

Abstract Submitted
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Exploring Ultrahigh-Intensity Laser-Plasma Interaction Physics with QED Particle-in-Cell Simulations¹ S. V. LUEDTKE, Los Alamos National Laboratory, Univ of Texas, Austin, L. YIN, Los Alamos National Laboratory, L. A. LABUN, Univ of Texas, Austin, B. J. ALBRIGHT, D. J. STARK, R. F. BIRD, W. D. NYSTROM, Los Alamos National Laboratory, B. M. HEGELICH, Univ of Texas, Austin — Next generation high-intensity lasers are reaching intensity regimes where new physics—quantum electrodynamics (QED) corrections to otherwise classical plasma dynamics—becomes important. Modeling laser-plasma interactions in these extreme settings presents a challenge to traditional particle-in-cell (PIC) codes, which either do not have radiation reaction or include only classical radiation reaction. We discuss a semi-classical approach to adding quantum radiation reaction and photon production to the PIC code VPIC. We explore these intensity regimes with VPIC, compare with results from the PIC code PSC, and report on ongoing work to expand the capability of VPIC in these regimes.

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