

Abstract Submitted
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Measuring the distribution of non-thermal electrons in hot dense plasmas YUANFENG SHI, OLIVER HUMPHRIES, QUINCY VAN DEN BERG, SHENYUAN REN, JUSTIN WARK, SAM VINKO, University of Oxford, HAE JA LEE, BOB NAGLER, ERIC GALTIER, SLAC National Accelerator Laboratory, LCLS TEAM¹, OXCHEDES TEAM² — Understanding dense plasma dynamics at the level of electron collisional interactions is a challenging problem in plasma physics, dictating a host of plasma properties including stopping powers, opacities, and energy transport and equilibration timescales. Here we present an approach to investigate this ultrafast interaction dynamics via measurements of the evolution of the non-thermal electron distribution in a hot dense plasma. Using the LCLS x-ray free-electron laser we demonstrate how tailored non-thermal electron distributions can be created on-demand in highly ionized Fe plasmas and measured using single-photon-counting spectroscopy. Our results suggest a promising way to track experimentally the relaxation dynamics of a non-thermal electron distribution function on femtosecond timescales for the first time.

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