

Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Three-dimensional theory of nonlinear Thomson scattering
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ARTHUR KERMAN, MIT — A fully relativistic, three-dimensional code, tracking multiple electrons interacting with the electromagnetic field distribution of an intense laser pulse propagating paraxially in vacuum, has been developed to predict their radiation characteristics, within the context of classical Thomson scattering (no recoil). A 4th-order Runge-Kutta algorithm tracks the electron dynamics over 2^n steps, and is coupled to an FFT to provide fast, efficient simulations, with highly enhanced spectral dynamic range. It is found that, in addition to the well-known radiation pressure downshift and transient harmonics characterizing nonlinear Thomson scattering, the spectral lines are broadened inhomogeneously by the nonlinear ponderomotive pressure acting on the electrons during the interaction. These effects can significantly degrade the spectral purity of laser-linac-based light sources; a scheme devised to alleviate this problem will be presented. This work was performed under the auspices of the U.S. Department of Energy by University of California Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.

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Date submitted: 24 Jul 2006

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