homes. Such expanded opportunities for hands-on scientific experimentation could, in turn, attract a larger, more diverse group of talented students to careers in MPS disciplines and enhance science literacy related to national security.

III. ELIGIBILITY INFORMATION

The categories of proposers identified in the [Grant Proposal Guide](#) are eligible to submit proposals under this program announcement/solicitation.

IV. AWARD INFORMATION

The anticipated funding amount is \$3,500,000 in FY 2003, pending availability of funds.

Only supplements, Small Grants for Exploratory Research (SGERs) and workshop proposals will be considered for funding. Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Supplement, SGER and Workshop 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/cgi-bin/getpub?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.

Requests for supplemental support to existing NSF grants must include a summary of the proposed work, a brief justification, and a budget for the requested funds. These requests are submitted through the FastLane *Award and Reporting* module <http://www.fastlane.nsf.gov>. Supplements are described in Chapter V.B.4 in the Grant Proposal Guide. Small amounts of supplemental funding and up to six months of additional support may be requested.

For ACT supplements, proposers should enter the phrase "**In response to NSF 03-569**" at the top of the Summary Of Proposed Work. Failure to submit this information may delay processing.

Small Grants for Exploratory Research (SGERs) are described in the Grant Proposal Guide, http://www.nsf.gov/pubs/2003/nsf032/032_2.htm#IID1. The maximum SGER award amount is \$100,000. The project's duration will normally be one year but may be up to two years.

Workshop proposals are described in the Grant Proposal Guide, http://www.nsf.gov/pubs/2003/nsf032/032_2.htm#IID7

All PIs should budget travel funds to attend a grantees conference in Washington DC during the Spring of 2004.

Partnerships between academia and industry are encouraged via GOALI supplements <http://www.nsf.gov/pubs/ods/getpub.cfm?nsf98142>. In addition, industrial and government laboratory scientists may be included in workshops and SGERs.

As is usual for supplement requests, SGER proposals and workshop proposals, Principal Investigators should first contact an MPS Program Officer with appropriate expertise (see Contact List).

Proposers are reminded to identify the program announcement/solicitation number (03-569) 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 in proposals submitted under this Program Solicitation.

Other Budgetary Limitations:

SGER proposals are limited to \$100,000. For limits on supplements, see the Grant Proposal Guide or contact one of the cognizant Program Officers. Proposals for Workshops may include approximately \$50,000 per workshop.

Principal Investigators are strongly urged to discuss their project and appropriate budgets with a cognizant Program Officer (see ACT Contact List) before preparing their proposal.

Budget Preparation Instructions:

PIs should budget travel funds to attend a grantees conference in Washington DC in Spring 2004.

C. Due Dates

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

Supplement, SGER and Workshop Proposal Deadline(s) (due by 5 p.m proposer's local time):

July 17, 2003

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: <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 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 for ACT Supplements and Proposals

ACT supplements, SGERs and workshop proposals will be internally reviewed by MPS and IC personnel with the possibility of additional external review as needed.

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 judgements.

What is the intellectual merit of the proposed activity?

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

Additional Review Criteria

- Potential for a future contribution to national security
- Relevance of MPS discipline(s) for the proposed research and/or workforce development
- For workshop proposals, the potential to bring together researchers from a number of disciplines to address the goals of this solicitation

B. Review Protocol and Associated Customer Service Standard for ACT Supplements and Proposals

Internal review will be conducted by MPS and IC personnel with the possibility of additional external review as needed. The Program Officer assigned to manage the review will consider the advice of reviewers and will formulate a recommendation. The proposer will receive a summary explanation of the decision to award or decline funding.

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 date of receipt. The interval ends when the Division Director accepts the Program Officer's recommendation.

In all cases, after programmatic approval has been obtained, the supplement requests 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.

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 also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). 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.

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

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website at <http://www.nsf.gov/cgi-bin/getpub?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>.

Special Award Conditions:

Principal Investigators (PIs) are required to attend workshops as appropriate to report on the progress of their research. One workshop per year is anticipated to involve only ACT awardees, sponsoring agency representatives, and other invited guests. Travel funds for PIs to attend these meetings should be included in the budget request.

