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Linear and nonlinear Thomson scattering from the PHOENIX x-ray source

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Development of advanced x-ray sources based on the laser-Thomson scattering mechanism is becoming important pushed by a strong demand for ultrashort hard x-ray pulses. These can serve as a tool for structural analysis of complex systems with unprecedented temporal and spatial resolution. We explored the spectral shape and bandwidth of the x-ray beam as a result from the interaction of electron and laser beam. The intensity dependence of the backscattered photon spectrum is investigated and compared to full-physics 3D ab-initio simulations. The realization of a non-linear Thomson scattering source qualifies as an initial step towards strong field physics research.

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