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Contents

In Brief

This volume of the LLE Review, covering the period of April–June 1994, contains articles on surface characterization by atomic force microscopy; electron acceleration with intense laser field; spatial intensity variations induced by nonlinear beam propagation; backlighting of implosion targets exhibiting mix; and the use of cosmic rays to monitor large, multielement detectors. Four of these articles—surface characterization; nonlinear beam propagation; backlighting of mixed targets; and monitoring of the MEDUSA detector array—are directly related to the OMEGA Upgrade, which is currently under construction.

Highlights of the research presented in this issue are

- The effect on water-induced surface damage on thin-film coatings is studied with an atomic-force microscope. An experiment was conducted with Y_2O_3 coatings on BK-7 glass. Pyramidal growth features that irreversibly modify the columnar-growth structures have been observed.

- The acceleration of electrons from an underdense gas in the focal volume of a high-intensity laser has been observed. First-order relativistic effects are expected to occur at laser intensities of 10^{18} W/cm^2. The longitudinal acceleration of electrons from the magnetic-field term in the Lorentz force has been observed for the first time.

- The effect of stimulated rotational Raman scattering and propagation through a spatial filter at various vacuum pressures on the spatial uniformity of a high-power laser beam is reported. These two experiments were conducted in support of the OMEGA Upgrade design and construction. Transverse modulational instabilities were observed for both of the above experiments with the OMEGA laser. The data agree with previous work conducted in the field.

- The ability to diagnose an imploding target that is subject to mixing with an x-ray backlighter is calculated. The expected images from targets exhibiting mixing at the fuel-pusher interface that are either doped with a high-Z element or undoped CH shells show the utility of using a monochromatic backlighter to study this interface. The simulations indicate that data from this diagnostic technique will be used to deduce both the low-order nonuniformity and compression of the final core.

- A large scintillator array is being built to measure the secondary neutron emission from ICF targets. The ability to monitor the individual channels of this diagnostic is important to the interpretation of the data. A technique that uses cosmic rays to determine the status of each scintillator-photomultiplier detector is shown to provide the necessary information to evaluate the performance of the MEDUSA diagnostic.

James P. Knauer
Editor