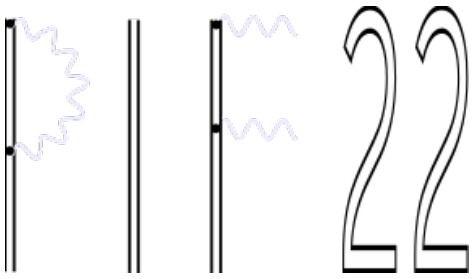

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New and old physics in the interaction of a radiating electron with the extreme electromagnetic field

Thursday 1 September 2022 09:20 (25 minutes)

We show that an all-optical configuration of the laser-electron collision in the λ^3 configuration based on 10 PW-class lasers presents a viable platform for reaching the range of parameters where a perturbative QED in strong external electromagnetic field breaks. This case is contingently referred to as a case of the non-perturbative QED, and this range of parameters is the intriguing goal from an experimental point of view because of a possible manifestation of a new physics of the interaction of a highly radiating particle with a strong electromagnetic field. We show that the strong-field region can be reached by electrons having initial energy higher than 50 GeV. Our theoretical considerations are in agreement with three-dimensional particle-in-cell simulations. While increasing of the electron energy raises the number of electrons experiencing the strong-field region, the observable signature of photon emission radiative correction in the strong field is expected to fade out when the electron energy surpasses the optimal value. This threshold of electron energy is identified and the parameters for achieving the non-perturbative limit of QED are provided.

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