

## IN BRIEF

This volume of the LLE Review, covering the period January–March 1991, contains a report on how photoelectric fluorescence affects x-ray absorption lines in laser-plasma experiments, and a review of recent analysis of transverse instabilities of counterpropagating light waves in homogeneous plasmas.

The section on advanced technology has reports on the experimental characterization of Bessel beams, the design, testing, and use of a Kirkpatrick-Baez x-ray microscope on OMEGA, and the investigation of phase noise in mode-locked lasers.

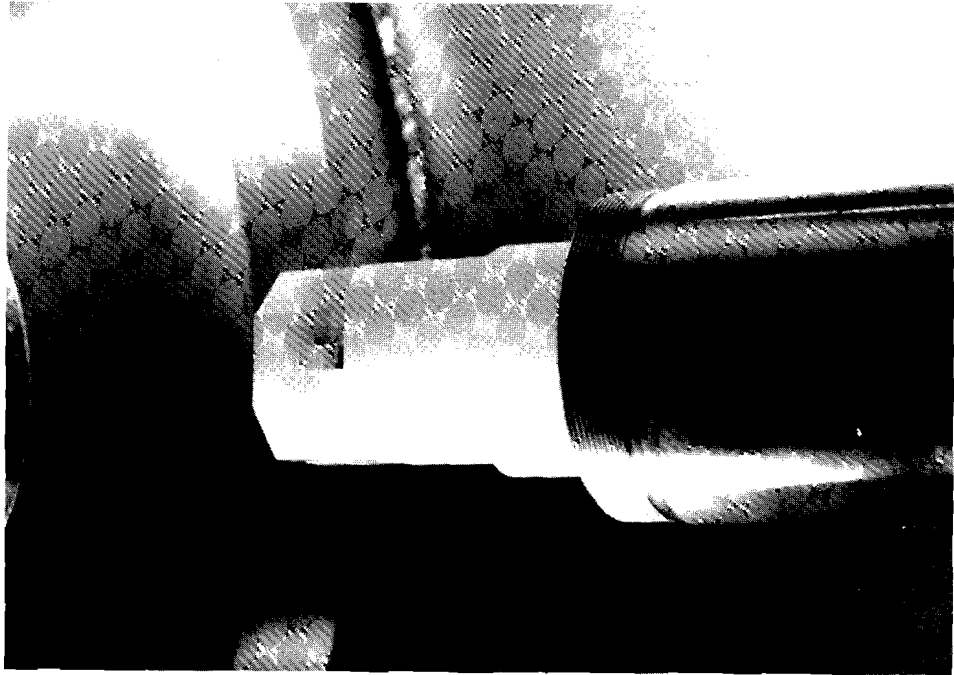
The highlights of this issue are

- Investigation of the effect of photoelectric fluorescence on the formation of x-ray absorption lines has demonstrated that this process should not be neglected when analyzing experiments where the continuum is hardened by high core temperatures, opacity effects, or core components that radiate efficiently at ionizing energies.
- Properties of transverse instabilities driven by the ponderomotive force of light waves in homogeneous plasmas have been analyzed. It is shown that the convective instability of a single light wave can be transformed into an absolute instability in the presence of a second, counterpropagating light wave.

- It has been demonstrated experimentally that Bessel beams can be generated with intensity profiles that closely resemble the ideal  $J_0^2$  transverse-intensity distribution. For applications where depth of focus and beam definition are of importance, Bessel beams present significant advantages over Gaussian beams.
- Kirkpatrick-Baez (KB) microscopes have been used on the OMEGA target chamber to image laser-plasma x rays for a number of years. Recently a testing facility for these microscopes has been assembled at LLE. This facility has been used to more fully characterize the resolution, field of view, and depth of field of these microscopes. A new KB microscope with gold-coated mirrors has been deployed on OMEGA enabling the imaging of higher-energy x rays (up to 7 keV).
- It has been found that thermal and acoustic effects can be significant sources of phase noise in short-pulse mode-locked lasers. Schemes for eliminating these problems have been discussed.

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Frederic Marshall, Research Scientist, is shown on the front cover assembling a Kirkpatrick-Baez x-ray microscope for installation on the OMEGA target chamber (background). Shown above is a closeup of the x-ray reflecting assembly (x-ray optics), which is described in the *Advanced Technology Developments* section of this issue of the LLE Review.