Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Simulation and Characterization of Gamma Ray Production by Petawatt Lasers Irradiating High-Z Solid Targets ALEXANDER HENDERSON, EDISON LIANG, PABLO YEPES, PETR CHAGUINE, Rice University, NATHAN RILEY, GILLIS DYER, SCOTT PENNINGTON, University Of Texas At Austin — On interaction with a solid target an ultra-intense short pulse high-energy laser, such as the Texas Petawatt Laser (TPW), accelerates a sub-pico-second burst of electrons into the target at high energies. These electrons then undergo bremsstrahlung, producing a beam of high-energy gamma rays. Even for mm thick gold targets, most of the bremsstrahling gamma rays escape, while many hot electrons do not. Here we attempt to characterize the angular distribution, energy spectrum and total yield of these gamma rays as produced by the TPW irradiating mm thick gold targets. GEANT4 Monte-Carlo simulation results are then fitted to the data and used to extrapolate the results beyond the limits of the measurements. We will also discuss potential applications of such intense gamma-ray beams.

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Date submitted: 20 Jul 2012 Electronic form version 1.4