First Target Shots on OMEGA EP: The OMEGA EP Laser fired its first short-pulse shots onto a target. A $500 \times 5000 \times 10$ μm^3-sized CH target was irradiated with up to 60 J of 1054-nm laser light at a pulse duration of ~12 ps. Figure 1 shows the first x-ray image produced on the OMEGA EP system. The start-up infrastructure of the OMEGA EP target chamber consists of three, ten-inch manipulators (TIM's), two static x-ray pinhole cameras (XRPC's), the target positioning system (TPS), the target viewing system (TVS), and the off-axis parabola (OAP) as the final focusing elements. One of the TIM's was used to insert an LLE-designed x-ray streak camera (PJX) to measure the timing of the x-ray pulses generated by the short laser pulse. An x-ray monitor system, consisting of two chemical vapor deposition (CVD) diamond detectors and one scintillator coupled to a fast photomultiplier, were mounted outside the target chamber wall. Co-timing between the OMEGA EP laser beams was established by firing two consecutive shots with both beams on a common path. The first shot used Beam 2 off the beam-combining optics and the second used Beam 1 through the beam-combining optics.

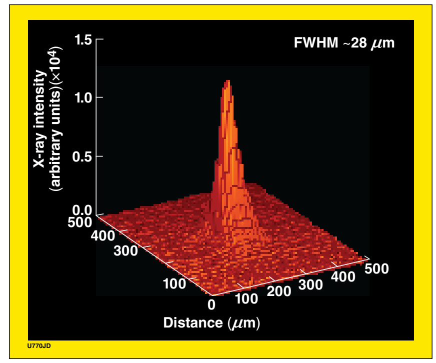

Figure 1. Enhancement of first x-ray image obtained on the OMEGA EP Laser System.

Proton Radiography of ICF Implosions: The 28 February 2008 issue of *Science* contains a paper entitled "Proton Radiography of Inertial Fusion Implosions" that was jointly authored by scientists and students from the MIT Plasma Science and Fusion Center (PSFC) and by scientists from LLE.[1] This paper is based on experiments carried out on the OMEGA Laser and supported largely by programs under the Fusion Science Center for Extreme States of Matter and the National Laser Users' Facility. It is the most recent example of notable research resulting from the long-standing collaboration between MIT's PSFC and LLE. The paper presents a distinctive way of quantitatively imaging inertial fusion implosions, resulting in the characterization of two different types of electromagnetic fields and in the measurement of the temporal evolution of capsule size and areal density. This work is based on radiography using a pulsed, monoenergertic, isotopic proton source produced by the implosion of a D^3He-filled capsule (see Fig. 2). Field structures are revealed through deflection of the proton trajectories, while areal density is characterized through the energy loss of protons while traversing the plasma. The two field structures include (a) many radial filaments with complex striations and bifurcations, permeating the entire field of view, with a magnetic-field magnitude of ~60 T and (b) a coherent, centrally directed electric field of ~10^9 V/m, observed close to the capsule surface. The mechanism for generating these fields and their effect on the implosion dynamics are subjects for future studies.

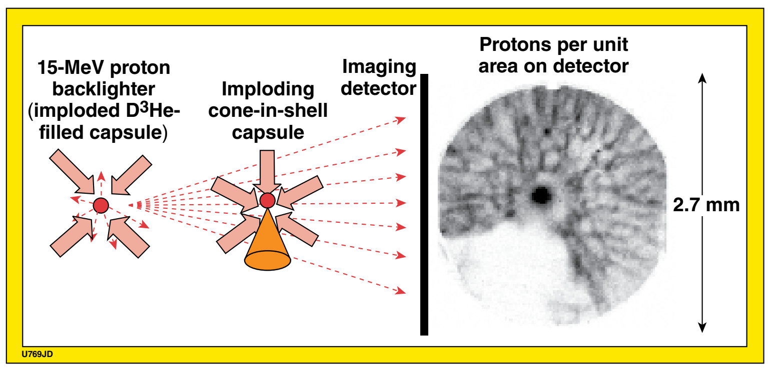

Figure 2. Schematic (left) and 15-MeV proton radiograph (right) of an imploding cone-in-shell capsule at the OMEGA Laser Facility. The radiograph shows the compressed capsule, the expanding cone, and a complex electromagnetic-field structure in the corona. Darker regions of the radiograph correspond to higher proton flux.

OMEGA Operations Summary: OMEGA conducted 92 target shots during February with an experimental effectiveness of 96.7%. The IDI NIC program accounted for 28 shots (16 LLE and 12 LLNL), while the DDI NIC received 27 shots (all LLE). A total of 12 shots were taken by an NLUF team led by the University of California, Berkeley; 16 shots were dedicated to CEA programs, and there were 9 shots taken by LLNL scientists for the HED program.

1. J. R. Rygg *et al*., Science **319**, 1223 (2008).

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