

AFOSR-BAA-2008-7

OVERVIEW INFORMATION

The Air Force Office of Scientific Research (AFOSR) manages the basic research investment for the U.S. Air Force (USAF). As a part of the Air Force Research Laboratory (AFRL), AFOSR's technical experts foster and fund research within the Air Force Research Laboratory, universities, and industry laboratories to ensure the transition of research results to support USAF needs.

This BAA is in support of the the National Hypersonic Science Center program. The National Hypersonic Science Center program is jointly sponsored by the Air Force Office of Scientific Research (AFOSR) and the Hypersonics Project of the National Aeronautics and Space Administration Aeronautics Research Mission Directorate Fundamental Aeronautics Program (NASA ARMD FAP). Hereafter the sponsoring agencies will collectively be referred to as "sponsors".

AFOSR invites proposals for research in the areas described in detail in Section I, Funding Opportunity Description. The schedule for this announcement is given below.

AFOSR will not issue paper copies of this announcement. The sponsors involved in this program reserve the right to select and fund for award all, some, or none of the proposals in response to this announcement. Sponsors will provide no funding for direct reimbursement of proposal development costs. Technical and costs proposals, or any other material, submitted in response to this BAA will not be returned. It is AFOSR policy to treat all proposals as sensitive competitive information and to disclose their contents only for the purposes of evaluation.

1. Federal Agency Name

Air Force Office of Scientific Research
875 North Randolph Street, Suite 325, Room 3112
Arlington VA 22203-1768

2. Funding Opportunity Title

National Hypersonic Science Centers (NHSC), Air Force Office of Scientific Research

3. Announcement Type

This is the initial announcement – Two-Step Broad Agency Announcement (BAA)

4. AFOSR-BAA-2008-7

5. Catalog of Federal Domestic Assistance (CFDA) Number

12.800

6. Response Dates

Submission of a brief white paper is required prior to submission of a full proposal. White papers will be accepted for consideration between 15 Sep and 17 Oct 2008.

White papers deemed likely to meet the stated objectives of the research topics will be invited to submit full proposals to this office no later than 4:00 PM Eastern Time, 12 Dec 2008.

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I. Funding Opportunity Description

This BAA is in support of the National Hypersonic Science Centers (NHSC), Air Force Office of Scientific Research. AFOSR requests white papers and proposals for research in the areas described in detail below. The schedule for this announcement is given in Section II, Award Information.

This jointly-funded NASA/AFOSR program supports basic science and/or engineering research that is of critical importance to the development of the national expert knowledge base in sciences associated with the hypersonic flight regime (hereafter referred to as “hypersonics”). The program is focused on critical research areas in air-breathing propulsion, high-temperature materials and structures and fluid mechanics identified in the National Hypersonic Foundational Research Plan.

This competition is for the three research topics listed below. Detailed descriptions of the topics can be found in Section IX entitled, “Research Topic Descriptions”, of this BAA. The detailed descriptions are intended to provide the offeror a frame of reference and are not meant to be restrictive to the possible approaches to achieving the goals of the topic and the program. Innovative ideas addressing these research topics are highly encouraged.

White papers and full proposals addressing the following topics (1) through (3) should be submitted to AFOSR:

- (1) Hypersonic Air-Breathing Propulsion
- (2) Hypersonic Materials and Structures
- (3) Hypersonic Laminar-Turbulent Transition Estimation and Control

Proposals from a team of investigators may be warranted because the necessary expertise in addressing the multiple facets of the topics may reside in different institutions or in different departments in the same institution. By supporting multidisciplinary teams, the program is complementary to other sponsored research programs that support research through single-

investigator awards. Proposals must name one Principal Investigator as the responsible technical point of contact. Similarly, one institution will be the primary awardee for the purpose of award execution. The relationship among participating institutions and their respective roles, as well as the apportionment of funds including sub-awards, if any, must be described in both the proposal text and the budget. Historically Black Colleges and Universities and Minority Institutions (HBCU/MIs) (as defined by 10 U.S.C. 2323a (1) (c)) are encouraged to participate in the program, either as the lead institution or as a member of a team. However, no specific funds are allocated for HBCU/MI participation.

