

**Office of Science
Financial Assistance
Funding Opportunity Announcement**

**DE-FOA-0000480
Theoretical Research in Magnetic Fusion Energy Science**

Office of Fusion Energy Sciences

SUMMARY: The Fusion Energy Sciences (FES) program of the Office of Science (SC), U.S. Department of Energy (DOE), hereby announces its interest in receiving grant applications for theoretical research relevant to the U.S. program in magnetic fusion energy sciences. All individuals or groups planning to submit applications for new or renewal funding in Fiscal Year 2012 should submit in response to this Funding Opportunity Announcement (FOA).

The specific areas of interest are:

1. Magnetohydrodynamics
2. Confinement and Transport
3. Boundary Physics
4. Plasma Heating, Non-inductive Current Drive, and Energetic Particles
5. Atomic and Molecular Processes in Plasmas

More specific information on each area of interest is outlined in the general and program specific supplementary information provided below and in the full Funding Opportunity Announcement.

Due to the limited availability of funds, Principal Investigators with continuing grants may not submit a new application in the same area(s) of interest as their previous application(s), which received funding. A Principal Investigator may submit only one application under each area of interest as listed above.

SUPPLEMENTARY INFORMATION:

Program Specific Information

1. Magnetohydrodynamics:

Grant applications are solicited for new research or continuation of past efforts in magnetohydrodynamic (MHD) theory and computations. Current areas of interest include, but are not limited to, equilibrium and stability, extended MHD including two-fluid effects, resistive wall modes, neoclassical tearing modes, and energetic particle effects.

2. Confinement and Transport:

Applications in this programmatic area should focus on the understanding and control of the collisional and turbulent physical processes that are responsible for the transport of heat, momentum and particles from the core of magnetically confined plasmas. Work focused on theory-based predictive transport modeling, including verification and validation (V&V) efforts, will be considered. Both analytical and computational approaches are of interest.

3. Boundary Physics:

Applications in this programmatic area should focus on the understanding of the physical processes occurring in the edge region of magnetically confined plasmas. In tokamaks, this region extends from the top of the pedestal to the first wall. Specific areas of interest include, but are not limited to, pedestal formation and characteristics, edge localized modes, collisional and turbulent edge plasma transport, resonant magnetic perturbations, scrape-off layer and divertor physics, plasma-surface effects, and neutral particle transport. Applications for both analytical and computational work will be considered.

4. Plasma Heating, Non-inductive Current Drive, and Energetic Particles:

Applications will be considered for work in the areas of plasma heating, non-inductive current drive, and energetic particle effects. Heating and current drive of plasmas based on radio frequency (RF) methods, neutral beam injection, helicity injection, and plasma injection will be considered. Specific areas of interest include, but are not limited to, the understanding of the physical processes involved in wave propagation and absorption in magnetically confined plasmas—including wave coupling at the plasma edge and wave-antenna interactions, the understanding of how waves affect macroscopic stability and transport in fusion plasmas, the dynamics of unstable modes excited by energetic particles, and the behavior of alpha particle dominated burning plasmas. Applications for both analytical and computational work will be considered.

5. Atomic and Molecular Processes in Plasmas:

Grant applications will be considered for analytical and computational research relevant to the description of atomic processes in plasmas. In addition to overall scientific merit, emphasis will be given to work that promises to aid the understanding of the basic atomic processes that are important for modeling of magnetically confined plasmas. Some current areas where atomic processes are considered to be important include transport, impurities, plasma-wall interaction, and the understanding of diagnostic methods.

Collaboration

Collaborative research projects involving more than one institution, as well as basic theoretical work in support of the FES Scientific Discovery through Advanced Computing (SciDAC) portfolio, are welcome. 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. 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. Synergistic collaborations with researchers in Federally Funded Research and Development Centers (FFRDCs), including the DOE National Laboratories, are also welcome though no funds will be provided to these organizations under this FOA. Further information on preparation of collaborative applications may be accessed via the Internet at: <http://www.science.doe.gov/grants/colab.asp>.

GENERAL INQUIRIES ABOUT THIS FOA SHOULD BE DIRECTED TO:

Technical/Scientific Program Contact:

Dr. John Mandrekas, Fusion Energy Sciences
Phone: (301) 903-0552
E-mail: john.mandrekas@science.doe.gov

AGENCY CONTACTS:

Magnetohydrodynamics: Dr. John Mandrekas, Fusion Energy Sciences
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Confinement and Transport: Dr. John Mandrekas, Research Division, SC-24.2,
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Boundary Physics: Dr. Curtis Bolton, Research Division, SC-24.2,
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Plasma Heating, Non-inductive Current Drive, and Energetic Particles: Dr. John Mandrekas,
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Atomic and Molecular Processes in Plasmas: Dr. Curt Bolton, Research Division, SC-24.2,
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LETTER OF INTENT AND PREAPPLICATION.

