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Inferring Electron Temperature of Shocked Liquid Deuterium Using Inelastic X-Ray Scattering S.P. REGAN, P.B. RADHA, T.R. BOEHLY, V.N. GONCHAROV, R.L. MCCRORY, D.D. MEYERHOFER, T.C. SANGSTER, V.A. SMALYUK, Laboratory for Laser Energetics, U. of Rochester, K. FALK, G. GREGORI, U. of Oxford, T. DOEPPNER, S.H. GLENZER, O.L. LANDEN, LLNL — A laser-ablation–driven shock wave (12 Mbar) was launched in a planar liquid-deuterium target on OMEGA, and the shocked conditions were diagnosed using inelastic x-ray scattering. The electron temperature (T_e) is inferred from the Doppler-broadened, Compton-downshifted peak of the noncollective x-ray scattering for $T_e > T_{Fermi}$. For this purpose, a saran backlighter foil was irradiated with a group of tightly focused beams having an overlapped intensity of $\sim 10^{16}$ W/cm^2. The spectrally resolved x-ray scattering of the Cl Ly$_\alpha$ emission ($h\nu = 2.96$ keV) was recorded at 90°. The inferred $T_e = 20 \pm 5$ eV is close to the predicted $T_e = 22$ eV. The experimental design and initial results will be reported. This work was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement No. DE-FC52-08NA28302. The work of G. Gregori and K. Falk was supported in part by EPSRC grant No. EP/G007187/1 and by the HiPER collaboration.

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