

LLE Review



Quarterly Report

Contents

In Brief	iii
Optical and Plasma Smoothing of Laser Imprinting in Targets Driven by Lasers with SSD Bandwidths up to 1 THz	173
Analysis of a Direct-Drive Ignition Capsule Designed for the National Ignition Facility	181
Core Performance and Mix in Direct-Drive Spherical Implosions with High Uniformity	191
Secondary-Neutron-Yield Measurements by Current-Mode Detectors	199
Fourier-Space Image Processing for Spherical Experiments on OMEGA	204
LLE's Summer High School Research Program	214
FY00 Laser Facility Report	216
National Laser Users' Facility News	217
Publications and Conference Presentations	

In Brief

This volume of the LLE Review, covering July–September 2000, begins with an article by T. R. Boehly, V. N. Goncharov, O. Gotchev, J. P. Knauer, D. D. Meyerhofer, D. Oron, S. P. Regan, Y. Srebro, W. Seka, D. Shvarts, S. Skupsky, and V. A. Smalyuk, who describe measurements of the effect of beam smoothing and pulse shape on imprinting. (Imprinting is defined as the imposition of pressure perturbations on the target by spatial variations in the laser intensity.) A principal result is the observation of reduced levels of imprint with the higher beam smoothing afforded by 1-THz smoothing by spectral dispersion (SSD).

Additional highlights of research presented in this issue are

- P. W. McKenty, V. N. Goncharov, R. P. J. Town, S. Skupsky, R. Betti, and R. L. McCrory describe calculations of directly driven ignition capsule performance on the National Ignition Facility (NIF). The authors detail how the various contributors to implosion disruption (laser imprint, power imbalance, and target roughness) affect target performance and final gain. The conclusions are obtained by examining the simulated target evolution with the two-dimensional hydrodynamics computer code *ORCHID*.
- D. D. Meyerhofer, J. A. Delettrez, R. Epstein, V. Yu. Glebov, V. N. Goncharov, R. L. Keck, R. L. McCrory, P. W. McKenty, F. J. Marshall, P. B. Radha, S. P. Regan, S. Roberts, W. Seka, S. Skupsky, V. A. Smalyuk, C. Sorce, C. Stoeckl, J. M. Soures, R. P. J. Town, B. Yaakobi, J. D. Zuegel, J. Frenje, C. K. Li, R. D. Petrasso, F. Séguin, K. Fletcher, S. Padalino, C. Freeman, N. Izumi, R. Lerche, T. W. Phillips, and T. C. Sangster describe the results of a series of direct-drive implosions of gas-fusion-fuel-filled plastic shells performed on the OMEGA laser system. The experiments include those performed with 1-THz SSD and high-quality power balance.
- V. Yu. Glebov, D. D. Meyerhofer, C. Stoeckl, and J. D. Zuegel describe the technique of measuring secondary neutron yield (DT neutron yield from D₂-filled targets) using current-mode detectors (i.e., many detection events per unit time interval). They show that current-mode detectors can be configured to survey a much larger dynamic range than single-event neutron counters.
- V. A. Smalyuk, T. R. Boehly, L. S. Iwan, T. J. Kessler, J. P. Knauer, F. J. Marshall, D. D. Meyerhofer, C. Stoeckl, B. Yaakobi, and D. K. Bradley detail a method of measuring the positional dependence of x-ray self-absorption with filtered x-ray framing cameras. They show how compressed shell nonuniformities can be measured by carefully modeling the imaging system.
- This volume concludes with the LLE's Summer High School Research Program, the FY00 Laser Facility Report, and the National Laser Users' Facility News.

Frederic J. Marshall
Editor

