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Simulations on strong field driven XUV attosecond pulse amplification

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Abstract: We present a theoretical study motivated and supported by experimental data on gas amplifiers driven by intense femtosecond laser pulses combined with XUV attosecond pulse trains. We identify different physical processes taking part in the interaction and show that x-ray parametric amplification dominates over others. In particular, we identify strong-field mediated intra-pulse parametric processes and XUV-mediated recombination at the single-atom level. Electron trajectories initiated by ionization of ions with 200 as XUV pulses in the presence of a strong IR pulse are investigated classically and with TDSE simulations. Absorption and gain of the XUV pulses is shown to critically depend on the relative delay between the XUV and IR pulses and the particular geometry of the system. Ongoing research might be a guide to achieve exponential growth of the signal in tabletop XUV lasers and used as a convenient seed in fully coherent plasma x-ray amplifiers.

References:

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