

**Program Announcement  
To DOE National Laboratories  
LAB 05-07**

***Research in Innovative Approaches  
To High Energy Density Physics In Fusion Energy Sciences***

**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 **peer-reviewable** Field Work Proposals (FWPs) for research in innovative approaches to High Energy Density Physics (HEDP) relevant to 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 proposals 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. Proposals 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: A Letter-of-Intent (LOI) to submit a proposal is REQUIRED and should be submitted by January 25, 2005. Failure to submit a Letter-of-Intent by a proposer may preclude the full proposal from due considerations.** Please see the "Supplementary Information" section below for further instructions on the preparation of the Letter-of-Intent and the full proposal. Electronic submission of the Letter-of-Intent and the formal proposal 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.

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

**ADDRESSES:** The Letter-of-Intent should be submitted electronically by email to John.Sauter@science.doe.gov and Francis.Thio@science.doe.gov. Please use "Letter-of- Intent for LAB 05-07" in the subject line.

A completed formal FWP in a single Portable Document Format (PDF) file of less than 10 MB referencing Program Announcement LAB 05-07 must be submitted via email to: John.Sauter@science.doe.gov; Mr. John Sauter, SC-55, U.S. Department of Energy, Office of Science, Germantown, MD. Please use "Program Announcement LAB 05-07" in the subject line of the email. FWPs in PDF format on CDs submitted by commercial courier or express mail service, or hand carried by the proposer, should use the following address: U.S. Department of Energy, 19901 Germantown Road, Germantown, MD 20874-1290, ATTN: Program Announcement LAB 05-07.

**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. Inquiry on submitting the proposals may be directed to Mr. John Sauter, SC-55, John.Sauter@science.doe.gov, (301) 903-3287. Request for technical information may be directed to Dr. Francis Thio, Program Manager for High Energy Density Physics, SC-55, (301) 903-4678, francis.thio@science.doe.gov.

**PROPOSAL SUBMISSION:** Each FWP must be submitted in a single Portable Document Format (PDF) of less than 10 MB by email to John.Sauter@science.doe.gov. Proposers may provide a back-up CD-ROM containing the proposal in PDF, submitted by commercial courier or express mail service, or hand carried by proposer to: Mr. John Sauter, SC-55, U.S. Department of Energy, 19901 Germantown Road, Germantown, MD 20874-1290, ATTN: Program Announcement LAB 05-07. The label on the CD must clearly identify the institution, principal investigator, and title of the proposal. All submissions and inquiries about this program should reference Program Announcement LAB 05-07.

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 proposal.

**Since we expect that the same reviewers will be asked to review several proposals, all proposals should be limited to a maximum of thirty five (35) pages (including text and figures) of technical information. Proposals 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 Proposal Cover 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 FWP must be peer-reviewable to be responsive. The proposal 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 proposals seeking to expand currently funded research, but optional for new proposals
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.

In addition, while adhering to the above format, the Office of Science FWP proposal preparation guidelines (attached below) should be followed whenever possible.

#### **SUPPLEMENTARY INFORMATION:**

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

Proposals 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. Proposals in this category should propose research with a performance period of, but not limited to, one or two years. Proposals 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. Proposals 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 proposal 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 proposals 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 **\$600,000** in FY 2005 for this initiative. In addition, approximately \$1,400,000 will be available for competition by universities and industry under a separate solicitation (Notice DE-FG01-05ER05-07).

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 proposals may request support for up to five years. OFES reserves the right not to make any awards if no proposal is judged to be of suitable scientific quality or of sufficient relevance to the OFES HEDP program. The cost-effectiveness of the proposal will be considered when comparing proposals 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 proposals 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.

The instructions and format described below should be followed. Reference Program Announcement LAB 05-07 on all submissions and inquiries about this program.

**OFFICE OF SCIENCE**  
**GUIDE FOR PREPARATION OF SCIENTIFIC/TECHNICAL PROPOSALS**  
**TO BE SUBMITTED BY NATIONAL LABORATORIES**

Proposals from National Laboratories submitted to the Office of Science (SC) as a result of this program announcement will follow the Department of Energy Field Work Proposal process with additional information requested to allow for scientific/technical merit review. The following guidelines for content and format are intended to facilitate an understanding of the requirements necessary for SC to conduct a merit review of a proposal. Please follow the guidelines carefully, as deviations could be cause for declination of a proposal without merit review.

**1. Evaluation Criteria**

Proposals will be subjected to formal merit review and will be evaluated against the following criteria. Included with each criterion are the detailed questions that are asked of the reviewers.

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

- Does this proposal 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?
- Is 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 proposer address these problems?

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

- How well qualified are the proposer'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 proposer'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 proposals 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.