Research Topic Descriptions

1. Hypersonic Air-Breathing Propulsion

Background: This topic responds to the national need for high-speed flight and low-cost space access. Over a range of Mach numbers from takeoff to hypersonic flight, different thermodynamic propulsion cycles (gas turbines, ramjets, scramjets, chemical rockets) have unique advantages. The combined cycle propulsion concept has been suggested to exploit these advantages by combining two or more of the modes of propulsion into a single propulsion system. A combined cycle engine may be an efficient means of providing propulsion throughout the entire operating envelope, from takeoff to orbit, for space access vehicles. Research challenges involve the scramjet mode of propulsion and mode transitions in a combined cycle system.

Objective: The objective is to study the unique challenges of high-speed, airbreathing propulsion, including the impact of compressibility on combustion, mode transitioning, the impact of materials on thermal management, and propulsion-airframe integration.

Research Concentration Areas: Research topics and associated supporting technologies are identified for the high-speed supersonic, hypersonic, and hypervelocity regimes: **(1)** characterization of the governing mechanisms with emphasis on turbulence-chemistry interactions, including chemical reactions, as well as novel experimental methods to acquire relevant data and innovative concepts for fuel-air mixing, ignition, and flame holding (via non-equilibrium plasma or other concepts); **(2)** formulation of novel simulation methods specifically addressing, but not limited to, large eddy simulations (LES) and LES-RANS hybrid models with high-order accuracy in the presence of shock-waves and associated sub-grid-scale closure models for compressible, turbulent combustion valid for both far-field and near-wall applications; and **(3)** novel concepts addressing combined-cycle-engine net-propulsive performance improvements, and/or dynamic mode-transition control methods.

Impact: Combined cycle propulsion is a critical enabling technology that will facilitate low-cost access to space and high-speed flight. While some limited operational experience has been achieved with systems such as the J58 engine in the SR71 aircraft and missiles that utilize rocket-boosted ramjet propulsion, the empirical knowledge base thus created is extremely limited and inadequate for the expanded challenges posed by future national requirements. This topic

will initiate a scientifically based approach to achieving optimal design and performance. It will be an essential first step to develop a rational design strategy for combined cycle engines.

Topic Leads: Dr. Julian Tishkoff, AFOSR, julian.tishkoff@afosr.af.mil, 703-696-8478
Dr. Aaron Auslender, NASA, aaron.h.auslender@nasa.gov, (757) 864-6545

2. Hypersonic Materials and Structures

Background: Sustained hypersonic flight is a national aeronautical goal. This topic focuses on developing the fundamental scientific foundation for how materials and structures perform under extreme thermal and loading environments.

Objective: The objective is to develop the fundamental scientific foundation that will accelerate the discovery and optimization of materials and structures in order to address the unique challenges of hypersonic flight.

Research Concentration Areas: The following focus areas have been identified for materials and structures: (1) Development of experimental and computational tools to accurately predict the properties, and ultimately model the performance and failure, of materials and structures in extreme and coupled thermal-mechanical-vibratory environments. (2) Discovery and characterization of new classes of thermal and oxidation resistant high-temperature materials including, but not limited to, complex hybrid engineered structures, composites, or thin films for repeated or sustained use at temperatures exceeding 1400 C. (3) Development of processing science necessary to realize damage tolerant, complex shaped materials with improved oxidation, reduced defects and near net geometry.

Impact: This research will aim to develop the next generation of materials and structures that will enable hypersonic flight systems that are currently unavailable using the current state of the art technology. This research will develop the fundamental science foundation to enable the discovery and optimization of materials and structures for sustained operations within an extreme hypersonic environment. The development of experimental and computational tools to accelerate discovery and characterization of high-temperature materials will provide new, revolutionary capabilities for the research and development of hypersonic vehicle systems.

Topic Leads: Dr. Joan Fuller, AFOSR, joan.fuller@afosr.af.mil, 703-696-7236
Dr. Anthony Calomino, NASA, anthony.m.calomino@nasa.gov, 216-433-3311

