Abstract Submitted
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Spectrally and angularly resolved x-ray scattering measurements of shock-compressed aluminum[1] LUKE FLETCHER, Stanford Institute for Materials and Energy Sciences, SLAC National Accelerator Laboratory, 2575 Sand Hill Road, Menlo Park, CA 94025, HIGH ENERGY DENSITY SCIENCE COLLABORATION — Measurements of the strength in the ionic structure factor at various scattering angles is important for accurate first-principle calculations of material properties in the high pressure and temperature phase. In this study, spectrally resolved XRTS measurements in combination with proof-of-principle, single shot 2D angularly resolved x-ray scattering measurements of changes in the ion-ion correlation peak for both single and double (counter-propagating) shocks have been observed in Al foils. A binary 527 nm, 2 GW laser system available at the MEC station of the LCLS facility has been used to compress 25 μm and 50 μm thick Al targets approximately 2x and 3x the solid density respectively. A drive intensity of 6x10^{14} W/cm^2 on each irradiated surface was used to generate high pressure shock waves into the sample while 8 keV x-rays from the LCLS were used to probe the compressed targets for both single and double shocked geometries. The results will show that the elastic x-ray scattering amplitude, angularly resolved, shifts to higher wave numbers with increasing density, while the width and peak amplitude provide information on the temperature and ionization state.

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