

LLE Review



Quarterly Report

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In Brief

This volume of the LLE Review, covering the period April–June 1998, includes a report on a recent series of experiments, performed by A. Babushkin, M. Guardalben, R. Keck, and W. Seka, that demonstrate a new scheme for converting the infrared light of OMEGA to the third harmonic in the ultraviolet over a bandwidth that is significantly wider than has been previously attainable. This innovative scheme, employing a second tripling crystal in addition to the doubler-tripler pair currently in use, was proposed by D. Eimerl at Lawrence Livermore National Laboratory and adapted to the OMEGA system by S. Craxton and S. Oskoui, a recent participant in LLE’s Summer High-School Research Program. Wider bandwidths on OMEGA will allow the use of broadband beam smoothing with faster smoothing times than have been employed until now.

Additional research highlights reported in this issue are

- O. Konoplev, Y. Fisher, and D. Meyerhofer report on ultrahigh-dynamic-range measurements of high-contrast pulses using a second-order autocorrelator that they have designed and built. This device is capable of measurements with dynamic ranges of up to $\sim 10^{12}$ at a time resolution of ~ 50 fs, the highest dynamic range yet achieved for measurements with this degree of time resolution.
- D. Harding describes results from two ion-beam analysis techniques—Rutherford backscattering spectroscopy and nuclear resonance analysis—that have been used to provide an accurate method for determining the complete elemental composition of capsules and target materials used at LLE. These new sources of information are more expansive than other analytical techniques in use, and the data are needed for interpreting the results of our experiments.
- By placing a pinhole array in front of a flat-crystal x-ray spectrometer, B. Yaakobi has introduced a diagnostic technique with the ability to obtain simultaneously a large number of two-dimensional images over a wide range of photon energies at a high degree of spectral resolution. This article presents images of $K\alpha$ fluorescence pumped by core radiation, delineating the compressed, cold shell, and pumped by suprathermal electrons, showing that $\sim 1\%$ of the laser energy preheats the target.
- The simultaneous forward and backward stimulated Brillouin scattering (SBS) of crossed laser beams is described in detail by C. McKinstrie and E. Startsev. They obtain new analytical solutions for the linearized equations governing the transient phase of the instability and the nonlinear equations governing the steady state. These solutions show that backward SBS dominates the initial evolution of the instability, whereas forward SBS dominates the steady state.
- R. Short and A. Simon have calculated the damping of localized plasma waves using a new physical approach that is linear in the wave field and that avoids introducing complex particle velocities. The simplicity of this approach is obtained by invoking the time-reversal invariance of the Vlasov equation. This greatly simplifies the calculation of Landau damping of plasma waves in an infinite of medium and “transit-time damping” of plasma waves localized in general geometries.

Reuben Epstein
Editor

