The impact of electron–electron correlation in ultrafast attosecond single ionization dynamics

K.M. Ziems, F.G. Fröbel, A. Schubert, S. Gräfe

The attosecond ultrafast ionization dynamics of correlated two- or many-electron systems have, so far, been mainly addressed investigating atomic systems. In the case of single ionization, it is well known that electron–electron correlation modifies the ionization dynamics and observables beyond the single active electron picture, resulting in effects such as the Auger effect or shake-up/down and knock-up/down processes. In this talk, I will extend these works by discussing the attosecond ionization of a molecular system involving correlated two-electron dynamics, as well as non-adiabatic nuclear dynamics. Employing a charge-transfer molecular model system with two differently bound electrons, a strongly and a weakly bound electron, one can distinguish different pathways leading to ionization, be it direct ionization or ionization involving elastic and inelastic electron scattering processes. I will show that different pathways result in a difference in the electronic population of the parent molecular ion, which, in turn, involves different subsequent (non-adiabatic) post-ionization dynamics on different time scales.

F.G. Fröbel et al., *J. Phys. B : At. Mol. Opt. Phys*. **2020**, in print; DOI: /10.1088/1361-6455/ab8c21