

## About the Cover:

Senior Scientist Sean Regan (left) and graduate student Hiroshi Sawada (right) (of the Department of Mechanical Engineering) analyze an x-ray absorption spectrum measured on the OMEGA Laser System. The time-resolved spectrum was recorded on film using an x-ray streak camera outfitted with a Bragg crystal spectrometer. A digital image of the absorption spectrum is projected in the background. An investigation of thermal transport in direct-drive targets is the main subject of Mr. Sawada's Ph.D. thesis research. The shock-heating and heat-front penetration resulting from the laser-ablation process are examined spectroscopically using a point-source x-ray backlighter. When the shock, and subsequently the heat front, reach the buried Al tracer layer in a planar plastic target, the Al is ionized and a time history of the electron temperature is inferred from the Al absorption spectral features. Experimental results of shock heating for direct-drive targets along with laser-absorption and mass-ablation-rate measurements are compared with simulations of the one-dimensional hydrodynamics code *LILAC* (see "Laser Absorption, Mass Ablation Rate, and Shock Heating in Direct-Drive Inertial Confinement Fusion," p. 1).



In preparation for a shot day on the OMEGA Laser System, Senior Scientist Sean Regan (principal investigator) presents the experimental objectives of the shock-heating campaign to the watchstanders at the 0800 Pre-Watch Briefing. Watchstanders are responsible for different aspects of the laser operation, including experimental operations, laser drivers, beamline operations, power conditioning, and amplifiers. Thirty watchstanders are needed for a 12-h shot day on OMEGA, which requires pre-watch system-startup activities beginning at 0400.

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-FC52-92SF19460, and other agencies.

For questions or comments, contact Igor Igumenshchev, Editor, Laboratory for Laser Energetics, 250 East River Road, Rochester, NY 14623-1299, (585) 275-4792.

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

Price codes: Printed Copy A04  
Microfiche A01

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