

Abstract Submitted
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Nonlinear dephasing and brightness optimization in Compton scattering¹ SHELDON WU, FREDERIC HARTEMANN, Lawrence Livermore National Laboratory — In Compton scattering light sources, a laser pulse is scattered by relativistic electrons to generate tunable x and gamma rays. Due to the inhomogeneous nature of the incident radiation, the relativistic Lorentz boost of the electrons is modulated by the ponderomotive force during the interaction, leading to intrinsic spectral broadening and brightness limitations. These effects are discussed, along with an optimization strategy to account for the laser bandwidth, diffraction, and nonlinear ponderomotive force. It is found that the maximum brightness is obtained when pulse duration and diffraction effects are balanced, and one operates near the onset of the weakly nonlinear ponderomotive dephasing.

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