Nonlinear Electron-Positron Pair Production in Strong Oscillating Electric Fields and Intense Photon-Beam Collisions

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The generation of electron-positron pairs in very strong electromagnetic fields is studied theoretically. In a first setup, the pairs are assumed to be created by high-energy bremsstrahlung photons colliding with an intense laser pulse. Total pair yields, energy spectra and angular distributions are discussed for field intensities ranging from the perturbative to the nonperturbative interaction regimes [1-3]. Corresponding experiments are currently planned in various laboratories worldwide. Besides, we consider pair production in strong bichromatic electric fields oscillating in time. The dependence of the process on the relative phase between the field modes is analyzed by the method of phase-of-the-phase spectroscopy that has recently been developed in strong-field atomic physics. The corresponding spectra are shown to exhibit characteristic structures in the form of checkerboard patterns whose physical origin is discussed [4].

References

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