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Numerical modeling of radiation physics in kinetic plasmas [III] - γ-ray transport via Bremsstrahlung in ultra-fast heated high Z matter[1]

RISHI PANDIT, YASUHIKO SENTOKU, University of Nevada Reno — Radiation transport code coupled with fully relativistic collisional Particle-in-Cell (PIC) code, PICLS, has been developed to study the transport of X-ray photons produced in laser-solid interaction. We have implemented the radiation cross-section of relativistic Bremsstrahlung to simulate γ-ray transport in ultrafast heated high Z matter by an intense short pulse laser. We discuss the laser energy dependence of the emission energy and the intensity dependence of the angular distribution of γ-rays. By solving the transport of hard X-rays we find that high energy photons emitted by relativistic electrons are co-moving with the electrons and they are intensified continuously. As a result the γ-rays have the signature of the fast electrons' temporal and spatial distribution. We also calculate the number of pairs by solving the Bethe-Heitler cross-section in the radiation transport simulation. Comparing the details of γ-rays via Bremsstrahlung and pair creations with varying laser intensities in simulations, we will discuss the laser parameters and the target conditions (material) to produce the higher yield.

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