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X-ray Thomson Scattering from Spherically Imploded ICF Ablators ANDREA KRITCHER, TILO DOEPPNER, OTTO LANDEN, SIEGFRIED GLENZER, Lawrence Livermore National Laboratory — Time-resolved X-ray Thomson scattering measurements from spherically imploded inertial fusion capsules-type targets have been obtained for the first time at the Omega OMEGA laser facility to characterize the in-flight properties of ICF ablators. In these experiments, the non-collective, or microscopic particle behavior, of imploding CH and Be shells, was probed using a 9 keV Zn He-alpha x-ray source at scattering angles of 113° and 135°. for two drive pulse shapes.As an example, the analysis of In-flight scattering measurements from one set of directly-driven compressed 8600 μm-diameter, 40-μm thick Be shells taken (4.2 ns after the start of the compression beamswhen compressed a factor of $\approx$ 4.83x) yielded electron densities of $\sim 1.2\pm0.23\text{x}10^{24}\text{cm}^{-3}$, temperatures of $\sim$13$\pm$32 eV, and an ionization state of Be(+2), with uncertainties in the temperature and density of about 40% and 20%. These conditions resulting in an inferred adiabat (ratio of plasma pressure to Fermi degenerate pressure) of 1.797 +0.3/-.5 with an error of about 30%. The high signal-to-noise and high signal-to-background ratio of data obtained in these experiments provides a platform for studying the adiabat of other indirect-drive ICF ablators such as CH and High Density Carbon (HDC) ablators and demonstrates the viability of using this diagnostic to study the in-flight properties adiabat of implosion targets at the National Ignition Facility (NIF).

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