

RABBIT-like Experiments with molecules

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The measurements of photoionization time-delays in molecules via e.g. the so called RABBIT scheme provide information about the intra-molecular dynamics and structure on very short time-scales. Very often, however, it is not even clear which excitation pathways are involved or, in other words, how the photons, XUV and/or IR, get absorbed by the molecule. At the first glance this sounds like an unwanted complication, but it also offers a unique possibility to investigate correlated two- or many electron transitions in a time-resolved manner. A few more general examples will be presented, and for the smallest molecule H₂ a more detailed analysis will be discussed. For the latter case in particular the potential of creating fully entangled two-electron states at will by means of combined XUV and IR pulses are demonstrated, which may serve as a new tool for controlling ionization and fragmentation of molecules