3. Hypersonic Laminar-Turbulent Transition

Background: The control of the transition process from laminar to turbulent flow has the potential to be one of the most significant air vehicle design breakthroughs in decades. Because much of the underlying physics of transition is similar in all speed regimes, no other technology

offers such a significant and broad ranging impact on vehicles ranging from micro air vehicles, to subsonic transports and hypersonic reentry systems. Unfortunately, accurate prediction of the onset of transition for any of these systems is currently impossible. Extreme surface heating rates make the hypersonic regime the most challenging flight system operational environment. Very little is known of the coupled aerothermodynamic, chemical, and material interactions at the vehicle surface. The problem is exacerbated by a general inability to exactly reproduce the hypersonic environment in ground test facilities. In the hypersonic flight regime the benefits of extended laminar flow include both improved aerodynamics and reduced thermal loads on the vehicle. Because turbulent heating rates can be almost an order of magnitude greater than laminar rates, dramatic reductions in thermal protection system requirements can be realized with an improved understanding of how and when the vehicle will transition from laminar to turbulent flow, with even greater reductions possible if the process can be controlled. The development of reliable, accurate methods for estimating and potentially controlling the onset of laminar-turbulent transition under hypersonic conditions requires a coordinated multidisciplinary approach integrating theoretical, numerical, and experimental contributions from fluid dynamics, high-temperature gas chemistry, and high-temperature materials. While most of the advancements made in understanding the phenomena associated with transition have come from fluid dynamics research, contributions from the high-temperature materials and gas chemistry disciplines must be included to appropriately consider the impact of realistic surface conditions, surface reactions, and catalytic effects.

Objective: The proposed research effort will develop the basic knowledge building blocks required for the eventual development of both an estimation capability for the onset of laminar-turbulent transition on hypersonic systems, and methods for control of the transition process. Such capabilities are currently in their infancy but are essential for the development of efficient hypersonic systems. Characterization of the fundamental interfacial issues between the aerothermodynamic environment, high-temperature gas chemistry, and high-temperature materials with an emphasis on characterizing, modeling and controlling the physical phenomena that drive the transition process is desired. Development of physically accurate and reliable numerical methods for estimation of transition may be required. Experimental validation of numerical approaches is of particular interest. Novel methods for exploiting the dominant physical phenomena to control the transition process are sought.

Research Concentration Areas: The National Hypersonic Science Center in Hypersonic Laminar-Turbulent Transition will develop and validate physics-based transition estimation methods for nonequilibrium flows over representative vehicle surfaces and develop strategies for control of the transition process. Research areas may include, but are not limited to the following:

1. Development of a theoretical basis for identification of instability mode competition and mode interaction leading to well defined physics-based numerical tools for the design environment
2. Experimental characterization of mode interactions and competition in transitional flows. Investigation of receptivity processes, instability growth, and both passive and active control approaches

3. Assessment of the influence of surface roughness, as-built surface finishes, and degraded surface materials on the transition process and physics-based estimation methods
4. Assessment of the influence of nonequilibrium thermodynamics, surface chemistry and catalysis, and ablation product blowing on the transition process
5. Development of strategies and methods for control of the transition process

Topic Leads: Dr. John D. Schmisser, AFOSR, john.schmisser@afosr.af.mil, 703-696-6962
Dr. Seokkwan Yoon, NASA, s.yoon@nasa.gov, 650-604-4482

II. Award Information

It is anticipated the awards will be made in the form of grants. Therefore, applications submitted as a result of this announcement will fall under the Department of Defense Grant and Agreement Regulations (DoDGARs). Each individual award will be for a one year base period with up to four additional one-year options. Awards will be incrementally funded.

The total amount of funding for five years available for grants resulting from this BAA is estimated to be about \$30M, pending out-year appropriations. It is anticipated that the maximum award will be \$2M per year, with the actual amount contingent on availability of funds, the specific topic, and the scope of the proposed work. It is strongly recommended that potential offerors communicate with the specific Topic Lead regarding these issues before the submission of formal proposals. Depending on the results of the proposal evaluation, there is no guarantee that any of the proposals submitted in response to a particular topic will be recommended for funding. On the other hand, more than one proposal may be recommended for funding for a particular topic.

III. Eligibility Information

All responsible, potential applicants from academia and industry are eligible to submit proposals. AFOSR and NASA particularly encourage proposals from U.S. institutions of higher education (universities) including DoD institutions of higher education and historically black colleges and universities with degree-granting programs in science and/or engineering, minority institutions and minority researchers.

Cost sharing is encouraged but not required.

Offerors may be ineligible for award if all requirements of the solicitation are not met by the due dates as indicated herein.

IV. Application and Submission Information

1. Address to Request Announcement Package – This announcement may be accessed from the Internet at the Grants.gov web site (<http://www.grants.gov>). See ‘For Electronic Submission’

below. Offerors should be alert for any BAA amendments that may permit extensions to the proposal submission date or that may otherwise modify the announcement.