Publications, presentations and workshop reports must acknowledge ACT funding in the following format: "This material is based upon work supported by the National Science Foundation and the Intelligence Community through the joint "Approaches to Combat Terrorism" Program (NSF grant number)."

The joint support of the National Science Foundation and the Intelligence Community also must be orally acknowledged during all news media interviews, including popular media such as radio, television and news magazines.

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:

- Eileen D. Friel, Executive Officer, Directorate for Mathematical & Physical Sciences, Division of Astronomical Sciences, 1045 S, telephone: (703) 292-4895, fax: (703) 292-9034, email: efriel@nsf.gov
- Vernon L. Pankonin, Program Director, Directorate for Mathematical & Physical Sciences, Division of Astronomical Sciences,

1045 S, telephone: (703) 292-4902, fax: (703) 292-9034, email: vpankoni@nsf.gov

- Janice M. Hicks, Program Director, Directorate for Mathematical & Physical Sciences, Division of Chemistry, 1055 S, telephone: (703) 292-4956, fax: (703) 292-9037, email: jhicks@nsf.gov
- Lynn Schneemeyer, Program Director, Directorate for Mathematical & Physical Sciences, Division of Chemistry, 1055 S, telephone: (703) 292-4945, fax: (703) 292-9037, email: lschneem@nsf.gov
- LaVerne D. Hess, Program Director (EM), Directorate for Mathematical & Physical Sciences, Division of Materials Research, 1065 N, telephone: (703) 292-4937, email: lhess@nsf.gov
- Hugh M. Van Horn, Senior Scientist/Program Director (NAF), Directorate for Mathematical & Physical Sciences, Division of Materials Research, 1065 N, telephone: (703) 292-4920, email: hvanhorn@nsf.gov
- Hans G. Kaper, Program Director, Directorate for Mathematical & Physical Sciences, Division of Mathematical Sciences, 1025 N, telephone: (703) 292-4879, fax: (703) 292-9032, email: hkaper@nsf.gov
- Michael H. Steuerwalt, Program Director, Directorate for Mathematical & Physical Sciences, Division of Mathematical Sciences, 1025 N, telephone: (703) 292-4860, fax: (703) 292-9032, email: msteuerw@nsf.gov
- Bradley D. Keister, Program Director, Directorate for Mathematical & Physical Sciences, Division of Physics, 1015 N, telephone: (703) 292-7377, fax: (703) 292-9078, email: bkeister@nsf.gov
- Thomas Lucatoro, Program Director, Directorate for Mathematical & Physical Sciences, Division of Physics, 1015 N, telephone: (703) 292-7373, email: tlucator@nsf.gov

Proposers are strongly urged to contact an appropriate ACT Contact before preparing or submitting a proposal to this solicitation.

For questions related to the use of FastLane, contact:

- Kim S. Elliott, Computer Specialist, Directorate for Mathematical & Physical Sciences, Division of Astronomical Sciences, 1053 S, telephone: (703) 292-4894, email: kelliott@nsf.gov
- Paul G. Spyropoulos, Computer Specialist, Directorate for Mathematical & Physical Sciences, Division of Chemistry, 1055 S, telephone: (703) 292-4968, fax: (703) 292-9037, email: pspyropo@nsf.gov
- Maxine E. Jefferson-Brown, Computer Specialist, Directorate for Mathematical & Physical Sciences, Division of Materials Research, 1065 N, telephone: (703) 292-4918, fax: (703) 292-9035, email: mjeffers@nsf.gov
- Ramona Winkelbauer, Computer Specialist, Directorate for Mathematical & Physical Sciences, Division of Physics, 1015 N, telephone: (703) 292-7390, fax: (703) 292-9078, email: rwinkelb@nsf.gov
- Florence Rabanal, Electronic Business Coordinator, Directorate for Mathematical & Physical Sciences, 1005 N, telephone: (703) 292-8808, fax: (703) 292-9151, email: frabanal@nsf.gov
- FastLane HelpDesk, telephone: 1-800-673-6188, email: fastlane@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 *Custom News Service* (<http://www.nsf.gov/home/cns/start.htm>) to be notified of new funding opportunities that become available.

Related Programs:

- Sensors and Sensor Networks ([NSF 03-512](#))

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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.

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