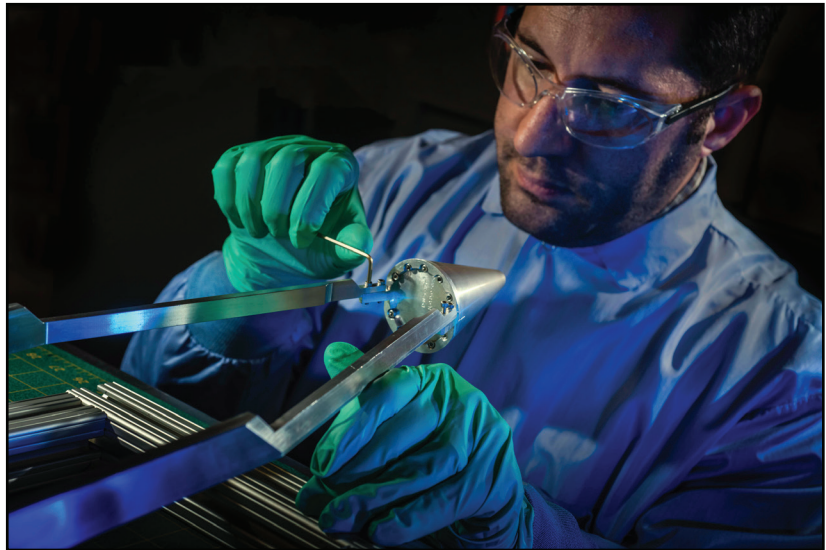


About the Cover:

The neutron-induced breakup cross sections of deuterium show two recent theoretical models (JENDL-4.0 and CENDL-3.0) and the results from past experiments. The most recent experiment used, for the first time, a laser-based facility (OMEGA) to generate a bright neutron source to induce the breakup of deuterium in nuclear reaction vessels positioned near the target chamber center. This new experimental configuration measured a larger energy spectrum—from 0.5 to 10 MeV—as compared to previous methods performed on accelerator-based platforms. The measured energy spectrum of neutrons produced from the breakup of deuterium is inconsistent with a two-nucleon-force model. The experimental data are more accurately described by the predictions of a recently developed theoretical framework that assumes the presence of a three-nucleon force used in modern theoretical models. A noticeable peak at 11.8 MeV, which has not been confirmed experimentally, represents the final-state interaction and is required to further develop an accurate description of the three-nucleon-force model. The bracket shown in the inset was designed with minimal mass in order to avoid additional neutron scattering along the detector's line of sight once it is positioned at target chamber center.

The photo on the right shows C. J. Forrest assembling a nuclear reaction vessel that is attached to a specially designed bracket mounted in one of the ten-inch manipulator diagnostic ports on the target chamber.



This report was prepared as an account of work conducted by the Laboratory for Laser Energetics and sponsored by New York State Energy Research and Development Authority, the University of Rochester, the U.S. Department of Energy, and other agencies. Neither the above named sponsors nor any of their employees makes any warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, mark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or any other sponsor. Results reported in the LLE Review should not be taken as necessarily final results as they represent active research. The

views and opinions of authors expressed herein do not necessarily state or reflect those of any of the above sponsoring entities.

The work described in this volume includes current research at the Laboratory for Laser Energetics, which is supported by New York State Energy Research and Development Authority, the University of Rochester, the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement No. DE-NA0001944, and other agencies.

For questions or comments, contact Sid Sampat, Editor, Laboratory for Laser Energetics, 250 East River Road, Rochester, NY 14623-1299, (585) 275-2596.

Worldwide-Web Home Page: <http://www.lle.rochester.edu/>

Printed in the United States of America

Available from

National Technical Information Services
U.S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161
www.ntis.gov