Office of Science
Financial Assistance
Funding Opportunity Announcement
DE-PS02-08ER08-08

Theoretical Research in Magnetic Fusion Energy Science

The Office of Fusion Energy Sciences (OFES) 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 2009 should submit in response to this Notice.

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. Innovative Magnetic Confinement Concepts
6. Atomic and Molecular Processes in Plasmas

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

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.

LETTER OF INTENT DUE DATE: February 22, 2008

A Letter of Intent (LOI) to submit an application is **REQUIRED** and should be submitted by February 22, 2008. **Failure to submit a Letter of Intent by an applicant may preclude the full application from due consideration.** The Letter of Intent should be submitted electronically by E-mail to John.Sauter@science.doe.gov and Curt.Bolton@science.doe.gov. Please include "Letter of Intent for Notice DE-PS02-08ER08-08" in the subject line.

The purpose of the Letter of Intent (LOI) is to facilitate the OFES 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, so as to identify any potential conflict of interest in the selection of qualified reviewers for the application.

APPLICATION DUE DATE: April 1, 2008, 8 PM Eastern Time

Applications must be submitted using Grants.gov, the Funding Opportunity Announcement can be found using the CFDA Number, 81.049 or the Funding Opportunity Announcement number, DE-PS02-08ER08-08. Applicants must follow the instructions and use the forms provided on Grants.gov.

PROGRAM MANAGERS:

Magnetohydrodynamics: Dr. Rostom Dagazian, Research Division, SC-24.2, Telephone (301) 903-4926, or by E-mail: rostom.dagazian@science.doe.gov

Confinement and Transport: Dr. John Mandrekas, Research Division, SC-24.2, Telephone (301) 903-0552, or by E-mail: john.mandrekas@science.doe.gov

Boundary Physics: Dr. Curtis Bolton, Research Division, SC-24.2, Telephone (301) 903-4914, or by E-mail: curt.bolton@science.doe.gov

Plasma Heating, Non-inductive Current Drive, and Energetic Particles: Dr. Rostom Dagazian, Research Division, SC-24.2, Telephone (301) 903-4926, or by E-mail: rostom.dagazian@science.doe.gov

Innovative Magnetic Confinement Concepts: Dr. Francis Thio, Research Division, SC-24.2, Telephone (301) 903-4678, or by E-mail: francis.thio@science.doe.gov; or

Dr. Sam Barish, Research Division, SC-24.2, Telephone: (301) 903-2917, or by E- mail: sam.barish@science.doe.gov.

Atomic and Molecular Processes in Plasmas: Dr. Michael Crisp, Research Division, SC-24.2, Telephone (301) 903-4883, or by E-mail: michael.crisp@science.doe.gov.

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. Work in support of tokamaks as well as non-tokamak innovative magnetic confinement configurations will be considered. 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. Topics of interest include, but are not limited to, ion and electron thermal transport, large-scale and zonal flow generation, particle and momentum transport, impurity transport, and theory- based predictive transport modeling including verification and validation (V&V) efforts. Work in support of tokamaks as well as non-tokamak innovative magnetic confinement configurations 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 magnetized plasmas- including wave coupling at the plasma edge, 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. Innovative Magnetic Confinement Concepts:

Grant applications are desired for analytical and computational research on innovative concepts that have the possibility of leading to improved magnetic fusion systems. Increased analytical and computational research is needed to help in the analysis of experimental data and aid in planning innovative fusion related experiments. Concepts of interest include, but are not limited to, compressional heating of magnetized plasmas, field reversed configuration, spheromak, levitated dipole, plasma jets, centrifugal confinement, reversed field pinch, spherical torus, and stellarator.

6. 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. The program has found understanding electron-atom and electron-ion collisions and the radiation emitted by atoms and ions to be of importance for the modeling of plasma behavior in experiments. 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 OFES Scientific Discovery through Advanced Computing (SciDAC) portfolio, 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. 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 encouraged though no funds will be provided to these organizations under this Notice. Further information on preparation of collaborative applications may be accessed via the Internet at: http://www.science.doe.gov/grants/Colab.html.

Program Funding

It is anticipated that about $3,500,000 of Fiscal Year 2009 funding will be available to fund new work, or renewals of existing work, from applications received in response to this Notice. Applications should be for one year, with a continuation of up to two additional years possible for those tasks requiring a multi-year effort. Since future year funding is not anticipated to increase, applications should propose constant effort in future years (allowing for inflation). Future year funding will depend upon suitable progress, the availability of funds and programmatic needs. The cost-effectiveness of the application will be considered when comparing applications with differing funding requirements. The number and size of awards will depend on the number of meritorious applications and the availability of appropriated funds. DOE is under no obligation to pay for any costs associated with preparation or submission of applications. DOE reserves the right to fund, in whole or in part, any, all, or none of the applications submitted in response to this Notice.

Posted on the Office of Science Grants and Contracts Web Site
January 24, 2008.