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Final state electromagnetic interaction of electrons and positrons with heavy nuclei in ultra-peripheral ultra-relativistic heavy-ion collisions

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The photon-photon interaction in ultra-relativistic heavy-ion collision is a source of the (e^+, e^-) pairs. The photon-photon fusion leads to the lepton creation in the broad configuration space around ''collision" point. Those created close to heavy nuclei may undergo strong interaction with them.
The impact parameter space distributions of electrons and positrons are calculated within the b-space EPA model and Wigner-function approach. The evolution due to the electromagnetic final state interaction (FSI) of (e^+, e^-) with nuclei is studied, and the distortion of rapidity and transverse momentum distributions are shown. Part of the analysis is independent of the production model (initial condition).

We show first exploratory results for the reaction Pb+Pb at $\sqrt{s_{NN}} = 17.3$˜GeV (SPS) and 200˜GeV (RHIC) energies. We provide results for selected creation points and when integrating over their position as dictated by the b-space EPA model. We observe a strong influence at low transverse momenta, so far not measured regions of the phase space. In particular, we predict a possible sizeable accumulation of electrons with rapidities close to the beam rapidity. The EM effects lead to asymmetry in the production of electrons and positrons.

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