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LLE Review

Quarterly Report

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Contents

In Brief

This volume of the LLE Review, covering the period July–September 1998, includes reports on two of the newest subsystems in the OMEGA laser facility. A. V. Okishev, M. D. Skeldon, and W. Seka have developed a highly stable, diode-pumped Nd:YLF master oscillator for the OMEGA laser system. This new master oscillator produces either single-frequency *Q*-switched pulses or cw radiation for the OMEGA pulse-shaping system. The switch-over between these two regimes requires no laser realignment. The new master oscillator is completely computer controlled and has been operating continuously in OMEGA for six months without operator intervention. A. Babushkin, W. Bittle, S. A. Letzring, M. D. Skeldon, and W. Seka have designed a negative-feedback–controlled regenerative amplifier that has been part of the OMEGA laser system for the past two years. The negative feedback makes the energy output of the regenerative amplifier stable and insensitive to the variations in pulse energy. This amplifier's long-term output energy stability is the highest ever demonstrated for a millijoule-level laser system, either flashlamp pumped or diode pumped.

Additional research highlights reported in this issue are

- K. Green, W. Donaldson, R. Keck, A. V. Okishev, M. D. Skeldon, W. Seka, and R. Sobolewski have expanded the pulse-shape bandwidth of OMEGA's driver line from approximately 3 GHz to over 5 GHz by using a novel measurement scheme that takes into account the transient carrier dynamics of the photoconductive switches used in the pulse-shaping subsystem.

- J. Marozas has performed calculations of near-field intensity modulations in high-intensity laser beams due to self- and cross-phase modulation between the orthogonally polarized laser beams emerging from KDP wedges placed into the OMEGA laser beamlines. Such wedges produce a reduction in the far-field speckle nonuniformity by polarization smoothing and are not expected to be a significant source of intensity modulation under expected operating conditions.

- V. A. Smalyuk, T. R. Boehly, D. K. Bradley, J. P. Knauer, and D. D. Meyerhofer have characterized an x-ray radiographic system for measuring mass modulations in planar laser-driven targets. Using the known sensitivity, resolution, and noise characteristics of this system, they have formulated a Wiener filter that reduces noise, compensates for detector resolution, and facilitates measurement of perturbations imprinted on targets by laser nonuniformity.

- R. W. Short and A. Simon have found a plausible explanation for observations of stimulated Raman scattering (SRS) that have been at odds with theoretical predictions. By calculating the collisionless damping rate of plasma waves confined within a small cylinder, they have found that plasma waves

confined within small-radius filaments damp much more slowly than plane plasma waves in a homogeneous plasma. Predictions using these corrected rates, rather than rates obtained using the usual Landau theory for plane waves in homogeneous plasmas, provide a viable explanation of the anomalous SRS observations.

- This volume concludes with the Summer High School Program Report, the Laser Facility Report, and the National Laser Users' Facility News.

Reuben Epstein
Editor