Office of Science
Notice DE-FG01-05ER05-07

Research in Innovative Approaches to High Energy Density Physics in Fusion Energy Sciences

Department of Energy

Office of Science Financial Assistance Program Notice DE-FG01-05ER05-07: Research in Innovative Approaches to High Energy Density Physics in Fusion Energy Sciences

AGENCY: U.S. Department of Energy

ACTION: Notice inviting grant applications.

SUMMARY: The Office of Fusion Energy Sciences (OFES) of the Office of Science (SC), U.S. Department of Energy (DOE), announces its interest in receiving grant applications for research in innovative approaches to high energy density physics in fusion energy sciences.

The OFES has a broad program of science-based research to develop the knowledge base needed for an economically and environmentally attractive fusion energy source in the long term. One of the approaches to fusion energy is based on inertial fusion, which seeks to produce fusion reactions by creating plasmas of extremely high density and using inertia to contain momentarily the extreme pressure generated by the fusion burning plasma. In order for inertial fusion to achieve significant energy production, it will be necessary to develop attractive physics pathways for providing the necessary conditions for ignition and burn. In turn, these conditions will require states of matter with extremely high energy density (HED). The physics of matter at such high energy densities is an emerging field that cuts across many areas of science [Reference: The National Research Council, High Energy Density Physics: The X-Games of Contemporary Science, Committee on High Energy Density Physics, The National Academy Press, Washington, D.C., 2003]. The OFES is sponsoring research in high energy density physics (HEDP) that might be relevant to creating fusion energy by inertial fusion or equivalently high density plasmas.

The OFES HEDP Program has the long-term performance measure of demonstrating progress in developing the fundamental understanding and predictability of high energy density plasma physics, including potential energy producing applications. This fundamental understanding and predictability is to be gained by conducting a series of scientific campaigns, experimentally, theoretically and computationally. The OFES research plan in HEDP is guided largely by the recent Report of the National Task Force on High Energy Density Physics commissioned by the Interagency Working Group on the Physics of the Universe under the auspices of the Office of Science and Technology Policy [Reference: Office of Science and Technology IWG on POU, Frontiers for Discovery in High Energy Density Physics, National Task Force on High Energy Density Physics, July 2004]. Current research efforts funded by OFES include creation of high

energy density states by the use of heavy ion beams, dense plasma jets and the Fast Ignition approach to inertial fusion.

The purpose of this Notice is to seek competitive applications for innovative research in high energy density physics relevant to fusion energy sciences, but it is not meant to provide a means to increment research in heavy ion beams which is funded separately by OFES. Applications for research in ion beams should not be submitted under this Notice. This Notice is meant to create research opportunities for other attractive physics pathways that have the potential of creating high energy density plasmas. Examples of such approaches that have been identified in the Report of the National Task Force on HEDP includes, but are not limited to, Fast Ignition and dense plasma jets.

DATES: To permit timely consideration for awards in FY 2005, applications submitted in response to this notice must be received by DOE no later than 4:30 p.m., Eastern Time, February 3, 2005.

A Letter-of-Intent (LOI) to submit an application is REQUIRED and should be submitted by January 25, 2005. Failure to submit a Letter-of-Intent by an applicant may preclude the full application from due considerations. Please see the "Supplementary Information" section below for further instructions on the preparation of the Letter-of-Intent and the full application. Electronic submission of the Letter-of-Intent and the formal application in PDF format are required. It is important that the submission be in a single PDF file. Please see the "Addresses" section below for further instructions on the method of proposal submission.

ADDRESSES: Formal applications from universities and the private sector referencing Program Notice DE-FG01-05ER05-07 must be sent electronically by an authorized institutional business official through DOE's Industry Interactive Procurement System (IIPS) at: http://e-center.doe.gov (see also http://www.science.doe.gov/grants/). IIPS provides for the posting of solicitations and receipt of applications in a paperless environment via the Internet. In order to submit applications through IIPS your business official will need to register at the IIPS website. **IIPS offers the option of using multiple files, please limit submissions to one volume and one file if possible, with a maximum of no more than four PDF files.** The Office of Science will include attachments as part of this notice that provide the appropriate forms in PDF fillable format that are to be submitted through IIPS. Color images should be submitted in IIPS as a separate file in PDF format and identified as such. These images should be kept to a minimum due to the limitations of reproducing them. They should be numbered and referred to in the body of the technical scientific grant application as Color image 1, Color image 2, etc. Questions regarding the operation of IIPS may be e-mailed to the IIPS help desk at: HelpDesk@pr.doe.gov or you may call the help desk at (800) 683-0751. Further information on the use of IIPS by the Office of Science is available at: http://www.science.doe.gov/grants/IIPS-Instructions.html.