2. Marking of Proposals - Every effort will be made to protect the confidentiality of the proposal and any evaluations. However, under the Freedom of Information Act (FOIA) requirements, such information (or portions thereof) may potentially be subject to release. Offerors should apply the restrictive notice prescribed in the provision of FAR 52.215-1(e) Instructions to Offerors-Competitive Acquisition.

3. Content and Form of Application Submission

The proposal submission process is in two stages. Prospective awardees are required to submit white papers to minimize the labor and cost associated with the production of detailed full proposals that have very little chance of being selected for funding. Based on an assessment of the white papers, the responsible Research Topic Chief will provide informal feedback notification to the prospective awardees to encourage or discourage them to submit full proposals.

Due Date:

White papers will be accepted for consideration between 9:00 A.M. Sep 15 and 4:00 P.M. Oct 17, 2008 (Eastern Daylight Time).

Submission of White Papers:

White papers must be submitted via e-mail directly to a Research Topic Lead. White papers submitted by any other mechanism will not be considered.

Evaluation/Notification: Initial evaluations of the white papers will be issued on or about **31 October 2008**.

The white papers and full proposals submitted under this BAA are expected to address unclassified foundational research. The full proposal submissions will be protected from unauthorized disclosure in accordance with FAR 15.207, applicable law, and DoD regulations. Offerors are expected to appropriately mark each page of their submission that contains proprietary information. Grants awarded under this announcement will be unclassified.

White Paper Submission: Contents and Format of Applications

Each topic in this announcement has one or more Research Topic Leads identified from one of the participating sponsors. You should submit your application to the AFOSR Research Topic Leads identified for the topic to which you are applying.

White paper format should be as follows:

- Paper Size - 8.5 x 11 inch paper
- Margins - 1 inch
- Spacing - single

- Font - Times New Roman, 12 point
- Number of Pages - no more than six single-sided pages including the cover page. Pages in excess of the page limit will not be evaluated.

White Paper content should be as follows:

- A cover page, labeled "PROPOSAL WHITE PAPER," that includes the BAA number, proposed title, and proposer's technical point of contact, with telephone number, facsimile number, e-mail address, topic number, and topic title
- Identification of the research and issues
- Proposed technical approaches
- Potential impact on national scientific capabilities
- Potential team and management plan
- Summary of estimated costs
- Abbreviated curriculum vitae of key investigators (optional)

The white paper should provide sufficient information on the research being proposed (e.g., hypothesis, theories, concepts, approaches, data measurements and analysis, etc.) to allow for an assessment by a technical expert. It is not necessary for white papers to carry official institutional signatures.

NOTE: White papers must be submitted via e-mail to the AFOSR Research Topic Lead.

Full Proposal Submission: Content and Format of Applications

Any offeror may submit a full proposal even if their white paper was not identified as being of “particular value” to the Government. However, the initial evaluation of the white papers should give prospective awardee some indication of whether a later full proposal would likely result in an award.

Full Proposal format should be as follows:

- Paper Size - 8.5 x 11 inch paper
- Margins - 1 inch
- Spacing - single
- Font - Times New Roman, 12 point
- Number of Pages - no more than twenty-five (25) single-sided pages not including the grants.gov forms described below. Pages in excess of the page limit will not be evaluated.

NOTE: Full Proposals must be submitted electronically via grants.gov.

(1) Advance Preparation for Electronic Submission - Electronic proposals must be submitted through www.Grants.gov. There are several one-time actions your organization must have completed before it will be able to submit applications through Grants.gov. Well before the

submission deadline, you should verify that the persons authorized to submit proposals for your organization have completed those actions. If not, it may take them up to 21 days to complete the actions before they will be able to submit applications.

The process your organization must complete includes obtaining a Dun and Bradstreet Data Universal Numbering System (DUNS) number, registering with the Central Contract Registry (CCR), registering with the credential provider, and registering with Grants.gov. (Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called MPIN are important steps in the CCR registration process.) Go to http://www.grants.gov/applicants/get_registered.jsp. Use the Grants.gov Organization Registration Checklist at <http://www.grants.gov/section3/OrganizationRegCheck.pdf> to guide you through the process. To submit a proposal to through Grants.gov, applicants will need to download Adobe Reader. This small, free program will allow you to access, complete, and submit applications electronically and securely. To download a free version of the software, visit the following web site: http://www.grants.gov/help/download_software.jsp. Consult Grants.gov to ensure you have the required version of Adobe Reader installed. Should you have questions relating to the registration process, system requirements, how an application form works, the submittal process or Adobe Reader forms, call Grants.gov at 1-800-518-4726 or support@Grants.gov for updated information.

