

Abstract Submitted
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XUV – UV spectroscopy in atoms and molecules. GABRIEL KARRAS, Rutherford Appleton Laboratory — A novel experimental approach employing XUV and UV femtosecond pulses is presented and applied to the study of ultrafast physical processes in atomic and molecular targets in the gas phase. In particular, we report on the resonant pulse propagation of XUV pulses in He atoms and on the photoemission time delay of nitrogen molecules. The propagation of light pulses with a spectrum containing resonant frequencies with the propagating medium can significantly reshape the pulse envelope, as long as the pulse duration is shorter than the lifetime of the excited states. Here we discuss the macroscopic propagation of a resonant XUV attosecond pulse train, APT, using photoelectron spectroscopy experiments. Our measurements show how the XUV propagation induces a phase accumulation that leads to a chirp of the emitted electron wave-packets on the attosecond timescale and to time-dependent structures on femtosecond timescale. Taking advantage of the limited spectral congestion provided by our scheme we also applied it on a molecular target and we demonstrated its applicability in the study of photoemission time delays. Specifically we report on the relative photoemission time delay from the first two bound states of N_2^+ , namely A and X.

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