

Program Announcement To DOE National Laboratories LAB 00-07

New Programs in Fusion Energy Sciences

The Office of Fusion Energy Sciences of the Office of Science (SC), U.S. Department of Energy (DOE) hereby announces its interest in receiving proposals for new work in Fusion Energy Sciences.

The specific areas of interest are:

1. Magnetic Fusion Concept Exploration Experiments
2. Inertial Fusion Energy Concept Exploration Research
3. Inertial Fusion Energy Chamber and Target Research
4. Fusion Materials Modeling
5. Basic and Applied Plasma Science

More specific information on each area of interest is outlined in the program specific supplementary information sections below. Each proposal can be submitted to only one area of interest. Proposers must identify the area of interest in their formal submission.

DATES: To permit timely consideration for awards in Fiscal Year 2000, proposers are requested to submit a letter-of-intent by January 31, 2000 which includes the title of the proposal, the name of the principal investigator(s), the requested funding and a one-page abstract. These letters-of-intent will be used to organize and expedite review processes. Failure to submit a letter-of-intent will not negatively prejudice a responsive formal proposal submitted in a timely manner. Electronic submissions of letters-of-intent are acceptable.

Formal proposals submitted in response to this program announcement must be received no later than 4:30 p.m., February 29, 2000. Electronic submissions of proposals will not be accepted.

ADDRESSES: Letters-of-intent referencing Program Announcement LAB00-07 should be forwarded to: U.S. Department of Energy, Office of Science, Office of Fusion Energy Science, SC-50, 19901 Germantown Road, Germantown, Maryland 20874-1290, ATTN: John Sauter. Letters-of-intent can also be submitted via E-mail at the following E-mail address: john.sauter@science.doe.gov

The completed formal proposals referencing Program Announcement LAB00-07 should be forwarded to: U.S. Department of Energy, Office of Science, Grants and Contracts Division, SC-64, 19901 Germantown Road, Germantown, Maryland 20874-1290, ATTN: Program Announcement LAB00-07. The above address must also be used when submitting proposals by U.S. Postal Service Express, any commercial mail delivery service, or when handcarried by the proposer.

FOR FURTHER INFORMATION CONTACT: Office of Fusion Energy Sciences, U.S. Department of Energy, 19901 Germantown Road, Germantown, MD 20874-1290. Specific

contacts for each area of interest, along with telephone numbers and Internet addresses, are listed below:

Magnetic Fusion Concept Exploration Experiments: Ronald A. Blanken, Research Division, SC-55; Telephone: (301) 903-3306 or 4095, or by Internet address, ronald.blanken@science.doe.gov.

Inertial Fusion Energy Concept Exploration Research: Ronald McKnight, Research Division, SC-55; Telephone: (301) 903-4597 or 4095, or by Internet address, ronald.mcknight@science.doe.gov.

Inertial Fusion Energy Chamber and Target Research: Gene Nardella, Facilities and Enabling Technologies Division, SC-52; Telephone: (301) 903-4956 or 3068, or by Internet address, gene.nardella@science.doe.gov.

Fusion Materials Modeling: Bill Wiffen, Facilities and Enabling Technologies Division, SC-52; Telephone: (301) 903-4963 or 3068, or by Internet address, fw.wiffen@science.doe.gov.

Basic and Applied Plasma Physics: Ronald McKnight, Research Division, SC-55; Telephone: (301) 903-4597 or 4095, or by Internet address, ronald.mcknight@science.doe.gov.

Approximately \$2,500,000 of Fiscal Year 2000 funding divided by program element as outlined below will be available to start new projects from proposals received in response to this Notice. The number of awards and range of funding will depend on the number of proposals received and selected for award. Since future year funding is not anticipated to increase, proposals should propose constant level of effort (allowing for inflation). Future year funding will depend upon suitable progress and the availability of funds. The cost-effectiveness of the application will be considered when comparing proposals with differing funding requirements

New research is herein defined as research which is not within the scope of work of existing programs. In cases where the new work assumes the availability of a facility, experimental apparatus or base group to perform the work, the funding source(s) for the base must be identified in the proposal.

Proposers are encouraged to collaborate with researchers in other institutions, such as universities, industry, non-profit organizations, federal laboratories and Federally Funded Research and Development Centers (FFRDCs), including the DOE National Laboratories. In the case of collaborative proposals submitted from different institutions which are directed at a single research activity, 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.sc.doe.gov/production/grants/Colab.html>.

Although it is not required, it would be helpful for each proposer to submit fifteen (15) copies of their proposal due to the anticipated number of reviewers; otherwise the standard number of copies must be received with each proposal as outlined in the detailed instructions below.

In selecting proposals for funding, the DOE Office of Fusion Energy Sciences will give priority to proposals that can produce results within the first project period after project initiation (typically three years but as many as five years in the case of projects where construction of complex experimental apparatus is required.)

