Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Soft X-ray betatron radiation characterization for warm-dense matter studies at LCLS-MEC W. SCHUMAKER, F. CORDAMINE, A. FRY, E. GALTIER, E. GRANADOS, P. HEIMANN, J. KOTICK, HAE JA LEE, S.H. GLENZER, SLAC, B. BARBREL, A. SANDERS, R. FALCONE, LBNL, A. RAVARSIO, LULI, J. GAUDIN, CELIA, B.B. POLLOCK, F. ALBERT, LLNL
— Laser wakefield acceleration (LWFA) can produce high-energy (>100 MeV) electron beams with ultra-short durations (<100 fs)[1] in a compact, mm-scale plasma. Transverse motion of the electrons in the wakefield leads to the emission of synchrotron-like X-ray beams, called betatron radiation, with peak photon energies >10 keV and source sizes of a few microns [2]. These X-ray beams are presumed to retain the short-pulse characteristic of the electrons, resulting in high peak brightness and peak energy, making the source an excellent candidate for ultrafast temporally resolved pump-probe applications, especially for free-electron laser (FEL) and high-energy density (HED) experiments [3]. Presented here are some of first experimental measurements of betatron in the soft X-ray regime (<1 keV) using X-ray mirrors and a grating spectrometer to collect, transport, and focus betatron X-rays for pump-probe experiments at the LCLS Matter-in-Extreme Conditions (MEC) facility.

[1] O. Lundh et al., Nat. Phys. 2011
[2] S. Kneip et al., Nat. Phys. 2010
[3] F. Albert et al., PRL 2013

Will Schumaker
Stanford University

Date submitted: 24 Jul 2015 Electronic form version 1.4