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Ultrafast Polarization of an Electron Beam in an Intense Bi-chromatic Laser Field D. SEIPT, Center for Ultrafast Optical Science, University of Michigan, Ann Arbor, Michigan 48109, USA, D. DEL SORBO, High Energy Density Science Division, SLAC National Accelerator Laboratory, Menlo Park, CA 94025, USA, C. P. RIDGERS, York Plasma Institute, Department of Physics, University of York, York YO10 5DD, United Kingdom, A. G. R. THOMAS, Center for Ultrafast Optical Science, University of Michigan, Ann Arbor, Michigan 48109, USA
— Recent high-intensity laser-plasma experiments provided evidence for quantum radiation reaction effects due to hard photon emission. In this talk I will discuss the radiative spin-polarization of the electrons as a manifestation of quantum radiation reaction affecting the spin-dynamics. It is demonstrated that radiative polarization of high-energy electron beams can be achieved in collisions with bi-chromatic laser pulses, by employing both a Boltzmann kinetic approach and a Monte-Carlo algorithm within the quasi-classical approximation of intense field QED. I will present simulations for a near-term experimentally feasible scenario of a 8 GeV electron beam scattering from a 1 PW laser pulse. Aspects of spin dependent radiation reaction are also discussed, with spin polarization leading to a measurable splitting of the energies of spin-up and spin-down electrons.

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