OMEGA EP Two-Plasmon-Decay Experiments: The relatively large-diameter capsules (3 mm) required for direct-drive–ignition experiments on the NIF lead to long density scale lengths ($L_n \sim 500$ μm) at the quarter-critical surface. The two-plasmon-decay (TPD) threshold is expected to scale with the quarter-critical density scale length, necessitating an extension of our current understanding of the TPD from OMEGA scale lengths ($L_n \sim 150$ μm).

Experiments to study the dependence of TPD on density scale length were conducted on the OMEGA EP laser at an intensity of 7×10^{14} W/cm^2 using spherical targets of varying diameter. Figure 1(a) shows hydrodynamic simulations of the quarter-critical density scale length as a function of the diameters of the CH spherical targets. The simulations indicate that the scale length reaches a steady state after about 1 ns. Near 1 ns the hard x-rays, a signature of two-plasmon decay, are measured to increase rapidly and turn off at 2 ns along with the UV laser pulses.

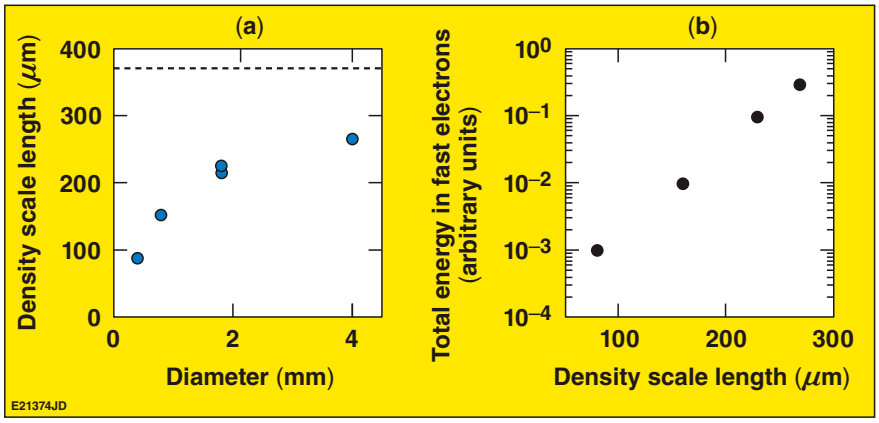

Figure 1. (a) The simulated quarter-critical density scale length is plotted as a function of the diameter of the spherical CH target for an overlapped intensity of 7×10^{14} W/cm^2. The dashed line indicates the scale length achieved when shooting planar CH targets. (b) The total energy of fast electrons inferred from the measured x rays above ~60 keV as a function of the scale length.

Figure 1(b) shows a rapid increase in the total energy in fast electrons as the scale length is increased. These results are consistent with the planar OMEGA EP experiments, where the scale length was held constant (~380 μm) and the fraction of laser energy converted to hot electrons was measured to increase exponentially from 5×10^{-6} to 4×10^{-3} when the laser intensity was increased from 1.3 to 3.5×10^{14} W/cm^2 (Ref. 1). These experiments are being modeled by a 3-D nonlinear Zakharov model (*QZAK3D*).[2] *QZAK3D* is used to study the nonlinear behavior of two-plasmon decay and provides a physics-based capability for calculating the fraction of laser energy converted to hot electrons at ignition plasma conditions.

Laboratory Basic Science Program: The proposal solicitation and selection process for the FY13 Laboratory Basic Science (LBS) program was completed in May. Thirty-two proposals from scientists from LANL, LLNL, and LLE requesting 68 days of Omega Laser Facility shot time competed for the 28 shot days of Omega time available for the LBS program in FY13. After an independent peer review of the proposals, 16 proposals with topics ranging from the exploration of electron–positron pair plasmas to magnetized ICF implosions were approved for FY13.

Omega Facility Operations Summary: The Omega Laser Facility conducted 249 target shots during the month of May (182 on OMEGA with average experimental effectiveness of 97.8% and 67 on OMEGA EP with experimental effectiveness of 92.5%). The NIC program conducted 107 target shots in May in experiments led by LANL, LLNL, and LLE scientists and the HED program accounted for 47 target shots led by LANL and LLNL. Fifty-two target shots were taken for several LBS experiments led by LLNL and LLE scientists and 30 target shots were conducted for NLUF experiments by teams led by the University of Michigan, the University of California, San Diego, the University of California, Berkeley, and General Atomics. CEA conducted 13 target shots during the month.

1. D. H. Froula *et al.*, Phys. Rev. Lett. **108**, 165003 (2012).
2. J. F. Myatt *et al.*, Phys. Plasmas **19**, 022707 (2012).

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