

Abstract Submitted
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Photon-photon scattering in vacuum and astrophysical plasmas G. BRODIN, Umea University — We present for the first time the nonlinear dynamics of quantum electrodynamic (QED) photon splitting in an electron-positron plasma that is held in a super-strong magnetic field. Such plasmas exist in magnetars, and may also arise in the next generation laser-plasma experiments. By using a QED corrected Maxwell equation, we derive a set of equations that show the existence of nonlinear couplings between electromagnetic (EM) waves due to nonlinear plasma currents and QED polarization and magnetization effects. Numerical analyses of our coupled nonlinear EM wave equations reveal the possibility of a new decay interaction, as well as new features of energy exchange among the three EM modes that are nonlinearly interacting in a magnetized pair plasma. Applications of our investigation to astrophysical settings, such as magnetars, are pointed out.

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