If you are unable to submit an application through IIPS, please contact the Grants and Contracts Division, Office of Science at: (301) 903-5212 or (301) 903-3064, in order to gain assistance for submission through IIPS or to receive special approval and instructions on how to submit printed applications.

The Letter-of-Intent should be submitted electronically by email to John.Sauter@science.doe.gov and Francis.Thio@science.doe.gov. Please include "Letter-of-Intent for Notice DE-FG01-05ER05-07" in the subject line.

FOR FURTHER INFORMATION CONTACT: Office of Fusion Energy Sciences, U.S. Department of Energy, SC-55/Germantown Building, 1000 Independence Avenue, SW, Washington, DC 20585-1290. Dr. Francis Thio, SC-55, (301) 903-4678, francis.thio@science.doe.gov, is the Program Manager for the OFES HEDP Program, and may be contacted for technical information. Mr. John Sauter, SC-55, (301) 903-3287, john.sauter@science.doe.gov may be contacted for administrative information relating to the submission of the application and Letter-of-Intent.

SUPPLEMENTARY INFORMATION:

The purpose of the Letter-of-Intent (LOI) is to facilitate the OFES in planning the review and the selection of potential reviewers for the proposal. For this purpose, the LOI must include a one-page abstract of the proposed research, and list the names and institutional affiliations of Principal Investigators, any Co-Principal Investigators, key investigators, collaborators, or consultants, so as to reveal any potential conflict of interest in the selection of reviewers for the application.

Since we expect that the same reviewers will be asked to review several applications, all applications should be limited to a maximum of thirty five (35) pages (including text and figures) of technical information. Applications exceeding these page limits may be rejected without review. The PDF file may also include a few selected publications in an Appendix as background information. In addition, please limit biographical and publication information for the principal investigator and key personnel to no more than two pages each. Each principal investigator should provide an e-mail address. The page count of 35 does not include the DOE Face Page and Budget Pages, the Title Page, the biographical material and publication information, and any Appendices of publications. Reviewers are not obliged to read the Appendices.

The application should be written in strict compliance with the following format:

1. Executive Summary - summarize the proposal in no more than two pages

2. Background and Recent Accomplishments

    2.1. Background
    2.2. Recent Accomplishments - This subsection is mandatory for applications seeking to expand currently funded research, but optional for new applications

3. Proposed research

    3.1. Detailed Plan (Scope)
    3.2. Project schedules and milestones

3.3. Statement of Work, Work Breakdown Structure (WBS) with resource allocations, and Deliverables

4. Textual Summary of Budget (in addition to the formal budget pages) - in particular, showing how the budget relates to the proposed research and task plans

5. Management plan - if appropriate (for projects of large size and complexity)

6. Description of facilities, resources, and personnel

7. Other current and pending support.

General information about development and submission of applications, eligibility, limitations, evaluations and selection processes, and other policies and procedures may be found in the Application Guide for the Office of Science Financial Assistance Program and 10 CFR Part 605. Electronic access to SC's Financial Assistance Guide and required forms is possible via the Internet using the following Web site address: http://www.science.doe.gov/grants/. DOE is under no obligation to pay for any costs associated with the preparation or submission of an application if an award is not made. The information required by 10 CFR Part 605 should be conveyed by the application using the above format wherever possible.

In selecting applications for funding, the DOE Office of Fusion Energy Sciences will give priority to applications that can produce experimental results within three to four years after grant initiation. Theoretical research will be accepted for consideration under this Notice when bundled with and in support of an experimental application. Preferred applications in this category would typically have a performance period of, but not limited to, three or four years.

Applications concerned with scientific assessment of new concepts or approaches that are not ready for experimental investigation should have a well-defined scope. The product of such assessment would be a clear scientific description of the concept and its operation, its physics and engineering basis, critical analysis of major difficulties to be overcome in developing the concept, and an analysis of what would be achieved by moving to experimental research. Applications in this category should propose research with a performance period of, but not limited to, one or two years. Applications in this category with a funding request between $25,000 and $50,000 are particularly welcome.

