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Investigation of Direct-Drive Shock Heating Using X-Ray Absorption Spectroscopy H. SAWADA, S.P. REGAN, R. EPSTEIN, D. LI, V.N. GONCHAROV, P.B. RADHA, D.D. MEYERHOFER, T.R. BOEHLY, V.A. SMALYUK, T.C. SANGSTER, B. YAAKOBI, Laboratory for Laser Energetics, U. of Rochester, R.C. MANCINI, U. of Nevada, Reno — The shock-heated shell in a direct-drive imploding capsule has plasma conditions in the Fermi-degenerate, strongly and weakly coupled regimes ($T_e \sim 10$ eV, $n_e \sim 10^{23}$ cm^{-3}). Time-resolved Al $1s$–$2p$ absorption spectroscopy was used to diagnose direct-drive, shock-heated plasmas. A surrogate target consisting of a CH planar foil (50 μm) with a buried tracer layer of Al (1 to 2 μm) was irradiated with 10^{14} to 10^{15}W/cm^2, and x rays (1.4 to 1.6 keV) from a point-source Sm backlighter were transmitted through the drive foil. The T_e inferred with detailed atomic physics codes (PrismSPECT, Spect3D) from the measured spectral line shapes are close to the predictions of the 1-D hydrodynamics code *LILAC*. The extension of this technique to infer density from the broadening of the spectral line shapes will be discussed. This work was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement No. DE-FC52-92SF19460.

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