(2) Submitting the Application

(a) Electronic Submission – Application forms and instructions are available at Grants.gov. To access these materials, go to <http://www.grants.gov>, select “Apply for Grants”, and then follow the instructions. In the Grants.gov search function, enter the funding opportunity number for this announcement (AFOSR-BAA-2008-7). In the Search Results, click on the Opportunity title: NATIONAL HYPERSONIC SCIENCE CENTERS (NHSC). On the next page, click on the box marked "Application" in the upper right hand corner of the page. Then click on 'download' under the heading 'Instructions and Application' to download the application package. You can also search for the CFDA Number 12.800, Air Force Defense Research Sciences Program. On the Selected Grant Applications for Download page, click on 'download' under the heading 'Instructions and Applications' to download the application package. The funding opportunity will be listed. Select the Competition ID ‘NHSC’ to download the instructions and application.

All attachments to all forms must be submitted in PDF format (Adobe Portable Document Format). Grants.gov provides links to PDF file converters at this site: <http://grants.gov/agencies/asoftware.jsp#3>.

(b) SF 424 Research and Related (R&R) – The SF 424 (R&R) form must be used as the cover page for all electronic and hard copy proposals. No other sheets of paper may precede the SF 424 (R&R) for a hard copy proposal. A signed copy of the SF 424 (R&R) should be submitted with all hardcopy proposals. Complete all the required fields in accordance with the “pop-up” instructions on the form and the following instructions for the specified fields. To see the instructions, roll your mouse over the field to be filled out. You will see additional information about that field. For example on the SF424 (R&R) the Phone Number field says 'PHONE NUMBER (Contact Person): Enter the daytime phone number for the person to contact on matters relating to this application. This field is required.' Mandatory fields will have an

asterisk marking the field and will appear yellow on most computers. In grants.gov, some fields will self populate based on the BAA selected. Please fill out the SF 424 first, as some fields on the SF 424 are used to auto populate fields in other forms. The completion of most fields is self-explanatory except for the following special instructions:

- Field 2: The Applicant Identifier may be left blank.
- Field 3: The Date Received by State and the State Application Identified are not applicable to research.
- Field 7: Complete as indicated. If Small Business is selected, please note if the organization is Woman-owned and/or Socially and Economically Disadvantaged. If the organization is a Minority Institution, select "Other" and under "Other (Specify)" note that you are a Minority Institution (MI).
- Field 9: List Air Force Office of Scientific Research as the reviewing agency. This field is pre-populated in grants.gov.
- Field 17: Choose 'No'. Check 'Program is Not Covered By Executive Order 12372'.
- Attachments: All attachments to all Grants.gov forms must be submitted in PDF format (Adobe Portable Document Format). To convert attachments into PDF format, Grants.gov provides a list of PDF file converters at http://www.grants.gov/resources/download_software.jsp

(c) Certification – All awards require some form of certifications of compliance with national policy requirements. For assistance awards, i.e., grants and cooperative agreements, proposers using the SF 424 (R&R) are providing the certification required by 32 CFR Part 28 regarding lobbying. (The full text of this certification may be found at <http://www.wpafb.af.mil/shared/media/document/AFD-070817-127.pdf>). If you have lobbying activities to disclose, you must complete the optional form SF-LLL, Standard Form – LLL, 'Disclosure of Lobbying Activities' in the downloaded Adobe forms package.

(d) Research and Related (R&R) Other Forms – The following other forms must be used for all proposals: R&R Senior/Key Person Profile form, R&R Project/Performance Site Locations form, R&R Other Project Information form and the R&R Budget form. The R&R Subaward Budget Attachment Forms is required when subawardees are involved in the effort. The SF-LLL form is required when applicants have lobbying activities to disclose. PDF copies of all forms may be obtained at the grants.gov website.

(e) R&R Senior/Key Person Profile Form – Complete the R&R Senior/Key Person Profile Form for those key persons who will be performing the research. Information about an individual is subject to the requirements of the Privacy Act of 1974 (Public Law 93 579). The information is requested under the authority of Title 10 USC, Sections 2358 and 8013. The principal purpose and routine use of the requested information are for evaluation of the qualifications of those persons who will perform the proposed research. Failure to provide such information will delay award. For the principal investigator and each of the senior staff, provide a short biographical sketch and a list of significant publications (vitae) and attach it to the R&R Senior/Key Person Profile Form.

