Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Characterization of x- and gamma- radiation in relativistically intense laser-solid interactions[1] BIXUE HOU, CALVIN ZULICK, ZHEN ZHAO, JOHN NEES, THOMAS BATSON, ANATOLY MAKSIMCHUK, ALEXANDER G.R. THOMAS, KARL KRUSHELNICK, University of Michigan, CENTER FOR ULTRAFAST OPTICAL SCIENCE TEAM — Using a high resolution ($\lambda/\Delta\lambda$>100) high purity germanium detector, the angular and material dependence, and the intensity scaling, of bremsstrahlung gamma radiation from relativistically intense (I>10^{18} W/cm^2) laser-solid interactions have been characterized at energies between 0.1 and 1 MeV with the high-repetition rate (500 Hz) Lambda-Cubed laser facility. The bremsstrahlung spectra of SiO_2, Mo, and Eu_2O_3 were observed to have two-temperature energy distributions, corresponding to two different groups of electrons and depending on both laser intensity and observation angle. The spectra and source sizes of hard x-radiation under 0.1 MeV are also studied. These x-ray sources are being developed for phase-contrast imaging.

[1]Support provided by DHS (EECS-0833499), AFOSR (FA99550-12-1-0310), ARO (W911NF-11-1-0116)

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Date submitted: 12 Jul 2013 Electronic form version 1.4