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Contents

In Brief

This volume of the LLE Review, covering April–June 2001, features "A Self-Calibrating, Multichannel Streak Camera for Inertial Confinement Fusion Applications" by Dr. W. R. Donaldson, R. Boni, R. L. Keck, and P. A. Jaanimagi. This article (p. 109) describes the 60-beam streak camera system used on OMEGA and focuses on the hardware and software calibration techniques that maximize its utility. The system can diagnose each of the beams on every target shot and can measure beam energies with 8% accuracy and timing at 7 ps rms. Beam-to-beam power variations of less than 5% can be detected.

Additional highlights of research presented in this issue include the following:

- V. A. Smalyuk, V. N. Goncharov, J. A. Delettrez, F. J. Marshall, D. D. Meyerhofer, S. P. Regan, and B. Yaakobi (p. 122) present modeling and shot data showing the evolution of shell modulations near the point of peak compression in spherical, direct-drive implosions. The effect of two different levels of beam smoothing is described. Both the model and the experiment show that modulations in the shell areal density decrease during compression and increase during decompression.

- W. Seka, H. A. Baldis, J. Fuchs, S. P. Regan, D. D. Meyerhofer, C. Stoeckl, B. Yaakobi, R. S. Craxton, and R. W. Short (p. 128) report on the first multibeam laser–plasma interaction experiments with a critical density surface present at all times. These plasma conditions are tailored to resemble future direct-drive laser fusion implosions on the NIF. The results show strong evidence of electromagnetic (EM) wave seeding of SBS backscatter as well as evidence of strongly driven, common, symmetrically located ion waves. The expected SBS scattering levels for NIF direct-drive ignition experiments are well below 1%. This gives confidence that good direct-drive target performance will be achieved.

- A. D. Semenov, G. N. Gol'tsman, and R. Sobolewski (p. 134) survey the main aspects of nonequilibrium hot-electron phenomena in superconducting films. Various theoretical models developed to describe the hot-electron effect are presented. The article describes a number of radiation-sensing devices that have been fabricated and tested and demonstrate significantly improved performance over conventional implementations.

- K. Anderson, R. Betti, and V. N. Goncharov address the issues associated with determining the minimum drive energy needed to achieve ignition in inertial confinement fusion implosions (p. 153). A new model that consistently incorporates two competitive scaling approaches is developed. Topics covered in this article include hot-spot dynamics, two approaches to shell modeling, derivations of ignition scaling, and verification of initial assumptions. Good agreement with other published results is shown.

Thomas H. Hinterman
Editor