

Abstract Submitted  
for the DPP10 Meeting of  
The American Physical Society

**Imaging X-ray Thomson Scattering Concept for the Matter in Extreme Conditions Instrument at LCLS** D.S. MONTGOMERY, Los Alamos National Laboratory, E.J. GAMBOA, Univ. Michigan — The Linac Coherent Light Source at SLAC, an x-ray free electron laser tunable in the range 800 – 8000 eV, with  $2 \times 10^{12}$  photons in a 200 fsec pulse, is a revolutionary facility that will impact many fields of science, including high energy density (HED) laboratory plasmas. The Matter in Extreme Conditions (MEC) instrument at LCLS will use high-power lasers to create HED plasmas, and will use the XFEL with various diagnostics to probe these conditions. One proposed use of the LCLS-MEC is to perform Thomson scattering in dense plasmas using the x-ray laser as a probe. Recent experiments at LANL's Trident Laser demonstrate the ability to measure spatial profiles of dense plasma conditions using a laser-plasma x-ray source, together with a high-efficiency, high-resolution imaging spectrometer, to perform imaging x-ray Thomson scattering. Here we propose an imaging spectrometer design, with  $<20\text{-}\mu\text{m}$  resolution, that will provide profiles of density, temperature, and ionization state in near-solid-density plasmas with a 8 keV probe at the LCLS-MEC, and propose an initial experimental design to examine shocks in near-solid-density plasmas.

David Montgomery  
Los Alamos National Laboratory

Date submitted: 16 Jul 2010

Electronic form version 1.4