(f) R&R Project/Performance Site Locations Form – Complete all information as requested.

(g) R&R Other Project Information Form – Human Subject/Animal Use and Environmental Compliance.

Human Subject Use. Each proposal must address human subject involvement in the research by addressing Field 1 and 1a of the R&R Other Project Information Form. If Field 1 indicates “Yes”, the Air Force must receive a completed OMB No. 0990-0263 form before a contract, grant, or cooperative agreement may be awarded to support research involving the use of human subjects. Attach the document to the R&R Other Project Information Form. If using grants.gov, a completed OMB No. 0990-0263 form shall be attached in field 11 of the R&R Other Project Information Form. Refer any questions regarding human subjects to the AFOSR Directorate of Mathematics, Information and Life Sciences at (703) 696-7720.

Animal Use. Each proposal must address animal use protocols by addressing Field 2 and 2a of the R&R Other Project Information Form. If selected for award, additional documentation in accordance with Air Force standards will be required. Refer any questions regarding animal subjects to the AFOSR Directorate of Mathematics, Information and Life Sciences at (703) 696-7720.

Environmental Compliance. Federal agencies making contract, grant, or cooperative agreement awards and recipients of such awards must comply with various environmental requirements. The National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. Sections 4321-4370 (a), requires that agencies consider the environmental impact of “major Federal actions” prior to any final agency decision. With respect to those awards which constitute “major Federal actions,” as defined in 40 CFR 1508.18, federal agencies may be required to comply with NEPA and prepare an environmental impact statement (EIS) even if the agency does no more than provide grant funds to the recipient. Questions regarding NEPA compliance should be referred to the AFOSR legal staff at (703) 696-9705. Most research efforts funded by AFOSR will, however, qualify for a categorical exclusion from the need to prepare an EIS. Air Force instructions/regulations provide for a categorical exclusion for basic and applied scientific research usually confined to the laboratory, if the research complies with all other applicable safety, environmental and natural resource conservation laws. Each proposal shall address environmental impact by filling in fields 4a through 4d of the R&R Other Project Information Form. This information will be used by AFOSR to make a determination if the proposed research effort qualifies for categorical exclusion.

Abstract - Include a concise (not to exceed 300 words) abstract that describes the research objective, technical approaches, anticipated outcome and impact of the specific research. In the header of the abstract include the program manager’s name and directorate who should receive the proposal for consideration and evaluation. Attach the Abstract to the R&R Other Project Information form in field 6.

(h) R&R Other Project Information Form – Project Narrative Instructions

Project Narrative – Describe clearly the research including the objective and approach to be performed keeping in mind the evaluation criteria listed in Section V of this announcement. Also briefly indicate whether the intended research will result in environmental impacts outside the laboratory, and how the proposer will ensure compliance with environmental statutes and regulations. Attach the proposal narrative to R&R Other Project Information form in field 7.

Project Narrative - Statement of Objectives – Describe the actual research to be completed, including goals and objectives, on one-page titled Statement of Objectives. This statement of objectives may be incorporated into the award instead of incorporating the entire technical proposal. Active verbs should be used in this statement (for example, “conduct” research into a topic, “investigate” a problem, “determine” to test a hypothesis). It should not contain proprietary information.

Project Narrative - Research Effort – Describe in detail the research to be performed. State the objectives and approach and their relationship and comparable objectives in progress elsewhere. Additionally, state knowledge in the field and include a bibliography and a list of literature citations. Discuss the nature of the expected results. The adequacy of this information will influence the overall evaluation. Proposals for renewal of existing support must include a description of progress if the proposed objectives are related.

Project Narrative – Principal Investigator (PI) Time. PI time is required. List the estimate of time the principal investigator and other senior professional personnel will devote to the research. This shall include information pertaining to other commitments of time, such as sabbatical or extended leave; and proportion of time to be devoted to this research and to other research. Awards may be terminated when the principal investigator severs connections with the organization or is unable to continue active participation in the research. State the number of graduate students for whom each senior staff member is responsible. If the principal investigator or other key personnel are currently engaged in research under other auspices, or expect to receive support from other agencies for research during the time proposed for AFOSR support, state the title of the other research, the proportion of time to be devoted to it, the amount of support, name of agency, dates, etc. Send any changes in this information as soon as they are known. Submit a short abstract (including title, objectives, and approach) of that research and a copy of the budget for both present and pending research projects.