## 2. Summary of Proposal Contents

Field Work Proposal (FWP) Format (Reference DOE Order 5700.7C) (DOE ONLY)  
Proposal Cover Page  
Table of Contents  
Abstract  
Narrative  
Literature Cited  
Budget and Budget Explanation  
Other support of investigators  
Biographical Sketches  
Description of facilities and resources  
Appendix

### 2.1 Number of Copies to Submit

Each FWP must be submitted in a single Portable Document Format (PDF) of less than 10 MB by email to John.Sauter@science.doe.gov. Proposers may provide a back-up CD- ROM containing the proposal in PDF, submitted by commercial courier or express mail service, or hand carried by proposer to: Mr. John Sauter, SC-55, U.S. Department of Energy, 19901 Germantown Road, Germantown, MD 20874-1290, ATTN: Program Announcement LAB 05-07. The label on the CD must clearly identify the institution, principal investigator, and title of the proposal. All submissions and inquiries about this program should reference Program Announcement LAB 05-07.

### **3. Detailed Contents of the Proposal**

Proposals must conform to the following three requirements: the height of the letters must be no smaller than 10 point with at least 2 points of spacing between lines (leading); the type density must average no more than 17 characters per inch; the margins must be at least one-half inch on all sides. Figures, charts, tables, figure legends, etc., may include type smaller than these requirements so long as they are still fully legible.

#### **3.1 Field Work Proposal Format (Reference DOE Order 5700.7C) (DOE ONLY)**

The Field Work Proposal (FWP) is to be prepared and submitted consistent with policies of the investigator's laboratory and the local DOE Operations Office. Additional information is also requested to allow for scientific/technical merit review.

Laboratories may submit proposals directly to the SC Program office listed above. A copy should also be provided to the appropriate DOE operations office.

#### **3.2 Proposal Cover Page**

The following proposal cover page information may be placed on plain paper. No form is required.

Title of proposed project

SC Program announcement title

Name of laboratory

Name of principal investigator (PI)

Position title of PI

Mailing address of PI

Telephone of PI

Fax number of PI

Electronic mail address of PI

Name of official signing for laboratory\*

Title of official

Fax number of official

Telephone of official

Electronic mail address of official

Requested funding for each year; total request

Use of human subjects in proposed project:

If activities involving human subjects are not planned at any time during the proposed project period, state "No"; otherwise state "Yes", provide the IRB Approval date and Assurance of Compliance Number and include all necessary information with the proposal should human subjects be involved.

Use of vertebrate animals in proposed project:

If activities involving vertebrate animals are not planned at any time during this project, state "No"; otherwise state "Yes" and provide the IACUC Approval date

and Animal Welfare Assurance number from NIH and include all necessary information with the proposal.

Signature of PI, date of signature

Signature of official, date of signature\*

\*The signature certifies that personnel and facilities are available as stated in the proposal, if the project is funded.

### 3.3 Table of Contents

Provide the initial page number for each of the sections of the proposal. Number pages consecutively at the bottom of each page throughout the proposal. Start each major section at the top of a new page. Do not use unnumbered pages and do not use suffixes with page numbers, such as 5a, 5b.

### 3.4 Abstract

Provide an abstract of no more than 250 words. Give the broad, long-term objectives and what the specific research proposed is intended to accomplish. State the hypotheses to be tested. Indicate how the proposed research addresses the SC scientific/technical area specifically described in this announcement.

### 3.5 Narrative

The narrative comprises the research plan for the project and is limited to 25 pages. It should contain the following subsections:

**Background and Significance:** Briefly sketch the background leading to the present proposal, critically evaluate existing knowledge, and specifically identify the gaps which the project is intended to fill. State concisely the importance of the research described in the proposal. Explain the relevance of the project to the research needs identified by the Office of Fusion Energy Sciences. Include references to relevant published literature, both to work of the investigators and to work done by other researchers.

**Preliminary Studies:** Use this section to provide an account of any preliminary studies that may be pertinent to the proposal. Include any other information that will help to establish the experience and competence of the investigators to pursue the proposed project. References to appropriate publications and manuscripts submitted or accepted for publication may be included.

**Research Design and Methods:** Describe the research design and the procedures to be used to accomplish the specific aims of the project. Describe new techniques and methodologies and explain the advantages over existing techniques and methodologies. As part of this section, provide a tentative sequence or timetable for the project.

**Subcontract or Consortium Arrangements:** If any portion of the project described under "Research Design and Methods" is to be done in collaboration with another institution, provide

information on the institution and why it is to do the specific component of the project. Further information on any such arrangements is to be given in the sections "Budget and Budget Explanation", "Biographical Sketches", and "Description of Facilities and Resources".

### **3.6 Literature Cited**

List all references cited in the narrative. Limit citations to current literature relevant to the proposed research. Information about each reference should be sufficient for it to be located by a reviewer of the proposal.

### **3.7 Budget and Budget Explanation**

A detailed budget is required for the entire project period, which normally will be three years, and for each fiscal year. It is preferred that DOE's budget page, Form 4620.1 be used for providing budget information\*. Modifications of categories are permissible to comply with institutional practices, for example with regard to overhead costs.

