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Investigation of Shock Heating and Heat-Front Penetration in Direct-Drive Targets Using Absorption Spectroscopy H. SAWADA, S.P. REGAN, P.B. RADHA, R. EPSTEIN, V.N. GONCHAROV, D. LI, D.D. MEYERHOFER, V.A. SMALYUK, T.C. SANGSTER, B. YAAKOBI, Laboratory for Laser Energetics, U. of Rochester, R.C. MANCINI, U. of Nevada, Reno — Time-resolved Al $1s$–$2p$ absorption spectroscopy was used to diagnose direct-drive, shock-heated, and compressed planar targets having nearly Fermi-degenerate predicted plasma conditions ($T_e \sim 10$ to 30 eV, $n_e \sim 1$ to 6×10^{23} cm^{-3}). A 50-μm-thick CH foil with a buried Al tracer layer was irradiated with 10^{14} to 10^{15}W/cm^2, and $\sim$1.5 keV x rays from a point source Sm backlighter were transmitted through the drive foil. The measured absorption spectra were modeled with the atomic physics code PrismSPECT to infer T_e and n_e. The shock heating and heat-front penetration were simulated with the 1-D hydrocode *LILAC*, using a flux-limited or nonlocal transport model. Shock-heating observations are consistent with *LILAC* for the lower drive intensity, but there is evidence of preheat for the higher one. The timing of the heat-front penetration is consistent with a time-dependent flux limiter. This work was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement DE-FC52-92SF19460.

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