Extreme ultraviolet probing of energy-conversion in photoexcited states

Initiative: Lichtenberg - Professuren

Bewilligung: 23.08.2015

Laufzeit: 5 Jahre

Projekt-Website: exp-quantum.org

The professorship aims at a fundemantal study of selectivity and efficiency in photoenergy conversion, which is a basic requirement for biological function. Although light contains no information on how its energy can be used, many molecules transform light energy selectively into particular degrees of freedom like heat, chemical bond change or charge transfer. The answer to selectivity and efficiency thus must be encoded in the photoexcited state of matter. The dynamical processes will be studied that happen on the photoexcited state during the decisive timescale for chemical change, which lies in the femtosecond regime. Conceptually simple systems will be analyzed with highly selective experimental spectroscopic tools and combined with advanced quantum chemical theory. The method of choice is time-resolved photoelectron and transient grating spectroscopy using high photon energies for the probing of the photoexcited dynamics. This will enable to follow the complete relaxation pathway during the energy conversion. The high photon energies will allow for element selective probing of electronic and nuclear dynamics, which increases the spatial resolution to the atomic scale. The final goal will be reached when a picture of the photoenergy conversion in the three demonstrated cases will be elaborated.

Projektbeteiligte

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Open Access-Publikationen

Following excited-state chemical shifts in molecular ultrafast x-ray photoelectron spectroscopy
Ultrafast Photo-Ion Probing of the Ring-Opening Process in Trans-Stilbene Oxide
Probing ultrafast */n * internal conversion in organic chromophores via K-edge resonant absorption