A written justification of each budget item is to follow the budget pages. For personnel this should take the form of a one-sentence statement of the role of the person in the project. Provide a detailed justification of the need for each item of permanent equipment. Explain each of the other direct costs in sufficient detail for reviewers to be able to judge the appropriateness of the amount requested.

Further instructions regarding the budget are given in section 4 of this guide.

\* Form 4620.1 is available at web site: <http://www.sc.doe.gov/grants/forms-E.html>

### **3.8 Other Support of Investigators**

Other support is defined as all financial resources, whether Federal, non-Federal, commercial or institutional, available in direct support of an individual's research endeavors. Information on active and pending other support is required for all senior personnel, including investigators at collaborating institutions to be funded by a subcontract. For each item of other support, give the organization or agency, inclusive dates of the project or proposed project, annual funding, and level of effort devoted to the project.

### **3.9 Biographical Sketches**

This information is required for senior personnel at the laboratory submitting the proposal and at all subcontracting institutions. The biographical sketch is limited to a maximum of two pages for each investigator.

### **3.10 Description of Facilities and Resources**

Describe briefly the facilities to be used for the conduct of the proposed research. Indicate the performance sites and describe pertinent capabilities, including support facilities (such as

machine shops) that will be used during the project. List the most important equipment items already available for the project and their pertinent capabilities. Include this information for each subcontracting institution, if any.

### **3.11 Appendix**

Include collated sets of all appendix materials with each copy of the proposal. Do not use the appendix to circumvent the page limitations of the proposal. Information should be included that may not be easily accessible to a reviewer.

Reviewers are not required to consider information in the Appendix, only that in the body of the proposal. Reviewers may not have time to read extensive appendix materials with the same care as they will read the proposal proper.

The appendix may contain the following items: up to five publications, manuscripts (accepted for publication), abstracts, patents, or other printed materials directly relevant to this project, but not generally available to the scientific community; and letters from investigators at other institutions stating their agreement to participate in the project (do not include letters of endorsement of the project).

## **4. Detailed Instructions for the Budget**

(DOE Form 4620.1 "Budget Page" may be used)

### **4.1 Salaries and Wages**

List the names of the principal investigator and other key personnel and the estimated number of person-months for which DOE funding is requested. Researchers should list the number of postdoctoral associates and other professional positions included in the proposal and indicate the number of full-time-equivalent (FTE) person-months and rate of pay (hourly, monthly or annually). For graduate and undergraduate students and all other personnel categories such as secretarial, clerical, technical, etc., show the total number of people needed in each job title and total salaries needed. Salaries requested must be consistent with the institution's regular practices. The budget explanation should define concisely the role of each position in the overall project.

### **4.2 Equipment**

DOE defines equipment as "an item of tangible personal property that has a useful life of more than two years and an acquisition cost of \$25,000 or more." Special purpose equipment means equipment which is used only for research, scientific or other technical activities. Items of needed equipment should be individually listed by description and estimated cost, including tax, and adequately justified. Allowable items ordinarily will be limited to scientific equipment that is not already available for the conduct of the work. General purpose office equipment normally will not be considered eligible for support.

### **4.3 Domestic Travel**

The type and extent of travel and its relation to the research should be specified. Funds may be requested for attendance at meetings and conferences, other travel associated with the work and subsistence. In order to qualify for support, attendance at meetings or conferences must enhance the investigator's capability to perform the research, plan extensions of it, or disseminate its results. Consultant's travel costs also may be requested.

#### **4.4 Foreign Travel**

Foreign travel is any travel outside Canada and the United States and its territories and possessions. Foreign travel may be approved only if it is directly related to project objectives.

#### **4.5 Other Direct Costs**

The budget should itemize other anticipated direct costs not included under the headings above, including materials and supplies, publication costs, computer services, and consultant services (which are discussed below). Other examples are: aircraft rental, space rental at research establishments away from the institution, minor building alterations, service charges, and fabrication of equipment or systems not available off-the-shelf. Reference books and periodicals may be charged to the project only if they are specifically related to the research.

##### **a. Materials and Supplies**

The budget should indicate in general terms the type of required expendable materials and supplies with their estimated costs. The breakdown should be more detailed when the cost is substantial.

##### **b. Publication Costs/Page Charges**

The budget may request funds for the costs of preparing and publishing the results of research, including costs of reports, reprints page charges, or other journal costs (except costs for prior or early publication), and necessary illustrations.

##### **c. Consultant Services**

Anticipated consultant services should be justified and information furnished on each individual's expertise, primary organizational affiliation, daily compensation rate and number of days expected service. Consultant's travel costs should be listed separately under travel in the budget.

##### **d. Computer Services**

The cost of computer services, including computer-based retrieval of scientific and technical information, may be requested. A justification based on the established computer service rates should be included.

##### **e. Subcontracts**

Subcontracts should be listed so that they can be properly evaluated. There should be an anticipated cost and an explanation of that cost for each subcontract. The total amount of each subcontract should also appear as a budget item.

#### **4.6 Indirect Costs**

Explain the basis for each overhead and indirect cost. Include the current rates.