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Non-Drude conductivities in isochorically heated warm dense aluminum observed by inelastic x-ray scattering PHILIPP SPERLING, European XFEL GmbH, BASTIAN WITTE, Universitaet Rostock, Institut fuer Physik, LUKE B. FLETCHER, ERIC GALTIER, ELISEO J. GAMBOA, HAE JA LEE, SLAC National Accelerator Laboratory, ULF ZASTRAU, European XFEL GmbH, RONALD REDMER, Universitaet Rostock, Institut fuer Physik, SIEGFRIED H. GLENZER, SLAC National Accelerator Laboratory — We have performed highly-resolved inelastic x-ray measurements in warm dense aluminum isochorically heated by 8 keV Linac Coherent Light Source (LCLS) photons. The inelastic forward scattering spectra resolve electronic density fluctuations (plasmons) that allow an accurate determination of the electron density, electron temperature, and for the first time the electrical conductivity [1]. The plasmon spectrum is strongly affected by the electron interaction that show plasmon damping smaller than calculated by Landau damping. We present density functional theory molecular dynamic (DFT-MD) simulations of the electrical conductivity of warm dense aluminum that show non-Drude conductivities and a reduced plasmon damping indicating electron-particle collisions as well as electron excitation. Translated into a plasmon spectrum we find a very good agreement with our measurements previously not achieved by standard perturbative theories due to an insufficient description of dissipative processes in strongly coupled plasmas. [1] P. Sperling *et al.*, Phys. Rev. Lett. **115**, 115001 (2015).

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