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Probing Hotspot Conditions in Spherically Shock Compressed Matter[1] BENJAMIN BACHMANN, J. NILSEN, A. L. KRITCHER, D. SWIFT, J. R. RYGG, G. W. COLLINS, L. DIVOL, LLNL, R. W. FALCONE, UC Berkeley, J. GAFFNEY, LLNL, S. H. GLENZER, SLAC, R. HATARIK, LLNL, J. HAWRELIAK, Washington State University, S. KHAN, LLNL, D. KRAUS, UC Berkeley, O. L. LANDEN, N. MASTERS, S. R. NAGEL, T. PARDINI, G. ZIMMERMAN, T. DOEPPNER, LLNL — We present results of an approach to experimentally determine the conditions in the center of a CD_2 sphere that has been compressed to petapascal pressures by spherically converging shocks. By measuring the hotspot size using penumbral imaging [1], hotspot temperature using two-color spectroscopy [2], the neutron yield from DD nuclear reactions and the x-ray burn width, we infer average hotspot densities of 43 g/cm^3 at 1.6 keV temperature. These conditions correspond to pressures of 4.4 petapascal (44 Gbar) in an ideal gas and 3.5 petapascal from independently performed rad.-hydro. simulations. The experimentally determined neutron yield, temperature and density constrain the EOS in a regime that exceeds previously reported pressures obtained in carbon EOS measurements by three orders of magnitude [3]. The results show a path for constraining the EOS of matter at conditions that have been inaccessible with state-of-the-art experimental EOS techniques. [1] B. Bachmann *et al.*, Rev. Sci. Instrum. 85, 11D606 (2014) [2] B. Bachmann *et al.*, J. Phys. D: Appl. Phys. 46, 125203 (2013) [3] R. F. Smith *et al.*, Nature 511, 330-333 (2014)

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Benjamin Bachmann
LLNL

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