CFEL SCIENCE

SEMINAR

28th May 2015 - 10:00 h

CFEL – Building 99, seminar room I+II (ground floor)

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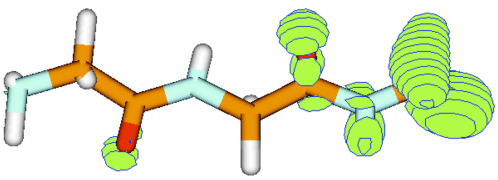
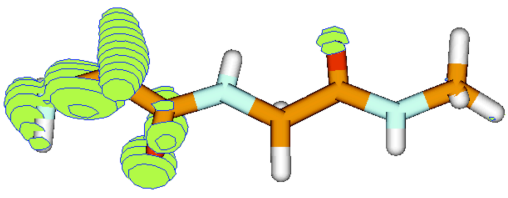
Ultrafast correlation-driven electron dynamics and their control: Facts and fiction

Exposing molecules to ultrashort laser pulses can trigger pure electron dynamics in the excited or ionized system. The positive charge created upon ionization of a molecule can migrate throughout the system on a few-femtosecond time scale solely driven by the electron correlation and electron relaxation. Charge migration triggered by ionization appeared to be a rich phenomenon with many facets that are rather characteristic of the molecule studied. Results from ab initio calculations on different systems will be presented and the mechanisms underlying the charge migration will be analyzed in terms of simple models. The importance of the phenomenon and the possibilities for its experimental verification will also be discussed. Due to the coupling between the electronic and the nuclear motion, the control over the pure electron dynamics offers the extremely interesting possibility to steer the succeeding chemical reactivity by predetermining the reaction outcome at a very early stage. A way to control the charge migration by appropriately tailored femtosecond laser pulses will be presented and the consequences of the application of such a scheme will be discussed.



Hole density at t = 0



Hole density after 6 fs

Host: Terry Mullins / CFEL Molecular Physics Seminar