

Abstract Submitted
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Resonant propagation of x-rays from linear to nonlinear regimes¹

KAI LI, University of Chicago, PHAY HO, Argonne National Laboratory, LINDA YOUNG, University of Chicago, Argonne National Laboratory, METTE B GAARDE, Louisiana State University, MARIE LABEYE, cole Normale Suprieure — The modification of strong x-ray fields propagating through a resonant medium of gaseous neon is studied via simulation. The simulation is based upon the solution of a 3D time-dependent Schrodinger-Maxwell equation, with the incident x-ray photon energy on resonance with 1s-3p transition. We solved for the evolution of the combined incident and medium-generated fields – which includes stimulated emission, absorption, ionization and Auger decay, as a function of the input pulse energy and duration. Self-induced transparency and self-focusing of strong x-ray free-electron laser (XFEL) pulses were revealed. These effects are important to understand and potentially applicable as control variables for XFEL pulse properties. Pulse reshaping and spectral modulation is also of interest for x-ray optics and spectroscopy.

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