Strong Signature of One-Loop Self-Energy in Polarization Resolved Nonlinear Compton Scattering

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The development of modern ultra-intense laser facilities brings about new possibilities for testing predictions of strong-field quantum electrodynamics (QED) theory. Recently, investigations on polarization dynamics of electrons in ultra-intense laser fields have drawn much attention since it can be utilized for the generation of polarized lepton sources [1-4] and for the observation of QED radiative correction effects [5,6]. In this talk, I will present one of our new works aiming at identifying the signals of the leading QED loop corrections in the spin polarization of electrons interacting with an ultra-strong laser field. While electron polarization emerges mostly due to spin-flips at photon emissions, there is a nonradiative contribution to the polarization which stems from the one-loop QED radiative corrections to the self-energy. I will discuss the signature of the nonradiative contribution based on Monte Carlo simulations, employing the radiation-dominated reflection regime of the interaction. This signature is robust with respect to the laser and electron parameters and amenable for experimental detection with current technology.

References

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