

With about 25.000 students the University of Kassel is a young, modern and vibrant university in the center of Germany, characterized by its openness to new ideas. It has an unconventional profile with fields of expertise in nature, technology, culture and society.

The Institute of Physics has become a powerhouse in fundamental research, with many international and internationally renowned groups in the fields of AMO physics and nanoscience. Testament to that are flagship collaborative research centers on the microscopic and quantum mechanical understanding of chiral molecules (ELCH) and on interdisciplinary nanostructure science and technology (CINSaT).

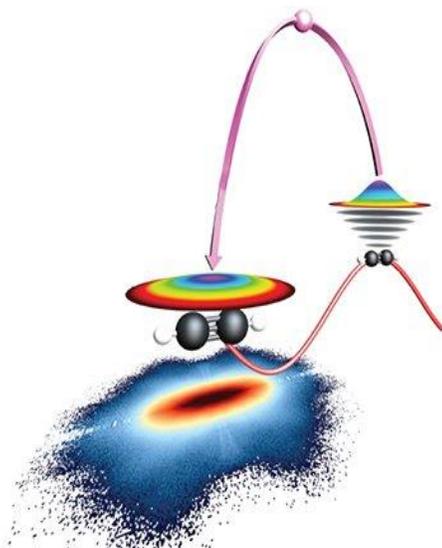
The new research group “Structural Molecular Dynamics” of Prof. Jochen Mikosch is looking for a

## PhD student (m/f/d).

Salary according to TV13/2.

### Job profile:

In our group we investigate the evolving structure in molecular and chemical dynamics on ultrafast timescales with methods adapted from attosecond ( $10^{-18}$ s) science. Processes on these unprecedented timescales represent one of the major new frontiers in contemporary physics.



We are offering a fully funded **PhD project in physics** dedicated to the **experimental investigation of laser-driven electron rescattering in molecules**. In this process, a single electron is extracted from a molecule by laser-induced tunnel ionization, accelerated in the strong infrared field of the laser and driven back to its origin within a fraction of the optical cycle (see image), where it can elastically scatter. Due to the well-defined source of the electron and the locking of the process to the optical laser cycle a high current is achieved at the location of the molecule, comparable to a conventional electron beam. Hence, from analysis of the diffracted, energetic electrons structural information on the molecule can be obtained, such as in conventional electron diffraction, but now with inherent time resolution. Laser-Induced Electron Diffraction (LIED), often described by self-imaged of a molecule by one of its own electrons, is one of the most promising emerging techniques to make the molecular movie. LIED is capable of recording structural changes in molecules, for instance during a chemical reaction, in real time.

We are looking for a PhD student (m/f/d), to join our team and lead the following scientific projects:

- Test a recently published, generalized model of laser-driven rescattering.
- Investigate frustrated tunneling ionization, in which the tunneling electron is re-captured into a Rydberg state.
- Explore the sensitivity of laser-driven electron rescattering to the chirality of molecules.
- Follow time-resolved dynamics using electron rescattering in a pump-probe experiment.

The position is fully funded by the Deutsche Forschungsgemeinschaft (DFG). The project involves setting up a state-of-the-art Reaction Microscope to detect the momentum of photoions and -electrons in coincidence.

### Requirements:

We are looking for a highly motivated PhD student (m/f/d) holding a Master degree in physics or a related field. Previous experience with molecular physics, ultrafast laser technology, and ion/electron spectroscopy is a plus, but not mandatory.

For further information, applications & inquires please contact **Prof. Dr. Jochen Mikosch**, [mikosch@uni-kassel.de](mailto:mikosch@uni-kassel.de).