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## Electron-positron pairs beaming in the Breit-Wheeler process

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Direct production of electron-positron pairs in photon collisions is one of the basic processes in the Universe. The electron-positron production  $\gamma + \gamma \rightarrow e^+ + e^-$  (linear Breit-Wheeler process) is the lowest threshold process in photon-photon interaction, controlling the energy release in Gamma Ray Bursts, Active Galactic Nuclei, black holes and other explosive phenomena [1]. It is also responsible for the TeV cutoff in the photon energy spectrum of extra-galactic sources. The linear Breit-Wheeler process has never been clearly observed in laboratory with important probability of matter creation [2].

Thanks to the recent progress in high-power laser sources it will be possible to create compact sources of intense  $\gamma$ -ray beams (few MeV) and to use them in new experiments allowing to observe and study the BW process in laboratory [3]. In this presentation, based on the kinematics of two photon collisions, we study the  $e^+ - e^-$  beam properties. In particular, we demonstrate a possibility for beaming of  $e^+ - e^-$  pairs in one particular direction, which may strongly facilitate the observation of the BW process [4]. We show that the pair beaming effect depends on the angle between photon beams and the energy of each beam. Moreover, the numerical simulations with the photon collision code TriLens [5] are in good agreement with the analytical model. Simulation results obtained with TriLens using optimized gamma beams to prepare experiments on future ultra-high intensities lasers like Apollon will be presented. With higher photon beam energies (>100 MeV) the beaming effect can be observed also for muon-pairs creation.

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