Intensity Scan of Warm Plastic-Shell Implosions on OMEGA: Implosion experiments were conducted on OMEGA to systematically study the effect of laser–plasma interactions in the underdense coronal plasma on direct-drive target performance. Warm D_2-filled 27-μm-thick-plastic shells were irradiated using triple-picket laser pulse shapes (Fig. 1). The intensity of the main pulse was varied between 3.5×10^{14} W/cm^2 (at 13.5 kJ of laser energy) and 1.1×10^{15} W/cm^2 (at 28 kJ of laser energy), while picket energies were kept nominally the same to maintain a similar shell adiabat. Time-resolved reflected light and its spectrum, neutron-rate histories, areal densities, ion temperatures, x-ray images of the compressed core, and time-resolved hard x-ray signals were successfully measured on these implosions. For some targets, the coronal electron and ion temperatures, as well as the plasma-expansion velocity, were measured using Thomson scattering. At intensities below the two-plasmon-decay (TPD) threshold, only stimulated-Brillouin-scattering–induced cross-beam energy transfer (CBET) affects the energy coupling to the target, whereas at higher intensities, both of these instabilities influence the implosion velocity. At high intensities (~1×10^{15} W/cm^2) fast electrons generated by TPD may preheat the shell, reducing compression. As the intensity was varied, other ways of degrading compression were held constant—shock timing was measured using cone-in-shell targets and is well modeled, and shell stability during acceleration was nominally the same since the in-flight aspect ratio of these targets was held constant. This leaves only the possibility of reduced drive generated by CBET or fast-electron preheat as potential causes of degradation in areal density.

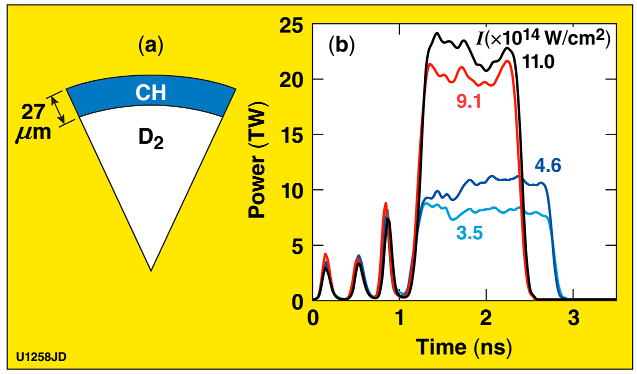

Figure 1. (a) Schematic of target used in this experiment. (b) Typical pulse shapes used for this experiment at peak intensities of 3.5, 4.6, 9.1, and 11.0×10^{14} W/cm^2, respectively.

The OMEGA Laser System provided pulse shapes close to the design for all the intensities. The observed time-integrated hard x-ray signals are shown in Fig. 2 as a function of laser intensity. These are the highest hard x-ray values observed on OMEGA that can be directly related to TPD in the coronal plasma of the capsule. The range of intensities studied and the related observations are being used to test models of cross-beam transfer and validate the models relating to the transport of fast electrons in *LILAC*. A complete analysis of these implosions including the effect of cross-beam transfer on implosion velocity and bang time, and the effect of fast-electron preheat on compression, is in progress.

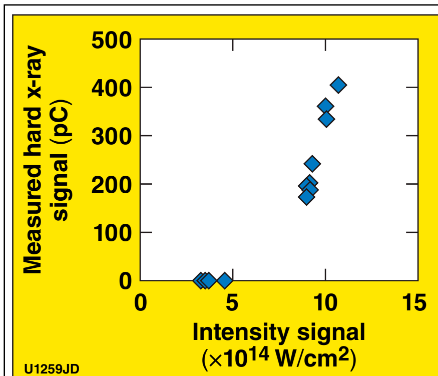

Figure 2. Measured hard x-ray signal versus the on-target laser intensity.

Laboratory Basic Science Proposal Solicitation: A record 40 proposals were submitted in response to this year's solicitation for Laboratory Basic Science (LBS) proposals for experiments to be conducted at the Omega Facility in FY12. The LBS program is open to scientists from the ICF laboratories (LLNL, LANL, SNL, and LLE) who wish to conduct basic high-energy-density-science experiments at the facility. Up to 15% of the facility time is available for this program. This year's submissions represent a 74% increase over those submitted in FY11. A total of 87.5 shot days at the Omega Facility was requested—over three times the shot days available for this program (27 days). A committee comprised of experts in high-energy-density physics from academia and national laboratories reviewed and ranked the proposals.

Omega Facility Operations Summary: The Omega Facility conducted 159 target shots in April (140 on the OMEGA laser and 19 on OMEGA EP). The average experimental effectiveness was 97.5% (97.9% for OMEGA and 94.7% for OMEGA EP). Seventy-six target shots were taken for the NIC program by experimental teams led by scientists from LANL, LLNL, and LLE. Forty-nine target shots were conducted for the HED program and led by scientists from LANL and LLNL. The NLUF program accounted for 24 target shots for the two experimental teams led by the University of Michigan and the University of Nevada, Reno. Ten LBS target shots were taken for experiments led by scientists from LLE.

Contact: John M. Soures (585) 275-3866; fax: (585) 256-2586; e-mail: jsou@lle.rochester.edu