Abstract Submitted
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Probing ionization of proton-heated matter with X-ray Thomson scattering P. DAVIS, UC Berkeley, S. LEPAPE, LLNL, P. NEUMAYER, D. HOCHHAUS, GSI, T. MA, T. DOEPPNER, A.L. KRITCHER, C. FORTMANN, LLNL, A. BENNUZZI-MOUNAIX, A. RAVASIO, M. KOENIG, LULI, T. WHITE, C. BROWN, G. GREGORI, University of Oxford, R. FALCONE, UC Berkeley, O.L. LANDEN, S.H. GLENZER, LLNL — We have demonstrated for the first time the effect of band structure on ionization state in the warm, dense matter regime. We compare the ionization state of two materials, B and BN, which have different room temperature band gaps. We show that in dense plasma conditions at temperatures of 13-18 eV, the band-gap of BN persists and lowers the ionization state to 0.5, compared to 2.5 in B. The experiment was performed on LLNL's Titan laser. The ultra-intense laser beam was split into two beams: one generated a proton beam while the other created a K-alpha x-ray probe. The proton beam isochorically heated the target foil, creating a solid-density plasma. Forward scattered x-rays were spectrally dispersed, providing an accurate measurement of the ionization and temperature from the position of the plasmon feature and the ratio of up- to down-shifted plasmon signals. *This work was performed under the auspices of the U.S. DOE by the LLNL, through the Institute for Laser Science and Applications, under contract DE-AC52-07NA27344. The authors also acknowledge support from LDRD Grant No. 08-LW-004 and the NNSA SSGF program.

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