Physikalisches Institut
Fakultät für Mathematik und Physik
Albert-Ludwigs-Universität Freiburg

IRTG-Seminar

Dr. Oleg Kornilov

Max-Born-Institut, Berlin

"Electronic structure and relaxation of solvated organic molecules studied by XUV time-resolved photoelectron spectroscopy"

Photoactivated processes play an important role in many biological systems from human vision to light-haresting complexes. Often, the very first step in the dynamics following the absorption of a photon are structural rearrangements, which strongly deepend on the environment of the chromophore molecule. These initial relaxation processes, such as isomerization of retinal in case of vision, have been extensively studied by all-optical time-resolved techniques. However, time-resolved photoelectron spectroscopy, one of the most direct methods for studies of elecronic structure relaxation, which promises an unprecedented time resolution, have not been demonstrated. Here we implement TRPES of organic molecules using wavelength-selected XUV pulses from high-order harmonic generation and the microliqid jet technology. We are able to record static photoelectron spectra of several organic molecules and follow relaxation dynamics of one of them, Quinoline Yellow, with the time resolution of 45 fs. This molecule was recently suggested to exhibit an excited state proton transfer (ESPT) from a nitrogen to an oxygen atom. Relaxation timescales obtained in our experiment are consistent with this proposal, but the process seems to be faster in water, than in non-polar solvents. Our results also suggest ultrafast solvent rearrangement following significant change of the molecular dipole upon electronic excitation.

Tuesday, July 10, 2018; 6:00 p.m., HSII
Physics high rise, Hermann-Herder-Str. 3

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