

Overview:
Report of the Interagency Task Force on High Energy Density Physics
September 28, 2007

An interagency task force today announced the release of a report that provides a roadmap for coordinating federal agencies' support of high energy density physics (HEDP), the study of matter subject to extreme temperatures and densities.

“HEDP is an area of science where theory and technology intersect to extend our conceptual framework of the universe,” Dr. John H. Marburger III, Director of the Office of Science and Technology Policy says in the transmittal letter accompanying the report. “Discoveries in HEDP will enrich our understanding of important phenomena and stimulate future technology development.”

The *Report of the Interagency Task Force on High Energy Density Physics* was prepared for the Executive Office of the President, Office of Science and Technology Policy by the interagency Task Force on High Energy Density Physics (TF-HEDP), which was chartered by the Interagency Working Group on the Physics of the Universe (IWG-POU) under the Committee on Science of the National Science and Technology Council. The report addresses scientific opportunities in high energy density science previously identified in studies by the National Academies as well as reports from the scientific community. In particular, the report describes actions which will be taken to encourage and nurture interactions among the diverse range of scientific disciplines and associated enabling technologies that encompass high energy density physics, including the creation of an interagency website, interdisciplinary meetings, and future workshops.

Extremes of heat and density – exceeding even the hostile conditions deep inside the sun – are seen in astronomical phenomena such as supernovae, the violent death of stars. They are also encountered routinely in a laboratory setting in laser, pulsed-power, and accelerator experimental facilities used in research on fusion energy (inertial confinement fusion), nuclear stockpile stewardship, and nuclear physics. The study of high energy density physics and related phenomena could therefore not only advance scientific understanding in fields such as astrophysics, cosmology, high energy physics, and plasma science, but also play an important role in accomplishing energy and national security mission goals.

The highly interdisciplinary nature of the field – several scientific and technological disciplines benefit from and contribute to the study of high energy density physics – requires substantial Federal coordination, as support for the research crosses Federal agency boundaries. Currently, activities related to high energy density physics are supported by the Department of Energy (DOE) (in both the Office of Science (SC) and the National Nuclear Security Administration (NNSA)), the National Aeronautics and Space Administration (NASA), the Department of Commerce’s National Institute of Standards and Technology (NIST), the National Science Foundation (NSF), and the Department of Defense (DOD). The IWG-POU chartered the interagency Task Force on

High Energy Density Physics to provide a coordinated Federal roadmap to address the scientific opportunities in high energy density science.

The membership of task force included representatives from DOE (SC and NNSA), NASA, NIST, NSF, and DOD, and was co-chaired by two senior scientists at the U.S. Department of Energy, Dr. Dennis Kovar, Acting Deputy for Science Programs and Associate Director for Nuclear Physics in the DOE Office of Science, and Dr. Christopher J. Keane, formerly Assistant Deputy Administrator for Inertial Confinement Fusion and National Ignition Facility at the National Nuclear Security Administration.

The report articulates how high energy density physics fits into the portfolio of Federally funded missions and includes agency actions to be taken to further this area of study. The discussion of the Federal management of high energy density physics in the report was structured by organizing the research activities into four Federal Research Categories: Astrophysics, High Energy Density Nuclear Physics, High Energy Density Laboratory Plasmas (HED-LP), and Ultrafast, Ultraintense Laser Science.

“We found that three of the four categories – astrophysics, high energy density nuclear physics, and ultra-fast, ultra-intense lasers – were already being well stewarded, and that the primary issue there was one of better coordination,” said Dr. Dennis Kovar. “However, it seemed to us that scientific opportunities in the study of plasmas at high energy densities in the laboratory setting could be better pursued through improved Federal stewardship and management.”

The report goes on to describe several actions that the agencies will take in order to improve stewardship of fundamental science of high energy density laboratory plasmas:

- The Office of Science and the NNSA within DOE will establish a joint program in high energy density laboratory plasmas (HED-LP) responsible for stewarding fundamental high energy density laboratory plasma science within the Department of Energy.
- The DOE will ensure that the joint program solicits advice from the scientific community regarding opportunities and priorities in fundamental HED-LP science.
- The joint program, in consultation with NSF, will develop a coordinated strategic plan for a national program in HED-LP and will support peer-reviewed research through normal agency planning processes and joint solicitations for research to be performed at universities and at national facilities.
- As the primary Federal steward of research capabilities in HED-LP within DOE, NNSA will develop management processes to provide additional access to its major facilities by researchers external to the NNSA national laboratories.

Copies of the report are being delivered to the chairs and ranking members of the House and Senate Appropriations Committees as well as the respective Subcommittees on Energy and Water.