Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Measurement of the EOS of WDM aluminum[1] JOHN BENAGE, ROBERT WATT, DAVID MONTGOMERY, Los Alamos National Laboratory, ELISEO GAMBOA, University of Michigan — The warm dense matter (WDM) regime is one of the most uncertain in terms of our knowledge of the equation of state (EOS) of materials. This is not only because it is difficult to calculate the properties of WDM, but also because we have so little data from that parameter regime. To address this need, we are developing an experimental platform to measure the EOS of WDM. This platform relies on using the shock and release technique with the addition of non-traditional diagnostic capabilities. Our experiment platform utilizes the Omega laser to drive a very strong shock into an aluminum sample. The shock is then released into 0.2 g/cm^3 aerogel foam which is used as a pressure standard. A shock breakout measurement is used to determine the shock velocity and pressure in the foam and released sample. We have also developed an imaging x-ray Thomson spectrometer to measure Compton scattered x-rays from the released aluminum sample. This information can be used to determine the temperature and density of the released aluminum, providing the necessary measurements to determine the EOS. Simulations predict the conditions of the released aluminum will be $\sim$ solid density at 10-15 eV. We will present our experimental results of pressure measurements along with preliminary data from the imaging x-ray Thomson spectrometer.

[1]Work performed under the auspices of the Department of Energy.

John Benage
Los Alamos National Laboratory

Date submitted: 21 Jul 2011 Electronic form version 1.4