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LLE Review

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Contents

In Brief

This volume of LLE Review 166 covers the period from January–March 2021. Articles appearing in this volume are the principal summarized results for long-form research articles. Readers seeking a more-detailed account of research activities are invited to seek out the primary materials appearing in print, detailed in the publications and presentations section at the end of this volume.

Highlights of research presented in this volume include:

- T. W. Overton reviews the many successes both in advancing inertial confinement fusion research and training the next generation of scientists that have been enabled by the close collaboration between LLE and General Atomics (p. 67).
- W. Y. Wang and R. S. Craxton propose pentagonal prism hohlraum experiments on OMEGA as a test bed for high-symmetry hohlraum experiments on future laser facilities (p. 76).
- K. M. Woo and R. Betti develop an analytic model for the impact of 3-D ρR asymmetries on the generalized ignition criterion that allows the degradation of the Lawson criterion to be inferred from ion-temperature asymmetry measurements (p. 81).
- J. L. Shaw *et al.* use OMEGA EP as the driver for a laser-plasma accelerator that generated a relativistic electron beam with charge exceeding 700 nC and laser-to-electron conversion efficiencies up to 11% (p. 83).
- K. L. Nguyen *et al.* investigate the nonlinear saturation of cross-beam energy transfer (CBET) using VPIC simulations. Trapping induced modification of the ion-velocity distribution was found to detune the CBET resonance and limit the gain (p. 86).
- J. L. Peebles *et al.* use the magneto-inertial fusion electrical discharge system (MIFEDS) to collimate a relativistic charge-neutral electron–positron beam generated using OMEGA EP (p. 90). The technique has the potential to generate pair plasmas that can be used to simulate astrophysical phenomena.
- S. Jiang *et al.* demonstrate enhanced positron production using microstructured targets in high-intensity laser–plasma interaction experiments on OMEGA EP (p. 93).
- D. H. Froula *et al.* provide an overview of the use of Thomson scattering as a spatially and temporally resolved diagnostic of plasma conditions and the associated velocity distribution functions (p. 95).
- L. E. Hansen *et al.* report on equation-of-state measurements of CO_2 up to 800 GPa using laser-driven diamond-anvil-cell targets (p. 101).
- M. C. Marshall *et al.* investigate the metastability of the liquid-to-ice VII phase transition under rapid compression and find that the liquid phase can persist at pressures up to 4× higher than the onset of metastability (p. 104).
- M. D. Bergkoetter *et al.* develop a method for laser wavefront phase retrieval in the presence of chromatic aberrations (p. 107). Forward fitting is used to retrieve the wavefront phase at the pupil plane based on a model where both monochromatic and chromatic aberrations are modeled using expansions over Zernike polynomials.
- I. A. Begishev *et al.* demonstrate high-efficiency (37%) optical parametric chirped-pulse–amplification on the Multi-Terawatt Laser System using large-aperture DKDP crystals (p. 111).

- C. Dorrer *et al.* develop a novel sum-frequency generation technique for broadband frequency conversion (p. 114). They demonstrated the scheme by combining the broadband 1ω output of an optical parametric amplifier with narrowband 2ω light, resulting in broadband 3ω with ~10 THz of bandwidth.
- V. V. Ivanov *et al.* describe magnetized plasma experiments performed on the Zebra pulsed-power machine (p. 117). Megagauss magnetic fields were used to significantly modify the plasma expansion from an interacting laser pulse.
- J. Puth *et al.* summarize operations of the Omega Laser Facility during the second quarter of FY21 (p. 121).

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Editor