

Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Determination of Pressure Response From Multi-Frame Monochromatic X-ray Backlighting¹ MATTHEW MARTIN, RAYMOND LEMKE, RYAN MCBRIDE, JEAN PAUL DAVIS, MARCUS KNUDSON, Sandia National Laboratories — The shockless compression of a cylindrical liner Z-pinch is explored as a method to obtain high pressure (10's of Mbar) states while minimizing the entropy production in the target material. Experiments with beryllium liners on the Z-machine resulted in radiographic profiles at four different times in the liner's trajectory. From these results, we infer the longitudinally and azimuthally averaged material density, material pressure, and magnetic pressure along with their uncertainties. By combining these results with magnetohydrodynamic simulation, we obtain a pressure versus density response in solid beryllium up to 2.4 Mbar. Through the use of synthetic diagnostics and simulation we conclude that the pressure versus density response for material samples in the 10 Mbar range is achievable on the Z-machine with improved radiographic capability.

¹Sandia is a multiprogram laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Company, for the US Department of Energy's National Nuclear Security Administration under Contract No. DE-ACO4-94AL85000.

Matthew Martin
Sandia National Laboratories

Date submitted: 22 Feb 2011

Electronic form version 1.4