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Simulation and Measurement of Ultra-intense, Short-Pulse Gamma Ray Production by Petawatt Lasers Irradiating High-Z Solid Targets ALEXANDER HENDERSON, EDISON LIANG, TAYLOR CLARKE, William Marsh Rice University, NATHAN RILEY, University of Texas At Austin, PETR SHAGIN, William Marsh Rice University, KRISTINA SERRATTO, 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 in Austin Texas, accelerates a sub-pico-second burst of electrons into the target at relativistic energies. These electrons then undergo bremsstrahlung, producing a beam of high-energy gamma rays. Even for mm thick gold targets, most of the bremsstrahlung 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 Texass Petawatt Laser irradiating mm thick gold and platinum targets using a combination of dosimeters, Filter Stack Spectrometers (FSS) and Forward Compton Electron Spectrometer (FCES). GEANT4 Monte-Carlo simulation results are then used to fit the data and 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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