

**Office of Science  
Financial Assistance  
Funding Opportunity Announcement  
DE-PS02-08ER08-16**

***Joint Solicitation for The OFES-NNSA  
Joint Program in High Energy  
Density Laboratory Plasmas and The  
NNSA Stewardship Science Academic  
Alliances Program***

The Office of Fusion Energy Sciences (OFES) of the Office of Science (SC) and the Defense Program (DP) of the National Nuclear Security Administration (NNSA), both of the U.S. Department of Energy (DOE), jointly announce their interests in receiving grant applications including renewals of existing grants in FY 2009 for research in the OFES-NNSA Joint Program in High Energy Density Laboratory Plasmas (HEDLP). This Announcement is directed at researchers who are not affiliated with DOE national laboratories and government laboratories. Applications should clearly indicate in the Title Page and in the Executive Summary the research area or areas (i) - (ii) identified in Section 1 the application is responding to.

A companion Program Announcement to DOE Laboratories (LAB08-16) will be posted on the Office of Science Grants and Contracts web site at:

[http://www.science.doe.gov/grants/LAB08\\_16.html](http://www.science.doe.gov/grants/LAB08_16.html).

**LETTER OF INTENT DUE DATE: August 18, 2008**

**A Letter-of-Intent (LOI) to submit an application is REQUIRED and should be submitted by August 18, 2008. Failure to submit a LOI by an applicant may preclude the full application from due consideration.** Electronic submission of the LOI and the formal application in PDF format is required. It is important that the submission be in a single PDF file. The LOI should clearly indicate the research area or areas identified in Section 1/Part I the application is responding to. The LOI should be submitted electronically by E-mail to John.Sauter@science.doe.gov, with a copy to Francis.Thio@science.doe.gov and Allan.Hauer@nnsa.doe.gov. Please include "Letter of Intent for Notice DE-PS02-08ER08-16" in the subject line.

The purpose of the LOI is to facilitate the OFES and NNSA 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 application. For proposed investigations requiring access to experimental user facilities,

confirmation of communication with the facility's point-of- contact should be indicated in the LOI.

### **Preapplication.**

Preapplications are not required.

**FORMAL APPLICATION DUE DATE:** September 11, 2008, 8 PM Eastern Time

Applications must be submitted using [Grants.gov](http://Grants.gov), the Funding Opportunity Announcement can be found using the CFDA Number, 81.049 or the Funding Opportunity Announcement number, DE-PS02-08ER08-16. Applicants must follow the instructions and use the forms provided on [Grants.gov](http://Grants.gov).

### **GENERAL INQUIRIES ABOUT THIS NOTICE SHOULD BE DIRECTED TO:**

**PROGRAM MANAGER:** Dr. Francis Thio, Office of Fusion Energy Sciences

**PHONE:** (301) 903-4678

**FAX:** (301) 903-1225

**E-MAIL:** Francis.Thio@science.doe.gov

**PROGRAM MANAGER:** Dr. Allan Hauer, National Nuclear Security Administration

**PHONE:** (202) 586-4797

**E-MAIL:** Allan.Hauer@nnsa.doe.gov

### **SUPPLEMENTARY INFORMATION:**

#### **1. Descriptions of the Research Programs and the Applications Solicited under this Announcement.**

The OFES and NNSA have agreed to coordinate their research activities in the field of HEDLP under a Joint Program. This coordination is aligned with the recommendations of the interagency Task Force on High Energy Density (HED) Physics to provide improved stewardship of the field of HEDLP, while maintaining the interdisciplinary nature of this area of science, by tying the basic scientific research to its roots in application [1]. An important objective of the Joint Program in HEDLP in the long term is to enable the broader scientific community to conduct research at the major NNSA HED facilities - e.g., the National Ignition Facility (NIF) at the Lawrence Livermore National Laboratory, the Z-pinch pulsed power accelerator at Sandia National Laboratory and the Omega laser at the Laboratory for Laser Energetics at the University of Rochester. However, extensive and comprehensive evaluation of concepts and proposed experiments are required to fully realize the scientific potential of these large-scale facilities and to capture the opportunities they afford. As a scientific path forward towards the use of these large-scale facilities, HEDLP conditions may be achieved at many small- or intermediate-scale facilities using pulsed power driven accelerators, lasers, or ion-beam compression techniques. The availability and use of experimental facilities to address the objectives of this program is discussed in Section 2. Another important objective of the Joint Program in HEDLP is to provide

an avenue to explore the HED physics that underpins the scientific foundation for inertial fusion energy sciences.

