

Abstract Submitted
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Measuring warm dense matter properties with spectrally resolved x-ray scattering¹ SIEGFRIED GLENZER, SLAC National Accelerator Laboratory, X-RAY THOMSON SCATTERING COLLABORATION — We have developed powerful ultrafast pump-probe techniques to measure the structural transformations and the physical properties of matter in extreme conditions. We apply megabar pressures to our samples using high-power laser irradiation followed by X-ray laser pulses from the Linac Coherent Light Source to take femtosecond measurements of the states that result. These experiments deliver data of unprecedented accuracy that allow critical experimental tests of theory in the challenging near-Fermi degenerate warm dense matter regime or in the non-ideal plasma state. We find good agreement with density functional theory simulations and provide predictions for new studies at the highest densities in laboratory plasmas that approach conditions of the interiors of brown dwarfs.

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