Project Narrative – Facilities. Describe facilities available for performing the proposed research and any additional facilities or equipment the organization proposes to acquire at its own expense. Indicate government-owned facilities or equipment already possessed that will be used. Reference the facilities contract number or, in the absence of a facilities contract, the specific facilities or equipment and the number of the award under which they are accountable.

Project Narrative – Special Test Equipment. List special test equipment or other property required to perform the proposed research. Segregate items to be acquired with award funds from those to be furnished by the Government. When possible and practicable, give a description or title and estimated cost of each item. When information on individual items is unknown or not available, group the items by class and estimate the values. In addition, state why it is necessary to acquire the property with award funds.

Project Narrative – Equipment. Justify the need for each equipment item. Additional facilities and equipment will not be provided unless the research cannot be completed by any other practical means. Include the proposed life expectancy of the equipment and whether it will be integrated with a larger assemblage of apparatus. If so, state who owns the existing apparatus.

Project Narrative – High Performance Computing Availability. Researchers that are supported under an AFOSR grant or contract, and meet certain restrictions, are eligible to apply for special accounts and participation in a full-spectrum of activities within the DOD high performance computing modernization program. This program provides, at no cost to the user, access to a range of state-of-the-art high performance computing assets and training opportunities that will allow the user to fully exploit these assets. Details of the capabilities of the program can be

found at the following Internet address: <http://www.hpcmo.hpc.mil>. Researchers needing high performance cycles should address the utilization of this program to meet their required needs. AFOSR program managers will facilitate the establishment of accounts awarded.

(i) R&R Budget Form – Estimate the total research project cost. Categorize funds by year and provide separate annual budgets for projects lasting more than one year. In addition to the Research & Related Budget forms available on Grants.gov, the budget proposal should include a budget justification for each year, clearly explaining the need for each item. Applicants who enter a fee on Part J of the budget will not be eligible to receive a grant or cooperative agreement. Should a grant be awarded AFOSR will make payments to educational and non-profit recipients based upon a predetermined payment schedule. Payments will normally be made quarterly in advance of performance, based upon a spending profile which must be provided as part of the proposal. Payments should be limited to the amounts needed to conduct research during each respective period. Educational and Non-profit organizations shall submit a spending profile with their cost proposal. Attach the budget justification and/or spending profile to Section K of the R&R Budget form.

4. Other Submission Requirements

Proposals submitted in whole or in part by electronic media (computer disk or tape, facsimile machine, electronic mail, etc.) will not be accepted (unless the full proposal is submitted electronically through Grants.gov).

5. Application Receipt Notices.

a. For Electronic Submission - The applicant's approved account holder for grants.gov will receive a confirmation page upon completing the submission to Grants.gov. This confirmation page is a record of the time and date stamp that is used to determine whether the proposal was submitted by the deadline.

Proposals received after the due date and time shall be governed by the provisions of FAR 52.215-1(c)(3).

After an institution submits an application, Grants.gov generates a submission receipt via email and also sets the application status to "Received". This receipt verifies the Application has been successfully delivered to the Grants.gov system. Next, Grants.gov verifies the submission is valid by ensuring it does not contain viruses, the opportunity is still open, and the applicant login and applicant DUNS number match. If the submission is valid, Grants.gov generates a submission validation receipt via email and sets the application status to "Validated". If the application is not validated, the application status is set to "Rejected". The system sends a rejection email notification to the institution and the institution must resubmit the application package. Applicants can track the status of their application by logging in to Grants.gov.

6. Significant Dates and Times

Schedule of Events		
Event	Date	Time
White Papers Accepted	15 Sep -17 Oct 2008	4:00 PM Eastern Time
Notification of Initial DoD Evaluations of White Papers	~31 October 2008*	
Full Proposals Due	12 December 2008	4:00 PM Eastern Time
Notification of Selection for Award	02 Feb 2009*	
Start Date of Grant	01 Apr 2009*	

V. Application Review Information

Proposals submitted under this BAA are evaluated through a peer or scientific review process, and selected for award on a merit-based competitive basis under Department of Defense Grant and Agreement Regulations (DoDGARs). Both white papers and full proposals will be reviewed by an evaluation panel chaired by the responsible Research Topic Leads and consisting of technical experts from Federal Agencies and national laboratories.

