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**Soft X-Ray Backlighting of Direct-Drive Implosions Using a Narrowband Crystal Imaging System** C. STOECKL, J.A. DELETTREZ, G. FIKSEL, D. GUY, R.K. JUNGQUIST, C. MILEHAM, P.M. NILSON, T.C. SANGSTER, M.J. SHOUP III, W. THEOBALD, Laboratory for Laser Energetics, U. of Rochester — X-ray backlighting of high-energy-density matter is widely used for imaging high-energy density plasmas in hydrodynamic experiments. High-energy petawatt (HEPW) lasers such as OMEGA EP promise significantly improved backlighting capability by producing enhanced xray power and shorter emission times. A narrowband x-ray imager with a spherically bent quartz crystal for the Si $He_\alpha$ line at $\sim$1.86 keV has been used to record backlit images of room-temperature direct-drive implosions driven by $\sim$15 kJ of UV (351-nm) laser light with a 1-ns pulse duration. The time-integrated images show a high signal-to-background ratio of >10:1 with backlighter laser energies of $\sim$1.5 kJ at a 10-ps pulse duration and a spatial resolution of better than 20 $\mu$m. The signal recorded from the backlighter foil is within a factor of 2 of the core emission. Concepts to improve the performance of the imaging system and to adapt it to cryogenic target implosions will be presented. This work was supported by the U.S. Department of Energy under Cooperative Agreement Nos. DE-FC02-04ER54789 and DE-FC52-08NA28302.

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