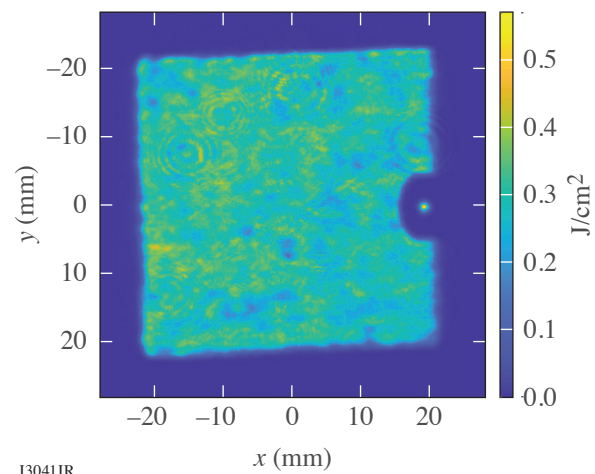


About the Cover:

The cover photo shows M. Spilatro and B. Webb installing a vacuum-compatible SPIDER diagnostic into the MTW-OPAL (Multi-Terawatt optical parametric amplifier line) grating compressor chamber for temporal pulse measurements at full power. MTW-OPAL is a mid-scale femtosecond laser built using optical parametric chirped-pulse amplification; the MTW laser pumps the final parametric amplifier. Just as MTW was a technology development and demonstration platform for the front end of OMEGA EP, MTW-OPAL is intended as a development and proof-of-concept laser for the future EP-OPAL (OMEGA EP-pumped optical parametric amplifier line—a femtosecond-kilojoule laser at LLE's Omega Laser Facility. The inset shows the time-domain reconstruction of the amplified and compressed pulse as measured by the SPIDER diagnostic. First Light Campaign results demonstrated $>7\text{-J}$ pulse energies with pulse durations $<20\text{ fs}$.

Large-aperture ($>\text{few-cm}$) noncollinear optical parametric amplifiers (NOPA's) are being developed using deuterated potassium dihydrogen phosphate (DKDP) crystals due to the large bandwidth supported by these crystals and potential for scaling to several tens of centimeters in aperture size. NOPA5, the final amplifier on MTW-OPAL, produces a $45 \times 45\text{-mm}^2$ profile with 11-J pulse energy and $>150\text{-nm}$ bandwidth (full width at 10%). The image to the right shows the near-field profile measured after NOPA5, with a peak-to-mean ratio of 1.4:1. The cutout is from a sampling mask used to extract a small portion of the beam for measurement with the SPIDER diagnostic.

Ultra-broadband transport optics, compressor gratings, and diagnostic tools compatible with EP-OPAL are an active area of development currently being explored using MTW-OPAL. The MTW-OPAL First Light Campaign concluded with a successful demonstration of 0.35-PW peak power. Next steps include developing hardware and techniques for $f/2$ focusing with a deformable mirror and double plasma mirror system to achieve ultrahigh-contrast focused intensities $>5 \times 10^{21}\text{ W/cm}^2$.



This report was prepared as an account of work conducted by the Laboratory for Laser Energetics and sponsored by New York State Energy Research and Development Authority, the University of Rochester, the U.S. Department of Energy, and other agencies. Neither the above-named sponsors nor any of their employees makes any warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, mark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring

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The work described in this volume includes current research at the Laboratory for Laser Energetics, which is supported by New York State Energy Research and Development Authority, the University of Rochester, the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement No. DE-NA0003856, and other agencies.

Printed in the United States of America

Available from

National Technical Information Services
U.S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161
www.ntis.gov

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