Collaborative research projects involving more than one institution are encouraged. Applications submitted from different institutions, which are directed at a common research activity, should clearly indicate they are part of a proposed collaboration and contain a brief description of the overall research project, and include Letters of Coordination from the collaborative partners. However, each application must have a distinct scope of work and a qualified principal investigator, who is responsible for the research effort being performed at his or her institution. Further information on preparation of collaborative applications may be accessed via the Internet at: http://www.science.doe.gov/grants/Colab.html.

Program Funding

This is a new initiative. There is no funding in the program at present but DOE has reasonable expectations of total funding up to an amount of $1,400,000 in FY 2005 for this initiative. In addition, approximately $600,000 will be available for competition by DOE National Laboratories under a separate solicitation **(Program Announcement LAB 05-07).**

Awards are expected to be made for a period of three years, with out-year support contingent on the availability of funds and satisfactory progress, though applications may request support for up to five years. OFES reserves the right not to make any awards if no application is judged to be of suitable scientific quality or of sufficient relevance to the OFES HEDP program. The cost-effectiveness of the application will be considered when comparing applications with differing funding requirements. Previous awards have ranged from $400,000 to $800,000 per year in similar areas. A single award or multiple awards may be made depending on the number and quality of the applications received and favorably reviewed. If multiple awards are made, it is anticipated that award sizes may range from $25,000 to $1,000,000 per year.

Merit Review

Applications will be subjected to formal merit review and will be evaluated against the following criteria, which are listed in descending order of importance as set forth in 10 CFR Part 605. (http://www.science.doe.gov/grants/605index.html). Included with each criteria are the detailed questions that are asked of the reviewers.

1. Scientific and/or technical merit of the project;

    - Does this application address an important problem in high energy density physics that might be relevant to fusion energy science in the long term?
    - What is the likelihood that it will lead to new or fundamental advances in its field?
    - If successfully attained, what is the significance of or how would the new advances impact the field?
    - How does the proposed research compare with other research in its field, both in terms of scientific and/or technical merit and originality?

2. Appropriateness of the proposed method or approach;

    - Are the conceptual framework, methods, and analyses adequately developed and sound?
    - For experimental investigations, are the proposed diagnostics appropriate, likely to be effective, or adequate?
    - How would you rate the proposed plans for analyzing and interpreting the data?
    - Are the proposed method or approach likely to lead to scientifically valid conclusions or advances in the field?
    - Are there significant potential problems and how well does the applicant address these problems?

3. Competency of the applicant's personnel and adequacy of the proposed resources;

- How well qualified are the applicant's personnel to carry out the proposed research? (If appropriate, please comment on the scientific reputation and quality of recent research by the principal investigator and other key personnel.)
- Are the applicant's research environment and resources adequate?
- Does the proposed work take advantage of unique facilities and capabilities and/or make good use of collaborative arrangements?

4. Reasonableness and appropriateness of the proposed budget.

The reviewers are also asked to comment on **Other Appropriate Factors**:

- How is the proposed project relevant to the long-term performance measure for the OFES High Energy Density Physics program?
- Could the proposed research make a significant contribution to another field?
- Is there potential for spin-offs?
- If applicable, please comment on the educational benefits of the proposed activity.

The Office of Fusion Energy Sciences will also consider, as part of the evaluation, other available advice or information as well as program policy factors such as ensuring an appropriate balance among the program areas and within the program areas, coupling to the theory and computational efforts, and quality of previous performance. Selection of applications for award will be based upon the findings of the technical evaluations, the importance and relevance of the proposed research to the Office of Fusion Energy Sciences' mission in high energy density physics, and funding availability. Funding under this Notice is limited to supporting research activities based in the U.S., though subcontracts with limited funding for collaborators outside the U.S. may be allowed with appropriate justifications.

The Catalog of Federal Domestic Assistance number for this program is 81.049, and the solicitation control number is ERFAP 10 CFR Part 605.

Martin Rubinstein
Grants and Contracts Division
Office of Science

Posted on the Office of Science Grants and Contracts Web Site
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