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Absorption of Attosecond Pulses by Laser-dressed Atoms SHAOHAO CHEN[1], METTE B. GAARDE, KENNETH J. SCHAFER, Department of Physics and Astronomy, Louisiana State University, Baton Rouge, LA 70803, USA — We study the transient absorption of attosecond pulses by IR-laser-dressed He atoms using both single-atom and macroscopic methods [1]. In the case of an attosecond pulse train, we report for the first time a quarter-cycle modulation (mixed with the well-known half-cycle modulation [2-4]) in the absorption as a function of time delay, indicating that high-order couplings between the harmonics can be obtained by modifying parameters of laser and gas medium. We also find that the absorption probability is tied to resonant laser-dressed atomic states, and the timing of absorption is sensitive to laser parameters and reshaping of the attosecond pulses. In the case of a single attoseond pulse, we exhibit the attosecond time-scale evolution of the absorption probability as well as that of the AC Stark shift [5]. We find a light-induced state formed by a resonant two-photon absorption process. We also find electron wavepacket interference between two quantum path ways into the continuum (direct and via bound states) [6].

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