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Effect of radiation reaction on charged particle dynamics moving in an intense electromagnetic wave

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The exact solution of Landau-Lifshitz equation of motion for a charged particle moving in an intense electromagnetic wave shows that the particle, on average, gains energy over a period of time [1]. This result has been recently derived for a charged particle placed in an electromagnetic wave, where the authors have derived an analytical expression for four-velocity of the particle [1-2]. In the present work, we have generalized the above calculations for an elliptically polarized light and an exact expression for four-position for the particle has been derived. We have further compared the energy gain calculated using the Landau-Lifshitz equation of motion with other equations viz. Hartemann equation of motion [3] and Ford-O-Connell equation of motion [4]. It is found that the energy gain is independent of the chosen model equation.

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