

Abstract Submitted
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Measurements of Release-Isentropes of Isochorically Heated Warm Dense Matter on the OMEGA-EP Laser¹

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Understanding the equation of state (EOS) of materials at high pressures had broad relevance to astrophysical objects and laboratory experiments. An area in which the EOS is particularly difficult to model is the warm dense matter (WDM) regime, in which the standard plasma physics approximations do not apply, highlighting the need for experimental work. Experiments have been done to characterize the WDM Hugoniot [1], but measuring the material isentrope also can validate EOS models, as has been demonstrated on ramp-compressed solids and has been recently extended to WDM through measurements of isentropic release [2]. We present results from a platform developed for the OMEGA-EP laser from which the release isentrope of warm dense aluminum is measured. The sample is isochorically heated up to 10 eV by protons. Streaked x-ray radiography quantifies the density of the expanding material, which can be analyzed to obtain a pressure-density isentrope curve [3]. Streaked optical pyrometry constrains the temperature of the sample. Results from this platform will benchmark EOS models in the WDM regime. [1] T. Doeppner et al., Phys. Rev. Lett. 121, 025001 (2018). [2] D. Hoarty et al., HEDP 8, 50 (2012). [3] M. E. Foord et al., RSI 78, 2586 (2004).

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