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X-ray scattering measurements from solid density plasmas¹ SIEGFRIED GLENZER, Lawrence Livermore National Laboratory, PAUL NEU-MAYER, OTTO LANDEN, NATIONAL IGNITION FACILITY PROGRAMS COLLABORATION — The development of spectrally resolved x-ray scattering for accurate measurements of densities and temperatures in solid-density plasmas has enabled new applications to characterize shock-compressed matter. The first proof-of-principle experiments on the Omega laser facility at the Laboratory for Laser Energetics have employed isochorically heated solid-density beryllium targets. In backscattering geometry, Compton scattering measurements have been shown to provide information on temperature and the ionization state from the spectral broadening and relative intensity of the inelastic scattering spectrum, respectively. In the forward scattering regime, the collective plasmon oscillations have been observed providing the local electron density from the frequency shift of the plasmon peak from the incident probe x-ray energy. These results indicate that the simultaneous application of forward (collective) and backward (non-collective) scattering will allow accurate measurements of the compressibility of warm dense matter. New experimental results important for applications to shock-compressed matter will be discussed.

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Siegfried Glenzer Lawrence Livermore National Laboratory

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