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Ultrafast Dynamics in Chiral Systems (extension and completion)

Initiative: Forschung mit Freie-Elektronen-Lasern: Peter Paul Ewald-Fellowships am LCLS in Stanford

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Laufzeit:

Projekt-Website: www.uni-kassel.de/fb10/institute/physik/forschungsgruppen/funktionale-duenne-schichten-physik-mit-synchrotronstrahlung/mitglieder-ag-ilchen.html

The handedness (chirality) of molecular structures has been challenging science for decades. Chirality is defined as the distinguishability of a system and its mirror image, as illustrated by the left and right hand. Besides its importance for living organisms, handedness can also be found in fundamental chemical and physical properties and processes. An important tool for the investigation and control of chirality are circularly polarized photons since they too possess a handedness. Recently, ultrashort, ultraintense and circularly polarized light pulses generated by free-electron lasers became available for dynamic chirality studies. During this project polarization diagnostics as well as temporal diagnostics will be advanced in order to probe chemical functions on ultrafast timescales in chiral molecules. The method of chiral quantification via photoionization of inner shell and valence electrons, i.e. photoelectron circular dichroism, is used since it typically yields much larger effect strength than normal circular dichroism. Transient studies during photolysis will be performed to observe chiral dynamics. Further, investigation and control of spin originated chiroptical processes are planned. A better understanding of fundamental processes and charge dynamics in chiral molecules is of prime importance to facilitate a biologically (and therefore also pharmaceutically) relevant approach on chirality control via mechanisms of ultrafast charge migration.

Projektbeteiligte

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Open Access-Publikationen

Symmetry Breakdown of Electron Emission in Extreme Ultraviolet Photoionization of Argon
Site-specific Interrogation of an Ionic Chiral Fragment During Photolysis Using an X-ray Free-Electron Laser
Mapping resonance structures in transient core-ionized atoms