Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Generation of Gigabar Pressures for High-Energy-Density Plasmas W. THEOBALD, R. BETTI, A. BOSE, W. SEKA, C. STOECKL, D. MANGINO, Laboratory for Laser Energetics and Fusion Science Center, U. of Rochester, A. CASNER, CEA, DAM, DIF, F.N. BEG, U. of California, San Diego, E. LLOR AISA, X. RIBEYRE, CELIA, U. Bordeaux, M.S. WEI, M.E. SCHOFF, General Atomics, R. FLORIDO, U. de Las Palmas de Gran Canaria, R.C. MANCINI, U. of Nevada — Experiments on the OMEGA laser were performed to study gigabar pressures in small (50-μm-diam) Ti and Cu target samples for high-energy-density plasma applications. The samples were precisely placed (better than 10 μm) at the center of a spherical plastic matrix that is irradiated at incident laser intensities of $\sim 5 \times 10^{15}\,\mathrm{W/cm^2}$. The laser launches a spherical shock wave that converges in the center in order to reach Gbar pressures in the sample. The shock convergence produces a short burst ($\sim 30\,\mathrm{ps}$) of x-ray emission. Time-resolved and time-integrated x-ray spectroscopy provides the means to diagnose the plasma conditions in the sample. The time-resolved spectra are compared to predictions from radiation–hydrodynamic simulations to infer the material conditions at Gbar pressures. A second x-ray flash delayed by $\sim 600\,\mathrm{ps}$ caused by the breakout of the rebounded shock through the outer surface of the compressed plastic was observed. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944 and by the Fusion Science Center under Grant No. DE-FC02-04ER54789.

W. Theobald
Laboratory for Laser Energetics and Fusion Science Center, U. of Rochester

Date submitted: 25 Jul 2016 Electronic form version 1.4