Abstract Submitted
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Measurement of ionization in shock-compressed deuterium using x-ray Thomson scattering[1] P. DAVIS, University of California, Berkeley, T. DOEPPNER, J.R. RYGG, W. UNITES, Lawrence Livermore National Laboratory, M. DESJARLAIS, Sandia National Laboratories, G.W. COLLINS, O.L. LANDEN, Lawrence Livermore National Laboratory, R.W. FALCONE, University of California, Berkeley, S.H. GLENZER, Lawrence Livermore National Laboratory — There is currently significant interest in the behavior of dense hydrogen under shock conditions, with applications ranging from planetary science to inertial confinement fusion. Here, we present the first x-ray Thomson scattering measurements on warm, dense deuterium in the collective regime. The experiment, performed on LLNL's Janus laser, used one 2 ns beam to drive a shock at a nominal pressure of 0.5 MBar into a deuterium target held at liquid conditions (19 K). A second 2 ns pulse pumped the Si Ly-α x-ray probe at 2 keV. Scattered x-rays were collected at 45 degrees in the forward direction and spectrally dispersed with a HOPG crystal spectrometer. A plasmon was detected, providing a direct measure of electron density. Simultaneous velocity interferometry was performed to determine pressure, allowing ionization state to be inferred. These results are compared to *ab initio* and hydrodynamic simulations.

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