Cover Photos

Upper Left: Senior Research Engineer Terrance Kessler inspects a precision glass sphere. The sphere, produced by LLE's Optical Fabrication Shop and the Center for Optics Manufacturing at the University of Rochester, is part of the vacuum OTIS (OMEGA Transport Instrumentation System) diagnostic used in the OMEGA laser facility. Precise beam transport measurements are routinely made with this sphere, located at the center of the OMEGA target chamber. Continuous-wave UV laser light is transported through the UV optical portion of each beamline, focused onto the surface of the sphere, and retroreflected back through the beamline to a charge-coupled-device (CCD)–based power ratiometer. The OTIS diagnostic is capable of 0.1% relative laser beam transport measurements.

Center Left: A mass density contour plot at peak neutron production of a two-dimensional (2-D) *DRACO* calculation of a recent cryogenic 1-ns square implosion experiment performed on the OMEGA laser. The target's inner ice surface was perturbed with modes $\ell = 2$ to $\ell = 30$ (even modes only) taken from the cryogenic characterization station prior to shooting. The predicted 2-D yield was 57% of the clean 1-D calculation.

Lower Left: Summer high school student intern Uyen Tran (in white), now a senior at the Wilson Magnet High School of Rochester, and her LLE research supervisor, Dr. Sean Regan, are shown aligning the apparatus used to record the far-field laser beam pattern of one of the OMEGA beams. Ms. Tran's summer project was to investigate the OMEGA far-field energy distribution with an annular aperture placed in the near field of the beam.

Center: Time-integrated photograph of an imploding OMEGA cryogenic target. Simulations based on ray-tracing calculations show that the 60 OMEGA beams are both reflected from the front of the target and refracted from behind the target into the camera lens. In this way all 60 laser spots are visible in this photograph.

Upper Right: Graduate student Carlo Williams positions an optoelectronic switch embedded in a coplanar strip line for a high-speed characterization experiment using an electro-optic sampling system. The system is capable of measuring subpicosecond transients.

Center Right: Shadowgram of a layered cryogenic target with a 919-μm outer diameter, a 3.9-μm CH thickness, and an 80-μm nominal fuel thickness. The bright band is a caustic generated by the ice/gas interface. Detailed analysis of this band produces a measure of the uniformity of the ice layer. This measurement can be carried out with a spatial resolution of 1 to 2 μm.

Lower Right: A mirror coated by the Optical Manufacturing Group (OMAN) is being inspected by Senior Technical Associate Gary Mitchell. This mirror was one of the Z-Beamlet optics coated by OMAN for the Sandia National Laboratory. The mirror is 440 mm × 940 mm × 118 mm thick and weighs 114 kg. Specifications for this optic were reflectance $R_p > 99\%$ at 527 nm and $R_s < 20\%$ at 1053 nm at 61° incidence. This is the largest optic coated by LLE with uniformity requirements maintained across the aperture.

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