IN BRIEF

This volume of the LLE Review, covering the period October–December 1989, contains an article discussing saturation effects and power-balance considerations in the design of high-power lasers and an article describing numerical modeling of the effects of power imbalances on target behavior. The advanced technology section reports on (1) the development of a liquid crystal laser-beam apodizer and (2) an experiment to study the high-intensity ionization of noble gases. Finally, the activities of the National Laser Users Facility and the GDL and OMEGA laser facilities are summarized.

The highlights of this issue are

- The problem of achieving power balance in high-efficiency, multibeam lasers has been studied in terms of gain-saturation effects and the nonlinear nature of harmonic frequency conversion. It is shown that power imbalance can be minimized by balancing the gains and losses in equivalent amplification stages in each beamline.

- The effects of target implosion behavior of various power-imbalance sources in the OMEGA laser system have been studied using the two-dimensional hydrodynamics code *ORCHID*. The simulations show good agreement with an experiment in which a deliberate power imbalance was applied to the target drive.

- Laser-beam apodizers with large clear apertures have been fabricated using cholesteric liquid crystals. A soft-edge profile has been achieved by filling a cell with two separate liquid crystals with different selective-reflection bands, and allowing them to partially mix at the interface.

- A study of the ionization of noble gases in the tunneling regime using high-intensity, 1-ps pulses from the tabletop terawatt laser (T^3) has been carried out. The measured ion production is well predicted by a Coulomb barrier suppression ionization theory.

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Milton Shoup III, a Technical Associate in the Engineering Division, shown assembling the Multisegmented Amplifier (MSA) prototype. This amplifier consists of a 2×2 array of disk amplifiers sharing common flash lamps. Originally conceived by Lawrence Livermore National Laboratory (LLNL) as a concept for the ATHENA multimegajoule laser system and designed by LLE personnel with the support and collaboration of LLNL, the MSA was successfully constructed and met or exceeded its design goals. The MSA serves as a proof-of-concept of arrayed amplifiers for future Laboratory Microfusion Facility (LMF) consideration, and was an important first step in the development of disk amplifiers for the OMEGA Upgrade.