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Gamma-ray emission in ultra-intense laser interaction with solid targets[1] ONDREJ KLIMO, JIRI VYSKOCIL, FNSPE, Czech Technical University in Prague, 11519 Prague, Czech Republic, DEEPAK KUMAR, Institute of Physics of the ASCR, ELI-Beamlines, Na Slovance 2, 18221 Prague, Czech Republic, JIRI LIMPOUCH, FNSPE, Czech Technical University in Prague, 11519 Prague, Czech Republic, STEFAN WEBER, Institute of Physics of the ASCR, ELI-Beamlines, Na Slovance 2, 18221 Prague, Czech Republic — Electrons moving in ultra-intense laser fields emit hard radiation due to radiation reaction and non-linear Compton scattering. Multi-MeV γ-rays were measured by scattering of electrons generated from laser wakefield with a focused laser of intensity $a_0 \sim 1$. However, non-linear Compton scattering and radiation reaction is also an efficient mechanism for generating copious amount of γ-rays in laser interaction with solids at intensities approaching $\sim 10^{22}$ W/cm^2. Emission of γ-rays due to radiation reaction and bremsstrahlung are investigated here in the high intensity regime of laser-solid target interaction by using a combination of Particle-in-Cell and Monte Carlo radiation transport simulations. The relative contribution of these processes is analyzed as a function of the target parameters. We concentrate on the influence of the target thickness, material, preplasma conditions or a surface structure on the generation of high energy photons and study separately their energy and angular distributions. It is demonstrated that the presence of preplasma or a special surface structure may significantly enhance emission of hard γ photons and their cut-off energy and change their angular distribution.

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