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IN BRIEF

This volume of the LLE Review covers the three-month period January–March 1993. The OMEGA laser facility was decommissioned during this quarter to make room for the OMEGA Upgrade laser facility. The decommissioning is described in this volume. Electron thermal transport in the corona and laser-irradiation uniformity are related issues for direct-drive laser fusion. Thermal transport can affect the laser-irradiation uniformity requirements. The status of Fokker-Planck modeling of electron transport at LLE is reviewed and is followed by a description of a new technique for achieving high laser uniformity using zero-correlation phase masks. The use of fast, optically triggered, superconducting opening switches can, in principle, reduce the peak electrical load requirements of systems like the OMEGA Upgrade. Recent research in this area is described. The last three articles discuss vacuum ultraviolet and x-ray emission from short-pulse, laser-matter interactions. The generation of a high spectral brightness, picosecond K_α source is described. The subsequent articles describe the generation of high-order harmonics of a high-intensity laser system in low-density, laser-atom interactions and the novel gas target used.

Highlights of the research reported in this issue include

- The *SPARK* Fokker-Planck code is described in detail. It incorporates fluid ions and solves for transport on either a two-dimensional (2-D) Eulerian grid or a one-dimensional (1-D) Lagrangian grid. Simulations of a laser-driven CH foil in 1-D planar geometry and of laser filamentation in a 2-D planar plasma are presented.

- Phase plates have been used in laser fusion to produce a well-defined, far-field intensity envelope that is relatively independent of the input-beam profile. Superposed on this envelope is unwanted, highly modulated speckle from the interference of the different phase-plate elements. A technique for choosing the phase-plate elements (in combination with polarization rotation) such that these intensity fluctuations approach zero in the limit of plane-wave, near-field irradiation is presented.
- High-T_c, superconducting thin films are used in a new type of opening switch. The superconducting film screens the magnetic flux linkage between the primary and secondary coils of a transformer. Short laser pulses are used to trigger the transition of the superconductor to its normal state, allowing the flux produced in the primary current to couple to the secondary. Experiments have confirmed the feasibility of this inductively coupled switch, and rise times of 50 ns have been observed for the secondary voltage pulse.
- Strong K_α emission is observed from a plasma produced by a high-intensity-contrast, picosecond, p-polarized laser pulse. The K_α emission is found to be induced by hot electrons having a temperature of around 5 keV and carrying up to 20% of the laser energy.
- The angular distributions of high-order harmonics generated in low-density gas targets of Xe, Kr, and Ar have been measured. In this experiment, the phase-matching effects are minimized. It is found that most of the harmonic angular distributions show a central region similar to that predicted by lowest-order perturbation theory.
- A thin (1-mm), low-pressure (<1-T) gas target for high-order, harmonic-generation experiments has been developed. It operates on the principle of free molecular flow rather than the principle of viscous flow, as does a gas jet. The device is a small, cylindrical, double-ended hole through which the focused laser beam passes. Monte-Carlo simulations of the density and flow of the gas within the nozzle are in good agreement with the experimental measurements of the gas-density profile.