Abstract Submitted
for the SHOCK15 Meeting of
The American Physical Society

Investigating iron material strength during phase transitions using Rayleigh-Taylor growth measurements[1] C.M. HUNTINGTON, J.L. BELOF, K.J.M. BLOBAUM, R.M. CAVALLO, N. KOSTINSKI, B.R. MADDOX, M.J. MAY, Lawrence Livermore National Lab, C. PLECHATY[2], Riverside Research, S.T. PRISBREY, B.A. REMINGTON, R.E. RUDD, D.W. SWIFT, R.J. WALLACE, M.J. WILSON, Lawrence Livermore National Lab — A solid-solid phase transition between the bcc (α) and hcp (ε) lattice structures in iron is known to occur as the material is compressed. When kept below its melting point, an effective increase in the macroscopic strength of the material accompanies this phase transition. Understanding the strength of iron throughout the deformation process is important for improving models of planetary structure, including interpretation of seismic measurements on Earth. To explore iron strength at high pressures and strain rates, we have performed experiments at the OMEGA laser. The laser drive produces a pressure near 1 Mbar on a thin Fe disk with a sinusoidal ripple pattern imposed on its face. The ripples seed the Rayleigh-Taylor (RT) instability, the growth of which is suppressed by the material strength of the sample. The ripple amplitude is diagnosed with x-ray radiography, and their growth is compared to values from simulations using different material strength models. This work will be compared to previous, similar experiments at 0.1 – 0.3 Mbar pressures (J. Belof et al., AIP Conf. Proc. 2012).

[1]This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore Na- tional Laboratory under Contract DE-AC52-07NA27344.
[2]Formerly of Lawrence Livermore National Lab

Channing Huntington
Lawrence Livermore National Lab

Date submitted: 29 Jan 2015 Electronic form version 1.4