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Radiation effects and radiation back reaction in strong and QED-strong pulsed laser fields IGOR SOKOLOV, Space Physics Research Lab., U of M, Ann Arbor, MI 48109, STEPAN BULANOV, FOCUS Center, U of M, Ann Arbor, MI 48109 , NATALIA NAUMOVA, LOA, UMR 7639 ENSTA, Ecole Polytechnique, CNRS, 91761 Palaiseau, France, JOHN NEES, VICTOR YANOVSKY, FOCUS Center, U of M, Ann Arbor, MI 48109 — A particle counter-propagating in strong laser field may experience QED strong field, as long as the energy associated with its motion is sufficiently high. An electric field may be considered to be QED-strong if it exceeds the Schwinger limit: $E>m^2c^3/eh$. Counter-propagating electrons can be generated in the course of strong laser pulse interaction with a solid target, so that QED effects become both macroscopic and significant, at high laser intensities. A correlated example exists in close proximity to a pulsar, where a QED-strong electric field may be exerted by relativistic charged particles, gyrating in the strong magnetic field of a neutron star, as the result of the Lorentz transformation of the electromagnetic field. We offer a model which is based on a numerical procedure to solve the Lorentz-Abraham-Dirac equation, with the self-force, in a classical limit, with QED corrections derived from the solution of the Dirac equation, for QED-strong fields. The QED effects are included into a kinetic physical and PIC numerical model via the effective interaction integral, quantitatively accounting for the electron and positron interactions with virtual photons.

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