Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Studying compressed matter physics at the Linac Coherent Light Source[1] SIEGFRIED GLENZER, LUKE FLETCHER, SLAC National Accelerator Laboratory, HED SCIENCE, SLAC NATIONAL ACCELERATOR LABORATORY TEAM, LAWRENCE BERKELEY LABORATORY TEAM, LAWRENCE LIVERMORE NATIONAL LABORATORY TEAM — With the advent of the Matter in Extreme Conditions instrument at the Linac Coherent Light Source a world-unique experimental capability has become available to study the physics of dynamically compressed solids. Our new high-energy-density science program at SLAC is aimed to take advantage of x-ray pulses with the highest peak brightness available today. In a single shot, the x-ray beam delivers 10^{12} x-ray photons in 50 fs focused to a spot of order 1 μm. This capability allows us to measure plasmons and to visualize the density and pressure evolution across melt lines by resolving correlations at distances comparable to atomic scales. Our data allow direct determination of pressure for validating theoretical models for the thermodynamics at high pressure. We will show how LCLS data test our theoretical models of compressed matter and will discuss future plans for the study of hot and dense matter.

[1]This work was supported by DOE Office of Science, Fusion Energy Science under FWP 100182

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Date submitted: 14 Nov 2014 Electronic form version 1.4