1. Evaluation Criteria

White papers will be evaluated to assess whether the proposed research is likely to meet the objectives of the specific topic, and thus whether to encourage the submission of a full proposal. The assessment will focus on scientific and technical merit (criterion 1, below) and relevance and potential contribution to national hypersonic capabilities (criterion 2, below), although other criteria may also be used in making the assessment.

Full proposals responding to this BAA in each topic area will be evaluated using the following criteria. The first three evaluation factors are of equal importance:

- (1) scientific and technical merits of the proposed basic science and/or engineering research;
- (2) relevance and potential contributions of the proposed research to the topical research area and to national hypersonic capabilities; and
- (3) potential impact of the proposed research on the nation's ability to perform hypersonic-relevant research and on the institution's ability to train, through the proposed research, students in science and/or engineering.

The following four evaluation criteria are each of lesser importance than any of the above three, but are equal to each other:

- (4) the qualifications and availability of the Principal Investigator and key co-investigators;

(5) the adequacy of current or planned facilities and equipment to accomplish the research objectives;

(6) the impact of interactions with other organizations engaged in related research and development; and

(7) the realism and reasonableness of cost (cost sharing is not a factor in the evaluation).

Decisions for exercising options will be based on accomplishments during the base years and potential research advances during the option years that can impact national research priorities and technological capabilities.

2. Review Process

Both white papers and full proposals will be reviewed by an evaluation panel chaired by the responsible Research Topic Leads and consisting of technical experts from Federal agencies and national laboratories.

Evaluation panel members are required to sign "no conflict of interest" statements.

Contractors working for AFOSR may be involved in the administrative processing of proposals.

3. Selection Process

Full proposals will undergo a multi-stage evaluation procedure. The respective evaluation panels will review proposals first. Findings of the evaluation panels will be forwarded to senior officials within the sponsoring agencies who will make funding recommendations to the awarding officials.

VI. Award Administration Information

1. Award Notices.

Should your proposal be selected for award, the principal investigator will receive a letter from AFOSR stating this information. This is not an authorization to begin work. Your business office will be contacted by the grant or contracting officer to negotiate the terms of your award.

2. Reporting Requirements.

Grants typically require annual and final technical reports, financial reports, and final patent reports. Copies of publications and presentations should be submitted.

Additional deliverables may be required based on the research being conducted.

VII. Agency Contacts

Should you have questions about a technical research area, contact one of the Research Topic Leads listed in Section IX. Should you have questions about the BAA or procedures for submission of a proposal, contact Ricky Christie at afosr.baa@afosr.af.mil.

VIII. Other Information

1. The cost of proposal preparation in response to this Announcement is not considered an allowable direct charge to any resulting award. Such cost is, however, an allowable expense to the normal bid and proposal indirect cost specified in FAR 31.205-18, or OMB Circular A-21, Cost Principles for Educational Institutions or OMB Circular A-122, Cost Principles for Nonprofit Organizations.
2. Every effort will be made to protect the confidentiality of the proposal and any evaluations. However, under the Freedom of Information Act (FOIA) requirements, such information (or portions thereof) may potentially be subject to release. Offerors should apply the restrictive notice prescribed in the provision of FAR 52.215-1(e) Instructions to Offerors-Competitive Acquisition.
3. Only contracting or grants officers are legally authorized to bind the government.
4. Intellectual Property
 - a. Proposers shall identify all aspects of the intellectual property; technical data, hardware, and software that they plan to develop under this award for which the Government will acquire less than unlimited rights and to list specifically what the restrictions are. In the event that proposers do not submit such a list, the Government will assume that it automatically has unlimited rights to all intellectual property, technical data, hardware, and software developed under this award. Furthermore, the Government will assume that it has unlimited rights to all intellectual property, technical data, hardware, and software developed under this award that is not listed.
 - b. Proposers are advised that proposals containing restrictions on intellectual property are by nature less favorable and valuable to the government. Restrictions will be considered in the evaluation process. If no restrictions are intended, then the proposer should state this fact.
5. AFOSR documents are available on the AFOSR website at <http://www.wpafb.af.mil/AFRL/afosr/>.
6. Responses should reference Broad Agency Announcement AFOSR BAA 2008-7.
7. Prospective awardee shall be registered in the CCR database prior to award, during performance, and through final payment of any award resulting from this announcement. Offerors may obtain information on registration and annual confirmation requirements via the Internet at <http://www.ccr.gov> or by calling 1-888-227-2423, or 269-961-5757.