Planning of the Joint Program by the two Offices has been guided by the reports of the National Task Force on High Energy Density Physics chaired by Davidson [2], the interagency Task Force on High Energy Density Physics chaired by Keane and Kovar [1], and the HEDLP Workshop at Argonne National Laboratory chaired by Rosner and Browne [3]. Following are two of the main themes that encompass the scientific challenges and opportunities of HEDLP. Proposed research efforts can include experimental, theoretical, and/or computational science. Proposals integrating experiments, theory, and simulation are encouraged.

**(i) Advance HED science that enables fusion energy**

Fusion power has potential as a limitless source of clean energy. HEDLP is the key scientific component necessary for realizing this goal. Emerging concepts in inertial fusion include fast ignition, shock ignition, magneto-inertial fusion and heavy ion fusion. An advanced understanding of the fundamentals of laser-plasma interaction, radiation-matter interaction, hydrodynamic and magnetohydrodynamic processes in HED plasmas, and equations of state of inertial fusion materials at relevant conditions is required for the successful development of these approaches. Novel approaches to inertial fusion energy sciences also include ion-driven fast ignition, plasma jets forming imploding liner, magnetic flux compression, compression of ion beams, general studies of high magnetic fields in dense plasmas, and new experimental diagnostics that can probe the fundamental properties of HEDLP. Research proposals are sought for advancing the scientific knowledge base underpinning the various inertial fusion approaches and their drivers.

**(ii) Creation, control, diagnosis and utilization of new HEDLP conditions**

There are substantial unexplored challenges to understanding phenomena in unique HEDLP conditions, including: shock-dominated, radiation-dominated, relativistic, high-pressure conditions, novel magnetic regimes, kinetic non-linear, and other unique physical states. This would also include novel methods of attaining those unique conditions. Research proposals are solicited that include investigations of the fundamental properties and behavior of plasmas created under high energy density conditions. Research addressing these questions includes novel methods of attaining and diagnosing those unique conditions, as well as in situ investigations of the dynamics of strongly-driven HED systems using advanced probes such as x-ray and synchrotron-radiation sources. Proposed investigations could include creating and probing the fundamental dynamical properties of HED states of matter using state-of-the-art ultrafast, ultraintense laser technology. Studies of HED conditions may be relevant to observed astrophysical phenomena. Laboratory astrophysics has been identified as a significant opportunity for new HEDLP studies. Research areas of investigations could include (but are not limited to) the development of scaling laws on compressible hydrodynamic mixing, strong shock phenomena, radiation flow, radiative shocks and jets, accretion disk dynamics, complex opacities, equations of state, and relativistic plasmas. It should also be recognized that the regime identified as "warm dense matter" is also a significant area of opportunity in HEDLP research. This state which is dense enough to display both "solid-like" and "plasma-like" properties should be considered as a potential topic for this solicitation.

The total amount of funds available for competition including funds for renewals of existing grants is expected to be approximately \$6,000,000 in FY 2009, subject to further appropriation of funds for FY 2009 by the Congress and other factors.

[1] Office of Science and Technology Policy (OSTP), Report of the Interagency Task Force on High Energy Density Physics (Chairs: C. Keane, D. Kovar, Executive Secretary: Y. C. F. Thio), National Science and Technology Council, Committee on Science, Interagency Working Group on the Physics of the Universe.

[2] Office of Science and Technology Policy (OSTP), Frontiers for Discovery in High Energy Density Physics, National Task Force on High Energy Density Physics (Chair: R. C. Davidson), July 20, 2004.

[3] R. Rosner and J. C. Browne, Summary of a Workshop on Opportunities for High Energy Density Laboratory Plasma Science, Argonne National Laboratory, May 23- 24, 2007.

