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Attosecond Delays in Resonant Photoionization

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Attosecond delays in the photoionization of atomic states have been evidenced in recent experiments performed in the 2010's [1, 2]. The delays were associated to the emission of photoelectron wave packets ejected from different atomic states, in the combined presence of attosecond pulses of XUV radiation and of a synchronized IR laser pulse, the latter being used as a reference "clock" [3]. These experiments were performed at XUV frequencies connecting the ground state to a "flat" continuum. Theoretical treatments were able to relate the measured delays to Wigner's definition of time delays in terms of the energy derivative of the phase-shift attached to the continuum wave functions of the photoelectrons [4]. Attention has recently shifted towards the case of resonant photoionization in the course of which the XUV frequency is tuned close to a resonance of the target system. The case of a transition towards an autoionizing states of the target is particularly interesting as it makes evident the role of electronic correlations [5]. Here, we shall present recent advances realized in the theoretical interpretation of this new class of experiments.

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