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Free-electron x-ray laser measurements in isochorically heated warm dense matter PHILIPP SPERLING, SLAC National Accelerator Laboratory, HYUN CHUNG, International Atomic Energy Agency, LUKE FLETCHER, ERIC GALTIER, ELISEO GAMBOA, HAE JA LEE, SLAC National Accelerator Laboratory, YULTUZ OMARBAKIYEVA, HEIDI REINHOLZ, GERD RPKE, Rostock University, ULF ZASTRAU, European XFEL GmbH, SIEGFRIED GLENZER, SLAC National Accelerator Laboratory — We present the highly-resolved measurements of inelastic x-ray scattering spectra in an ultrafast heated solid. The obtained spectra from the isochorically heated foils permit a direct temperature dependent determination of plasma properties, e.g. transport coefficient. X-ray pulses from the seeded Linac Coherent Light Source delivering an average of 0.3 mJ of 8 keV x-ray photons in a 0.005% bandwidth pulse, have been focused to micrometer diameter focal spots isochorically heating solid materials to temperatures up to several eV. The inelastic forward scattering spectra resolve electronic plasma oscillations that directly allow an accurate determination of the electron temperature and density indicating a warm dense matter state. This accuracy enable us to extract plasma properties, e.g. the electrical conductivity, and enables the validation of existing theories.

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