Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

WDM production with intense relativistic electrons[1] JOSH COLEMAN, HEATHER ANDREWS, MARK KLASKY, JAMES COLGAN, TREVOR BURRIS-MOG, DAN CREVELING, LANL, CRAIG MILLER, DALE WELCH, Voss Scientific, MIKE BERNINGER, National Security Technologies — The production of warm dense matter (WDM) through collisional heating with intense relativistic electrons is underway. A 100-ns-long monochromatic bunch of electrons with energies of 19.1-19.8 MeV and currents of 0.2-1.7 kA is used to heat 100-μm-thick foils with Z <29. The principal objective of these experiments is to develop a controlled method of measuring the equation of state with particle beams and benchmark numerical models. Measurements indicate the formation of a warm dense plasma near the end of the pulse, which is on the order of the beam size. These plasmas expand 5 mm in the first microsecond and slow down to <0.5 mm/μs over the next 10 μs. These plasmas also produce both emitted and absorbed spectra amongst a continuum for Ti, Fe, and Cu. Cu-I spectra is dominated by stark broadening, indicating a cool plasma with $n_e > 10^{18}$ cm^{-3}. At these densities our plasma is collisionally dominated making it possible to spectrally model the density and temperature in LTE. Preliminary density gradient measurements will also be presented indicating the spatial extent of the solid density cutoff.

[1]This work was supported by the National Nuclear Se- curity Administration of the U.S. Department of Energy under Contract No. DE-AC52-06NA25396.

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Date submitted: 15 Jul 2016 Electronic form version 1.4