Experimental Comparison of Hydrodynamic Efficiencies for Be, C, and CH Ablators: For direct-drive implosions, the implosion velocity of the unablated mass (v_{imp}) determines the minimum laser energy (E_{min}) required for ignition $\left(E_{\text{min}} \propto v_{\text{imp}}^{-5.9}\right)$. Experiments on the OMEGA laser show a 20% increase in the implosion velocity when using a Be ablator compared to a C or CH ablator at both low (5×10^{14} W/cm^2) and high (8×10^{14} W/cm^2) overlapped intensities [Fig. 1(a)]. The absorption is measured to be similar for all three ablators, where 80% of the laser energy is absorbed at low intensities and 70% at high intensities. Simulations show that this results in similar ablation pressures for the different materials. These results are consistent with the rocket equation that suggests that the significantly larger *A/Z* for Be will result in an increased mass ablation rate leading to a higher implosion velocity.[1] The hydrodynamic efficiencies are dominated by the implosion velocity and are increased by 23% when using the Be ablators.

Spherical implosions of 860-μm-diam targets were driven by triple-picket, low-adiabat pulses [Fig. 1(b)]. The implosion velocity is determined at the end of the laser pulse with an accuracy of 5% by measuring the trajectory of the imploding shell [Fig. 1(b)] using the soft x-ray radiation imaged from the corona.[2] To obtain a strong dependence of the kinetic energy on velocity, the shell thickness was varied for the different materials to maintain a constant initial target mass.

Figure 1 shows the results of *LILAC* simulations that include cross-beam energy transfer, which indicate that the calculated implosion velocity and shell trajectories are in good agreement with the measurements. These simulations show that the mass of the shell at the end of the laser pulse for high intensities is 17% lower for Be than for CH and C. The resulting hydrodynamic efficiencies are 3.9% for C and CH and 4.8% for Be.

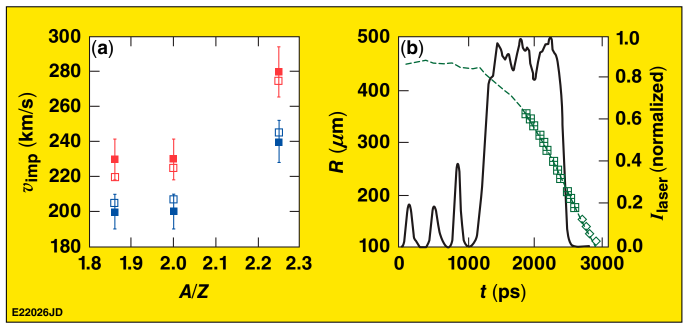
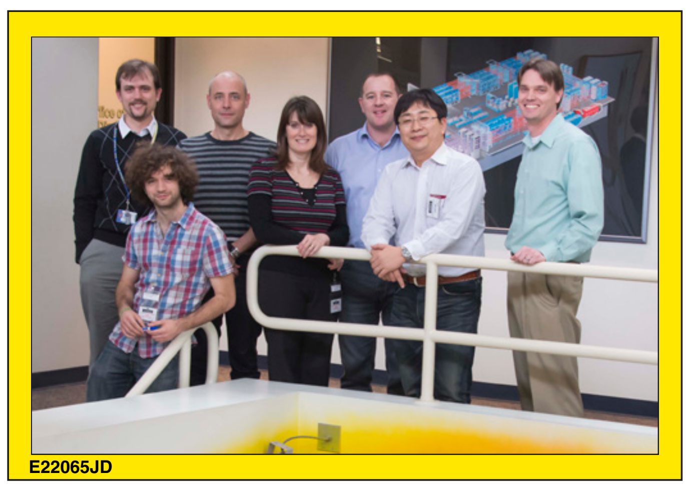


Figure 1. (a) Implosion velocities determined from the measured (solid squares) and calculated (open squares) shell trajectories for various ablator materials (CH, C, and Be) at low (blue) and high (red) overlapped intensities. (b) The shell trajectories measured on three shots (symbols) are compared to 1-D hydrodynamic simulations (dashed line) for the Be ablator experiments performed at high intensity. The laser pulse used for these experiments is shown on the right axis.

Omega Facility Operations Summary: During March 2013, the Omega Laser Facility performed a total of 135 target shots and 14 laser maintenance shots with an average experimental effectiveness of 94.4%. OMEGA conducted 114 target shots with an average experimental effectiveness of 94.3% for several campaigns including: 64 shots for LLE ICF experiments, 11 shots for the HED program, 26 shots for two NLUF campaigns (one from Princeton University and the other from MIT) and 13 shots for CEA experiments. The ratio of conducted to scheduled shots for the OMEGA laser was 1.27 in March. The OMEGA EP laser conducted 7 target shots for the HED program and 14 laser maintenance shots. The ratio of shots conducted to those scheduled was 2.33 for the OMEGA EP laser.



On 13 March 2013, LLE scientists in collaboration with scientists from CEA (France) and the Centre Lasers Intense et Applications (CELIA) conducted experiments to study laser imprint mitigation. The team included (left to right): Tomline Michel (LLE), Barthelemy Delorme (CEA, CELIA Ph.D. student), Philippe Nicolai (CELIA), Marina Olazabal (CELIA), Alexis Casner (CEA), Shinsuke Fujikoka (Univ. of Osaka), and Dustin Froula (LLE).

1. S. Atzeni and J. Meyer-ter-Vehn, *The Physic of Inertial Fusion: Beam Plasma Interaction, Hydrodynamics, Hot Dense Matter*, International Series of Monographs on Physics (Clarendon Press, Oxford, 2004).
2. D. T. Michel *et al*., Rev. Sci. Instrum. **83**, 10E530 (2012).