

Abstract Submitted
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Resonant attosecond transient absorption and photoelectron spectra of argon¹ COLEMAN CARIKER, University of Central Florida, FL, USA, EVA LINDROTH, Stockholm University, Stockholm, SE, EU, LUCA ARGENTI, University of Central Florida, FL, USA — Technological advances with ultrafast lasers make it possible to probe the dynamics of metastable electronic wavepackets in atoms and molecules with a temporal resolution shorter than the excited states' lifetime. Here, we use an ab initio time-dependent close-coupling method [1] to simulate the electron dynamics in an argon atom excited by weak extreme ultraviolet pump pulses and dressed by weak to moderately strong infrared pulses. We study how electron dynamics manifests itself in the transient absorption and photoelectron spectrum of the atom as a function of the parameters of the pump-probe pulse sequence. From the ab initio calculations, we also extract the radiative couplings between the essential states of the atom, which we use in a finite-pulse multiphoton extension of Fano's formalism [2][3] to simulate the pump-probe spectra analytically. Such model calculations allow us to study how to control the population, phase and lifetime of argon's bright autoionizing states via their radiative coupling to other metastable states, or to the continuum, at a considerably smaller computational cost than with full-fledged ab initio simulations. [1] L Argenti et al, PRA 105, 053002 (2010). [2] A. Jiminez-Galan et al, PRA 93, 023429 (2016). [3] U. Fano, Phys Rev 124, 1866 (1961).

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