Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Using Betatron Emissions from Laser Wakefield Accelerated Electrons to Probe Ultra-fast Warm Dense Matter JORDAN KOTICK, WILL SCHUMAKER, FLORIAN CONDAMINE, FELICIE ALBERT, BENJAMIN BARBREL, ERIC GALTIER, EDUARDO GRANADOS, ALESSANDRA RAVASIO, SIEGFRIED GLENZER, None — Laser wakefield acceleration (LWFA) has been shown to produce short X-ray pulses from betatron oscillations of electrons within the plasma wake. These betatron X-rays pulses have a broad, synchrotron-like energy spectrum and a duration on the order of the driving laser pulse, thereby enabling probing of ultrafast interactions. Using the 1 J, 40fs short-pulse laser at the Matter in Extreme Conditions experimental station at LCLS, we have implemented LWFA to generate and subsequently characterized betatron X-rays. Notch filtering and single photon counting techniques were used to measure the betatron X-ray spectrum while the spatial profile was measured using X-ray CCDs and image plates. We used an ellipsoidal mirror to focus the soft betatron X-rays for pump-probe studies on various targets in conjunction with LCLS X-ray and optical laser pulses. This experimental platform provides the conditions necessary to do a detailed study of warm-dense matter dynamics on the ultrafast time-scale.

Jordan Kotick
None

Date submitted: 23 Jul 2015 Electronic form version 1.4