1. Letter of Intent (LOI).

LOI DUE DATE: April 22, 2011

A LOI is STRONGLY ENCOURAGED and should be submitted by April 22, 2011.
It is important that the submission be in a single PDF file. The LOI should clearly indicate the research area or areas identified in Part I to which the application is responding, the appropriate budget request per year, and the intended duration of the

proposed project. The LOI should be submitted electronically by E-mail to John.Sauter@science.doe.gov and John.Mandrekas@science.doe.gov. **Please include “Letter-of-Intent for DE-FOA-0000480” in the subject line.**

The purpose of the LOI is to help the FES program in planning the peer review and the selection of potential reviewers for the application. 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, and whether or not the effort of each will be supported in the proposed budget so as to identify any potential conflict of interest in the selection of reviewers for the application.

2. Preapplication.

Preapplications are not required.

APPLICATION DUE DATE: May 26, 2011, 11:59 PM Eastern Time

Formal applications submitted in response to this FOA must be received by May 26, 2011, 11:59 PM Eastern Time, to permit timely consideration of awards in Fiscal Year 2012. **You are encouraged to transmit your application well before the deadline.**

APPLICATIONS RECEIVED AFTER THE DEADLINE WILL NOT BE REVIEWED OR CONSIDERED FOR AWARD.

IMPORTANT SUBMISSION INFORMATION:

The full text of the Funding Opportunity Announcement (FOA) is located on FedConnect. Instructions for completing the Grant Application Package are contained in the full text of the FOA which can be obtained at: <https://www.fedconnect.net/FedConnect/?doc=DE-FOA-0000480&agency=DOE>. To search for the FOA in FedConnect click on "Search Public Opportunities". Under "Search Criteria", select "Advanced Options", enter a portion of the title "Theoretical Research in Magnetic Fusion Energy Science", then click on "Search". Once the screen comes up, locate the appropriate Announcement.

In order to be considered for award, Applicants must follow the instructions contained in the Funding Opportunity Announcement.

Where to Submit: Applications must be submitted through Grants.gov to be considered for award. You cannot submit an application through Grants.gov unless you are registered. Please read the registration requirements carefully and start the process immediately. Remember you have to update your CCR registration annually. If you have any questions about your registration, you should contact the Grants.gov Helpdesk at 1-800-518-4726 to verify that you are still registered in Grants.gov.

Registration Requirements: There are several one-time actions you must complete in order to submit an application through Grants.gov (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the Central Contract Registry (CCR), register

with the credential provider, and register with Grants.gov). See <http://www.grants.gov/GetStarted>. Use the Grants.gov Organization Registration Checklist at <http://www.grants.gov/assets/OrganizationRegCheck.pdf> to guide you through the process. Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in the CCR registration process. Applicants, who are not registered with CCR and Grants.gov, should allow at **least 21 days** to complete these requirements. It is suggested that the process be started as soon as possible.

IMPORTANT NOTICE TO POTENTIAL APPLICANTS: When you have completed the process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e. Grants.gov registration).

Questions: Questions relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov.

Application Receipt Notices

After an application is submitted, the Authorized Organization Representative (AOR) will receive a series of four E-mails. It is extremely important that the AOR watch for and save each of the emails. It may take up to two (2) business days from application submission to receipt of email Number 2. The titles of the four E-mails are:

Number 1 - Grants.gov Submission Receipt Number

Number 2 - Grants.gov Submission Validation Receipt for Application Number

Number 3 - Grants.gov Grantor Agency Retrieval Receipt for Application Number

Number 4 - Grants.gov Agency Tracking Number Assignment for Application Number

Questions regarding the content of the Funding Opportunity Announcement (FOA) must be submitted through the FedConnect portal. You must register with FedConnect to respond as an interested party to submit questions, and to view responses to questions. It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses.

More information is available at

https://www.fedconnect.net/FedConnect/PublicPages/FedConnect_Ready_Set_Go.pdf. DOE will try to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website.

Modifications: Notices of any modifications to this Funding Opportunity Announcement will be posted on Grants.gov and the FedConnect portal. You can receive an email when a modification or an announcement message is posted by registering with FedConnect as an interested party for this FOA. It is recommended that you register as soon after release of the FOA as possible to ensure you receive timely notice of any modifications or other announcements. More information is available at <http://www.fedconnect.net>.

All applications should be in a single PDF file.