

Abstract Submitted
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Measuring Femtosecond Collisional Ionization Rates in Solid-Density Plasmas SAM VINKO, ORLANDO CIRICOSTA, PATRICK HOLLEBON, THOMAS PRESTON, JUSTIN WARK, University of Oxford, TOMAS BURIAN, JAROMIR CHALUPSKY, VOJTECH VOZDA, Academy of Sciences of the Czech Republic, GEORGI DAKOVSKI, MICHAEL MINITTI, SLAC National Accelerator Laboratory, ULF ZASTRAU, European XFEL — The rate at which atoms and ions within a plasma are further ionized by collisions with free electrons is a fundamental parameter that dictates the dynamics of plasma systems at intermediate and high densities. While collisional ionization rates are well known experimentally in a few dilute systems, similar measurements for non-ideal plasmas at densities approaching or exceeding those of solids remain elusive. Here we illustrate a spectroscopic method capable of measuring rates of collisional ionization dynamics in solid-density plasmas by clocking them to Auger recombination processes. We have recently employed this technique on the LCLS X-ray free-electron laser at SLAC and will present the first experimental results for optically-thin, solid-density magnesium plasmas at peak temperatures exceeding 200 eV.

[1] S.M. Vinko *et al.*, Nature **482**, 59 (2012).

[2] S.M. Vinko *et al.*, Nature Communications **5**, 6397 (2015).

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