Polarization Dependence of a Cross-Beam Energy Transfer: A new diagnostic was fielded on OMEGA to investigate cross-beam energy transfer (CBET) during implosions.[1] Unabsorbed light from each OMEGA laser beam was imaged as a distinct "spot" in time-integrated images (see Fig. 1). Each spot, is in essence, the end point of a beamlet of light that originates from a specific region of a beam profile and follows a path determined by refraction. The intensity of light in the beamlet varies along that path because of absorption and CBET with other beamlets. This diagnostic allows for the detailed investigation of the effects of CBET on specific locations of the beam profile.

In January, beamlet images were recorded with linearly polarized beams by removing the distributed polarization rotators (DPR's) from the OMEGA beamlines. By changing the time window of the gated images, a time-varying picture of CBET for linearly polarized beams was constructed. Early in time the intensity of the beamlet images are symmetric [Fig. 1(a)]. Late in time when CBET is predicted to be most effective, an asymmetry in the beamlet spot intensity is observed [Fig. 1(b)]. The beamlet intensity asymmetry is attributed to polarization effects on the coupling between beams.[2] The geometric arrangement of the beams is symmetric about this axis for the diagnostic's view. As the beam power balance is typically only a few percent and all the beams have similar beam profiles, a spot on one side of the axis should have a similar intensity to that of the corresponding spot on the opposite side when polarization smoothing is used. When each beam has a different linear polarization, the symmetry is broken by the effect of those polarizations on the CBET beam couplings. A fully 3-D CBET model is being used to study polarization effects on direct-drive energy coupling and to refine our understanding of CBET.

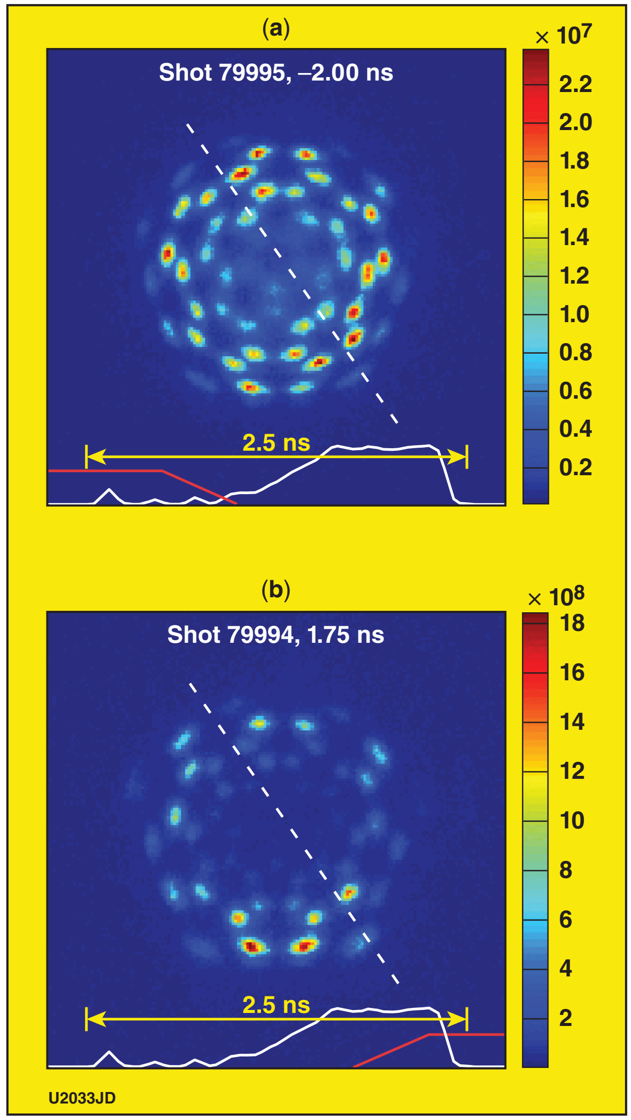

Figure 1. (a) Scattered-light image from early in an implosion. The camera is gated to include only the laser pulse pickets. The pulse shapes are shown in white and the gating time in red at the bottom of each frame. The dotted line indicates the axis of symmetry for the diagnostic setup. The scattered-light spot intensities are symmetrically distributed about this axis. The intensities primarily show a radial dependence. Since the inside spots are from beamlets with smaller impact parameters, they are more strongly absorbed than the spots at larger radii. (b) Scattered-light image from late in an implosion (the camera is gated to include only the end of the drive pulse). Large asymmetries are now observed between some spots that are located on different sides of the symmetry axis.

Omega Facility Operations Summary: The Omega Laser Facility conducted 154 target shots in January with an average experimental effectiveness of 94.2%. The OMEGA laser carried out 87 of these shots with average experimental effectiveness of 91.4% while OMEGA EP accounted for 67 shots with experimental effectiveness of 97.8%. The inertial confinement fusion program had 61 target shots taken for experiments led by SNL and LLE. High-Energy-Density-Physics campaigns led by LLNL and LANL accounted for 72 target shots. Two NLUF teams—one each led by Princeton and MIT, respectively—had 21 target shots during January.

1. I. V. Igumenshchev *et al*., Phys. Plasmas **17**, 122708 (2010).
2. P. Michel *et al*., Phys. Plasmas **20**, 056308 (2013).