

**Program Announcement
To DOE National Laboratories
LAB 02-19**

*Innovations in
Fusion Energy Confinement Systems*

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 innovative experiments in fusion energy confinement systems. Organizations with research projects funded under previous Notices need to check with their OFES program manager to see if they need to submit a renewal proposal for funding in FY03. Successful proposals will be funded early in FY 2003.

The Office of Fusion Energy Sciences is interested in proposals for innovative fusion energy experimental research. The specific areas of interest are:

1. Innovative Approaches to Understanding Plasmas
2. Innovative Confinement Concepts
3. Innovative Plasma Operations in Support of POP, PE, and Burning Plasmas

More specific information on each area of interest is outlined in the general and program specific supplementary information section below.

The research should be aimed at experimentally elucidating the physics principles involved. Research projects are sought which are unique, first of a kind and which provide new scientific insights. Although the main thrust of this initiative is experimental, consideration will also be given to proposals that are directed at scientific assessment of new concepts, approaches, and plasma operations that are not ready for experimental investigation. Proposals for research on existing large experiments, or initiatives in Inertial Fusion Energy should not be submitted in response to this notice. Collaborative proposals submitted from different institutions that are directed at a single proposed experiment will be "bundled" and reviewed collectively.

Due to the limited availability of funds, Principal Investigators with continuing research projects may not submit a new proposal in the same area(s) of interest as their current research. A Principal Investigator may submit only one proposal under each area of interest as listed above.

DATES: To permit timely consideration for awards in Fiscal Year 2003, FWPs submitted in response to this notice must be received no later than 4:30 p.m., May 15, 2002. No electronic submissions of formal FWPs will be accepted.

ADDRESSES: Completed formal FWPs referencing LAB 02-19 should be forwarded to: Mr. John Sauter, SC-55 GTN, U.S. Department of Energy, Office of Science, 19901 Germantown Road, Germantown, Maryland 20874-1290, ATTN: LAB 02-19. The above address must also be used when submitting FWPs by U.S. Postal Service Express, any commercial mail delivery service, or when hand carried by the proposer.

FOR FURTHER INFORMATION CONTACT: Specific contacts for each area of interest, along with telephone numbers and Internet addresses, are listed below:

Innovative Approaches to Understanding Plasmas: Steve Eckstrand, Research Division, SC- 55, Telephone: (301) 903-5546, or by Internet address, steve.eckstrand@science.doe.gov

Innovative Confinement Concepts: Curtis W. Bolton III, Research Division, SC-55, Telephone: (301) 903-4914, or by Internet address, curt.bolton@science.doe.gov

Innovative Plasma Operations in Support of POP, PE, and Burning Plasma Experiments: Chuck Finfgeld, Research Division, SC-55, Telephone: (301) 903-3423, or by Internet address, charles.finfgeld@science.doe.gov

GENERAL INFORMATION: DOE is under no obligation to pay for any costs associated with the preparation or submission of proposals.

SUPPLEMENTARY INFORMATION: In selecting FWPs for funding, the DOE Office of Fusion Energy Sciences will give priority to proposals that can produce experimental results within three to five years after initiation. Theoretical research will be accepted for consideration under this Notice when bundled with and in support of an experimental application. The detailed description of the proposed project should contain the following items: (1) A detailed experimental research plan, (2) The specific results or deliverable expected at the end of the project period, (3) Goal of the experiment, (4) Synopsis of the experimental program plan, (5) Adequacy of the facilities and budget, (6) Discussion of why this research would have an important impact on the prospects for fusion energy science, and (7) Discussion of how the experiment would elucidate the physics principles of the innovation.

The Office of Fusion Energy Sciences shall 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 theory and computational support, 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, and funding availability.

Proposals concerned with scientific assessment of new concepts, approaches, and plasma operations that are not ready for experimental investigation should have a well defined scope and a duration of no more than two years. These proposals will be considered non-renewable. 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 as a net producer of energy through the fusion process, and an analysis of what would be achieved by moving to experimental research.

PROGRAM SPECIFIC SUPPLEMENTARY INFORMATION:

1. Innovative Approaches to Understanding Plasmas: These are innovative experiments aimed at understanding some key scientific issue of importance to fusion energy. This could include experiments aimed at understanding turbulence and zonal flows, understanding reconnection, or understanding other outstanding fusion energy sciences issues.

2. Innovative Confinement Concepts: This is innovative experimental research that has the possibility of leading to improved fusion energy power plants.

3. Innovative Plasma Operations in Support of POP, PE, and Burning Plasma experiments: The fusion program has a number of confinement concepts that have passed beyond the exploratory stage to either the proof of principle (POP), performance extension (PE), or the burning plasma stages. Innovative Plasma Operations is aimed at developing the science and understanding of new ways to enhance the performance of the POP, PE, or burning plasma experiments. This could include work on stabilizing resistive wall modes, new methods of turbulence suppression, methods to suppress neo-classical tearing modes, and novel methods to use fusion energetic particles.

Program Funding

It is anticipated that up to \$3,500,000 in FY 2003 will be available to start new projects from FWPs received in response to this Notice. The number of awards for funding will depend on the number of proposals received and selected for award. Future year funding is anticipated to be greater but will depend on the nature of the proposals, suitable experimental progress and the availability of funds. The cost-

effectiveness of the proposal will be considered when comparing proposals with differing funding requirements. FWPs for scientific assessment of new concepts will be limited to a maximum of \$150,000 in any year. Proposals requiring annual funding as low as \$50,000 are welcome and encouraged.

PROPOSAL SUBMISSION: An original and seven copies of each FWP must be submitted. Due to the anticipated number of reviewers, it would be helpful for each proposer to submit an additional seven copies of each FWP. In lieu of the seven additional copies, proposers may provide a CD-ROM containing the proposal in Portable Document Format (PDF). The label on the CD must clearly identify the institution, principal investigator, and title of the proposal. (If the proposer elects to submit a CD, an original and seven copies of the proposal must still be submitted.)

The instructions and format described below should be followed. Reference Program Announcement LAB 02-19 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 (peer review) and will be evaluated against the following criteria which are listed in descending order of importance:

Scientific and/or technical merit of the project

Appropriateness of the proposed method or approach

Competency of the personnel and adequacy of the proposed resources

Reasonableness and appropriateness of the proposed budget

The evaluation will include program policy factors such as the relevance of the proposed research to the terms of the announcement, the uniqueness of the proposer's capabilities, and demonstrated usefulness of the research for proposals in other DOE Program Offices as evidenced by a history of programmatic support directly related to the proposed work.

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

An original and seven copies of the formal proposal/FWP must be submitted.

3. Detailed Contents of the Proposal

Proposals must be readily legible, when photocopied, and 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 suffices, 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 Science. 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/production/grants/forms.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. Proposers 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.