[http://www.science.doe.gov/ofes/ProgramNews/Orbach-HEDLP-final\\_\(2\).pdf](http://www.science.doe.gov/ofes/ProgramNews/Orbach-HEDLP-final_(2).pdf)

## **2. Use of Experimental Facilities**

A significant objective of the OFES-NNSA HEDLP Joint Program is to support and grow the use of intermediate- and large-scale experimental facilities by the external scientific community at large. These include National Laboratory-based, university-based and industrial HED science experimental facilities.

For applicants who propose investigations requiring the use of either laboratory- or university-based experimental facilities, the applicant must make arrangements with the appropriate laboratory or university. Potential applicants are responsible for contacting the specific laboratory or university to discuss any facility-related activities and utilization, including availability of beam-time and appropriate diagnostics, shot schedule, support for target fabrication, etc. A letter from either the facility manager or program manager indicating 1) the level of communication between the Principal Investigator (PI) and facility management, 2) the feasibility of the proposed use of the facility, and 3) arrangements pursued regarding facility availability for this project must be included with the application. For some national user facilities, such as those operated by the Office of Basic Energy Sciences (BES), the applicant may need to compete in a separate user facility access solicitation. A description of BES national scientific user facilities can be found at <http://www.science.doe.gov/bes/BESfacilities.htm>.

Budget requests supporting investigations at either laboratory- or university-based experimental facilities must include all incremental costs necessary to perform the proposed experiment above the facility's baseline operational budget.

Examples of HED science experimental facilities include:

### ***Intermediate-scale facilities:***

Jupiter Laser Facility (LLNL): <http://jlf.llnl.gov/>  
Contact: Andrew Ng,

JLF Science Director (925-423-4429, [ng1@llnl.gov](mailto:ng1@llnl.gov), <http://jlf.llnl.gov>)  
Don Correll, ILSA Director (925-422-6784, [correll1@llnl.gov](mailto:correll1@llnl.gov), <http://ilsa.llnl.gov>)

Trident Laser Facility (LANL): <http://Trident.lanl.gov>  
Principal Contact: David Montgomery: [montgomery@lanl.gov](mailto:montgomery@lanl.gov)  
(505) 665-7994, 699-1070

Alternate contact: Randy Johnson: [rpjohnson@lanl.gov](mailto:rpjohnson@lanl.gov)  
(505) 665-5089, 665-5575

Nevada Terawatt Facility (University of Nevada at Reno): <http://www.ntf.unr.edu/>  
Contact: Joseph M. Kindel  
Director  
Email: [jkindel@unr.edu](mailto:jkindel@unr.edu)  
Phone: 775-682-9706

Petawatt Laser Facility (University of Texas at Austin):  
[http://www.ph.utexas.edu/~utlasers/texas\\_petawatt\\_files/texas\\_petawatt.htm](http://www.ph.utexas.edu/~utlasers/texas_petawatt_files/texas_petawatt.htm)  
Contact: Todd Ditmire  
Professor  
The Texas Center for High Intensity Laser Science  
Department of Physics  
University of Texas  
Mail Stop C1600  
Austin, TX 78712  
Phone: 512-471-3296  
FAX: 512-471-8865  
email: [tditmire@physics.utexas.edu](mailto:tditmire@physics.utexas.edu)

Cobra Pulsed Power Facility (Cornell University): <http://www.plasmacenter.cornell.edu/>  
Contact: David Hammer  
Professor  
Electrical and Computer Engineering  
327 Rhodes Hall, Cornell University, Ithaca, NY 14853  
Tel: 607-255-3916  
Fax: 607-255-9072

Laboratory of Plasma Studies  
439 Rhodes Hall, Cornell University, Ithaca, NY 14853 Admin.  
Office: 607-255-4275;  
Laboratory: 607-255-5162  
Heavy Ion Beam Experimental Facility (LBNL): <http://hif.lbl.gov/VNLresearch.html>  
Contact: Grant Logan  
Director, Virtual National Laboratory for Heavy Ion Fusion Science  
Lawrence Berkeley National Laboratory  
1 Cyclotron Road

MS/47-112  
Berkeley, CA 94720  
Tel: (510) 486-7206  
Email: BGLogan@lbl.gov

***Large-scale facilities:***

National Ignition Facility (LLNL): <https://lasers.llnl.gov/>  
Contact: Rokaya Al-Ayat  
Director, NIF User Support Office  
National Ignition Facility and Photon Science Lawrence Livermore National Laboratory L-580  
Livermore, CA 94551  
925-422-8467, alayat1@llnl.gov