PROGRAM SPECIFIC SUPPLEMENTARY INFORMATION:

Magnetic Fusion Concept Exploration Experiments: Proposals are desired for new innovative scientific experiments that have the possibility of leading to improved magnetic fusion systems (this includes tokamak based systems with improved performance). The research should be aimed at experimentally elucidating the physics principles of such improved systems. Experiments are sought which are unique, first of a kind and which provide new insights. These funds are targeted toward the establishment of new experiments and are not meant to support collaborations on existing concept exploration or proof-of-principle experiments. Proposers for research on existing large tokamaks, independent theory investigations and new diagnostic development should not be submitted in response to this notice. Proposals for new programs based on the replacement of the cores of existing experimental facilities with cores designed to study new physics ideas are allowed. Approximately \$300,000 of FY 2000 funding, depending on the quality of the proposals, is targeted for proposals received in this area.

Inertial Fusion Energy Concept Exploration Research: Proposals are desired for new concept exploration scientific research that has the possibility of leading to improved inertial fusion energy systems. Such research may include, for example, expanding the scientific basis for concepts which could lead to significant increases in performance for more developed approaches. Efforts directed toward providing advances in physics understanding of problem areas, which have potentially high impact on inertial fusion energy science, are also of interest. Primary interest is in experimental programs, although it is recognized that part of a coordinated proposal may include theory and modeling in support of experiments. It is not anticipated that stand-alone theory proposals will be supported. Approximately \$400,000 of FY 2000 funding, depending on the quality of the proposals, is targeted for proposals received in this area.

Inertial Fusion Energy Chamber and Target Research: Proposals are desired for new innovative research that will address the key critical issues in the chamber systems, target technology, and safety and environmental areas for both heavy ion and laser driven inertial fusion energy systems. Examples of critical issues in the chamber systems area for heavy ion drivers are liquid chamber clearing and final focus/chamber interface. Examples of critical issues in the chamber systems area for laser drivers are chamber material lifetime uncertainty and final optics design and survivability. Examples of critical issues in the target technology area are low-cost, high production rate target fabrication and accurate injection and tracking. Examples of critical issues in the safety and environmental area are minimization of accident consequences and management of radioactive materials. The examples identified are not an inclusive list. This research can be either experimental and/or analytical in nature. Approximately \$200,000 of FY 2000 funding, depending on the quality of the proposals, is targeted for proposals received in this area.

Fusion Materials Modeling: Proposals are solicited for research on modeling and/or theory that will expand the knowledge base on understanding of the behavior of structural materials in the service environment of fusion systems. In particular, effects of the temperature, neutron flux, stress state, system fluids, dissimilar materials contact, or other components of the environment are of interest. Response to stresses arising from thermal, mechanical or other loading sources can be included. Material composition, microstructure and/or macrostructure variables may also be relevant to particular modeling approaches. In a broader sense, proposed research should also contribute to advancing the science of the behavior of materials. While the focus must be on the fusion environment, importance of proposed work beyond the interests of fusion should be identified. A particular goal of proposed modeling and/or theoretical research should be to add value to the in-place experimental program of research on materials for fusion systems. Models are desired that can guide and help interpret costly and difficult-to-obtain experimental results and that can be applied to resolving key material feasibility issues. Proposals that request funding for experimental work will not be considered. However, close collaboration with the currently in-place fusion and/or other experimental materials programs is expected and encouraged. Critical interfaces with experimental programs should be identified. Background information and definition of specific areas of interest are provided in two documents produced by the fusion materials community and available on the Internet at the Virtual Laboratory for Technology (VLT) web site, located at <http://vlt.ucsd.edu/>. The documents are "A Whitepaper Proposing an Integrated Program of Theoretical, Experimental, and Database Research for the Development of Advanced Fusion Materials" and "Advanced Materials Program", which is Appendix D of the VLT Roadmap. These documents should be used for background and guidance, but should not be considered as establishing absolute boundaries or scope for this announcement. Relevance of proposed research to fusion materials, especially to the feasibility issues identified in the above two referenced documents, will be considered in the process of selecting proposals for funding. Approximately \$600,000 of FY 2000 funding, depending on the quality of the proposals, is targeted for proposals received in this area with the goal of funding 2-4 proposals.

Basic and Applied Plasma Science: Proposals are desired for new scientific research in basic and applied plasma science. Proposed research in basic plasma science should contribute to increased fundamental understanding of plasmas. Discussions of important areas of basic plasma physics science research may be found in the National Council Report "Plasma Science: from Fundamental Research to Technological Applications" National Academy Press, 1995. Applied plasma science is defined herein as plasma science which is pursued to support or improve applications based on the use of plasmas. Of primary interest in applied plasma science are proposals that will contribute to improved scientific understanding of the plasma processes underpinning the application. Those proposals with a goal of improving an end product through empirical manipulations will be considered non-responsive. Primary interest is in experimental programs, although it is recognized that part of a coordinated proposal may include theory and modeling in support of experiments. It is not anticipated that stand-alone theory proposals will be supported. Proposals that are specifically directed toward fusion energy science itself will not be considered for funding under this area of the announcement. Approximately \$1,000,000 of FY 2000 funding, depending on the quality of the proposals, is targeted for proposals received in this area with a goal of funding 3-5 proposals.

The instructions and format described below should be followed. Reference Program Announcement LAB00-07 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 (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 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.

3.4 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 \$5000 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.