Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Quasi-Isentropic Compression of Iron to 268 GPa at the Omega Laser Facility[1] JUE WANG, Princeton Univ, RAYMOND SMITH, JON EGGERT, LLNL, JAVIER MONTOYA, Princeton Univ, DAVE BRAUN, LLNL, THOMAS BOEHLY, LLE, GILBERT COLLINS, LLNL, THOMAS DUFFY, Princeton Univ — Development of techniques for laser-based quasi-isentropic ramp compression in planetary materials has applications to understanding the structure and dynamics of the interiors of planets both within and outside our solar system. Ramp compression which achieves high compression at relatively modest temperatures can be used to extract quasi-isentropic equation-of-state data and study solid-solid phase transitions. An experimental platform for ramp loading of iron (Fe) has been established and tested in experiments at the Omega Laser Facility. A spatially planar ($\Delta t/t = 0.9\%$) ramp wave drive has been achieved in iron (Fe) stepped samples to peak stress above 1 Mbar over 10-ns time scales. The $\alpha - \varepsilon$ transition is overdriven by an initial shock pulse of ~81.4 GPa followed by ramp compression. Through the use of Lagrangian analysis on the measured wave profiles, stress-density states in iron have been determined to pressures of 268 GPa. Use of an initial shock followed by a ramp will allow a wider range of P-T states to be accessed via ramp compression.

[1]This work is supported by NLUF under DE-FG52-09NA29037.

Jue Wang
Princeton Univ

Date submitted: 11 Feb 2011 Electronic form version 1.4