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.

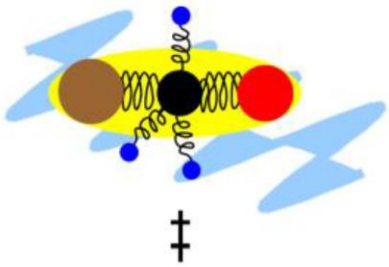
The Institute of Physics has become a powerhouse in fundamental research, with many international and internationally renowned groups in the fields of AMO physics and nanoscience. Testament to that are flagship collaborative research centers on the microscopic and quantum mechanical understanding of 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 **PhD project** dedicated to the **time-resolved structural imaging of chemical dynamics** within a project recently awarded with a prestigious Consolidator Grant by the European Research Council (ERC).

In a chemical reaction two molecules come so close that bonds between atoms are broken and new bonds are formed. The configurations during the chemical transformation, being neither reactants nor products, are called the transition state. Efforts to depict the structural transformations during chemical reactions have thus far fallen short due to a conceptual experimental problem: The start-time dilemma. In conventional samples the reactants are distributed over a wide range of spatial configurations and even with an ultrashort laser pulse there is no external control over the precise moment when a reaction takes place. We aim to solve this dilemma by bringing together two key ingredients: First, reaction partners are held closely together, in a well-defined initial configuration, within a reaction precursor. Such a complex allows initiating the chemical reaction at a defined time with a femtosecond laser pulse. Moreover, the tunable wavelength of the laser pulse allows controlling the speed with which the two reactions partners encounter each other. Second, as a function of delay after the initiating laser pulse, the three-dimensional structure of the transition state is imaged with Coulomb Explosion Imaging. Coulomb explosion is a tool from the toolbox of Attosecond Science: Within a very short time the binding electrons are removed with a second laser pulse such that the positively charged atomic fragments repel each other. An experimental determination of the fragment momenta in coincidence allows constructing the evolving chemical structure.

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

- Perform a time-resolved Coulomb explosion study on a neutral target in a lab-based reaction microscope.
- Participate in experiments at an X-ray Free Electron Laser user facility, within international collaborations.
- Built a dedicated experimental setup to produce a molecular ion target.
- Perform a first experiment on time-resolved bimolecular chemical reaction dynamics.

The position is fully funded by the European Research Council (ERC).

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.