Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

High power gamma flare generation in multi-petawatt laser interaction with tailored targets KIRILL LEZHNIN, Princeton University, DANILA KHIKHLUKHA, ELI-Beamlines, ILIA TSYGVINTSEV, VLADIMIR GASILOV, Keldysh Institute of Applied Mathematics, PAVEL SASOROV, GEORG KORN, SERGEI BULANOV, ELI-Beamlines — Using quantum electrodynamics particle-in-cell simulations, we optimize the gamma flare (γ-flare) generation scheme from the interaction of high power petawatt-class laser pulse with tailored cryogenic hydrogen target having extended pre-plasma corona. We show that it is possible to generate an energetic flare of photons with energies in the GeV range and total flare energy being on a kilojoule level with the efficient conversion of the laser pulse energy to γ-photons. We discuss how the target engineering and laser pulse parameters influence the γ-flare generation efficiency. High-Z targets, the oblique incidence of the laser pulse, and the effects of realistic pre-plasma obtained by hydrodynamical simulations are also discussed. This type of experimental setup for laser-based γ source would be feasible for the upcoming high power laser facilities.

Kirill Lezhnin
Princeton University

Date submitted: 02 Jul 2019 Electronic form version 1.4