

Abstract Submitted  
for the DPP11 Meeting of  
The American Physical Society

**Fundamental limits on the brightness of Compton scattering light sources**<sup>1</sup> FRED HARTEMANN, FELICIE ALBERT, SHELDON WU, LLNL — Fundamental limits on the brightness of Compton scattering light sources are studied by considering the interaction of a single electron with a fully 6-dimensional, Fourier transform-limited incident laser phase space in the weakly nonlinear regime [1]. It is shown that the number of scattered photons and the nonlinear dephasing due to the ponderomotive force in the laser field both scale as the square of the normalized vector potential and the normalized effective interaction length; this fundamentally limits the spectral brightness of the source. Mitigation strategies are proposed, based on optimum temporal and transverse laser shaping. Implications for practical design of Compton scattering light sources are outlined.

[1] F.V. Hartemann, *et al.*, Phys. Rev. Lett. 105, 130801 (2010)

<sup>1</sup>This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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Date submitted: 18 Jul 2011

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