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Measurements of Release-Isentropes of Proton Heated Warm Dense Matter with Streaked X-ray Radiography[1] SHENG JIANG, AMY LAZICKI, Lawrence Livermore Natl Lab, MATTHEW HILL, Atomic Weapons Establishment, DAMIAN SWIFT, JOE NILSEN, PHIL STERNE, HEATHER WHITLEY, JON EGGERT, YUAN PING, Lawrence Livermore Natl Lab — Understanding the equation of state (EOS) of warm dense matter (WDM) is of particular importance to fields ranging from astrophysics to high energy density physics. Experiments have been done to characterize either the Hugoniot [1, 2] or the isentrope [3] of WDM. We demonstrate the measurement of release isentrope of materials heated isochorically up to 10 eV by a proton beam generated by the OMEGA EP short-pulse laser. Three EP long-pulse beams were used to heat an X-ray backlighter to provide an X-ray source for streaked X-ray radiography, which recorded time-dependent density profiles of the expanding target. We have used a 1D zone plate to significantly improve the spatial resolution and signal-to-noise ratio of the radiograph, so that following a method derived by Foord et al. [4], we can analyze the results accurately enough to obtain a pressure-density isentrope curve for benchmarking various EOS models. [1] T. Do_ppner et al., Phys. Rev. Lett. 121, 025001 (2018). [2] A. L. Kritcher et al., HEDP 10, 27 (2014). [3] R. F. Smith et al. Nature 511, 330 EP (2014). [4] M. E. Foord et al., RSI 78, 2586 (2004).

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