Abstract Submitted
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Determination of pressure and density of shocklessly compressed beryllium through x-ray radiography of a magnetically driven cylindrical liner implosion[1] R.W. LEMKE, M.R. MARTIN, R.D. MCBRIDE, J.-P. DAVIS, M.D. KNUDSON, Sandia National Laboratory — High current, pulsed-power driven liner implosions can be used to produce extreme pressure states in condensed matter for equation of state (EOS) studies. The Z accelerator can deliver a current pulse to a cylindrical liner (tubular shell) that rises to a peak current of ∼20 MA in ∼100 ns; at peak current the magnetic pressure is ∼28 Mbar on the surface of a liner with radius 0.15 cm. We discuss a semi-empirical technique for obtaining EOS data for a metallic solid, quasi-isentropically (shocklessly) compressed to multi-megabar pressure, through x-ray radiography of a high current, magnetically driven, cylindrical liner implosion. Results are presented from experiments on Z in which a solid beryllium (Be) liner is quasi-isentropically compressed by magnetic pressure. Radiographs of the liner are used in conjunction with hydrodynamic equations to determine density and pressure on the principal quasi-isentrope of solid Be to a peak pressure of 2.4 Mbar.

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