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Penumbral Imaging of micrometer size plasma hot spots at shock stagnation in Gbar EOS experiments on the National Ignition Facility<sup>1</sup> BENJAMIN BACHMANN, A.L. KRITCHER, L.R. BENEDETTI, LLNL, R.W. FALCONE, LBL, S. GLENN, J. HAWRELIAK, N. IZUMI, LLNL, D. KRAUS, UC Berkeley, O.L. LANDEN, S. LEPAPE, T. MA, F. PEREZ, D. SWIFT, T. DOEPPNER, LLNL — We have developed an experimental platform for absolute equation of state (EOS) measurements up to Gbar pressures on the National Ignition Facility (NIF). We use a symmetry-tuned hohlraum drive to launch a spherical shock wave into a solid CH sphere. Streaked Radiography is the primary diagnostic to measure the density change at the shock front as the pressure increases towards smaller radii. At shock stagnation in the center of the capsule, we observe short and bright x-ray self emission from high density (50 g/cm<sup>3</sup>) plasma at 1 keV. Here, we present results obtained with penumbral imaging, carried out to characterize the size of the hot spot emission. A detailed understanding of this size and emission strength allows for benchmarking radiation-hydro simulations in a regime that is not accessible to radiography. The application of penumbral imaging extends existing NIF diagnostic capabilities to higher spatial resolution (currently 10  $\mu$ m to 1  $\mu$ m) and higher sensitivity. At peak emission we find the hot spot radius to be as small as 5.8 +/- 1  $\mu$ m, corresponding to a convergence ratio of 200.

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