Z Pulsed Power Accelerator (SNL): <http://zpinch.sandia.gov/>  
Contact: John Porter, (505)845-7526

Omega Laser (Laboratory for Laser Energetics at the University of Rochester):  
<http://www.lle.rochester.edu/>  
Contact: John M. Soures  
Manager, National Laser Users Facility  
Laboratory for Laser Energetics  
University of Rochester  
250 East River Rd.  
Rochester, NY 14623  
(585)-275-3866 (phone)  
(585)-275-5960 (FAX)  
jsou@lle.rochester.edu

For the use of the Omega Laser Facility at the University of Rochester, a parallel solicitation for the National Laser User Facility (NLUF) is planned to request access. A link to this solicitation can be found on Grants.gov. A link will also be posted at <http://www.lle.rochester.edu>.

Other facilities of relevance to the solicitation include:  
Los Alamos Neutron Science Center (LANL): <http://lansce.lanl.gov/>, (Proton Radiography, Weapons Nuclear Research, and Lujan Neutron Scattering Center) Contacts: Kurt Schoenberg, kurt@lanl.gov, 505 667 5051 Leilani Conradson, leilani@lanl.gov, 505 665 9505, lansce\_users@lanl.gov

Shiva Star Pulsed Power Facility  
Air Force Research Laboratory, Kirtland AFB, Albuquerque, NM  
Contact: James Degnan, (505) 846-1235, james.degnan@kirtland.af.mil  
Principal Physicist and Team Leader of the High Current Pulsed Power Team, AFRL/RDHP

NIKE Laser Facility, Naval Research Laboratory, <http://other.nrl.navy.mil/>  
Contact: Victor Serlin

Naval Research Laboratory, Code 6731,  
4555 Overlook Ave, S.W., Washington DC 20375  
tel. (202) 767-0678, fax (202) 767-0046  
Email: [serlin@this.nrl.navy.mil](mailto:serlin@this.nrl.navy.mil)

## **Program Funding**

Research Grant Awards (typically single-investigator projects) are expected to be made for a period of one to three years at a funding level appropriate for the proposed scope, with out-year support contingent on the availability of funds and satisfactory progress, though applications may request support for up to five years. Comprehensive, multi-disciplinary and multi-investigator Centers of Excellence are for five-year projects, managed as cooperative agreements with NNSA/DP or OFES. Proposals for new Centers or for the renewal of existing Centers may be submitted under this solicitation. In addition, consideration will be given to multi-institution consortia proposing Grand Challenge investigations advancing the state-of-the-art in the technical themes identified in Section 1/Part I of this solicitation and, as appropriate, culminating in the use of large-scale HEDP facilities (such as NIF, Z, and Omega), or intermediate-scale facilities.

Funding of Research Grant Awards, typically a few hundred thousand dollars per year, will be managed as Research Grants. Centers of Excellence, with funding ranging from approximately \$1,000,000 to \$3,000,000 per year, will be managed under a negotiated cooperative agreement with substantial involvement by NNSA/DP or OFES.

OFES and NNSA reserve the right not to make any awards if no application is judged to be of suitable scientific quality or of sufficient relevance to the programs described in Section 1. The cost-effectiveness of the application will be considered when comparing applications with differing funding requirements. Previous awards have ranged from approximately \$50,000 to \$1,000,000 per year in similar areas, typically less than \$500,000 per year. A single award or multiple awards may be made depending on the number and quality of the applications 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, typically less than \$500,000 per year.

## **Collaboration**

Collaborative research projects involving more than one institution 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, and include Letters of Coordination from the collaborative partners. 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. Further information on preparation of collaborative applications may be accessed via the Internet at: <http://www.science.doe.gov/grants/Colab.html>.

For further submission information please see the full version of this notice, DE-PS02-08ER08-16, located at: <http://www.grants.gov/>

The Catalog of Federal Domestic Assistance (CFDA) number for this program is 81.049, and the solicitation control number is ERFAP 10 CFR Part 605.

Posted on the Office of Science Grants and Contracts Web Site  
June 26, 2008.