

In the group of Molecular- and Nanophysics (www.nanophysics.uni-freiburg.de)
we are looking for motivate students for a



Bachelor/Master/Teacher Graduate Thesis

interested in exciting projects in the field of

Femtosecond Dynamics in Helium Droplets

The project aims at studying photo-initiated dynamics of atoms, molecules and clusters attached to superfluid helium nanodroplets. The unique properties of He nanodroplets, the superfluidity and the capability to capture and cool down dopants to milliKelvin temperatures makes helium isolation spectroscopy (HENDI) an excellent technique to study quantum chemical dynamics in fine details. A pump-probe setup in combination with a velocity map imaging (VMI) electron spectrometer and a time-of-flight (TOF) mass spectrometer enables us to trace the complex dynamics happening upon electronic excitation or ionization with femtosecond time. In particular, our focus is on the tracking of charge transfer processes inside organic molecules, gaining a detailed understanding of guest-host interactions between the He droplet and the attached dopant. In combination with simulations done in collaboration with theoreticians, the complex response of the superfluid He environment and the dopant can be efficiently traced back.

Experiments involving IR, UV or EUV radiation created by second and third harmonic generation will be realized. In addition to that, we are currently developing a VUV source which allows us to trace the dynamics of cations as well as of neutral species. The project aims at a better understanding of many-body quantum phenomena such as superfluidity and quantum vortex formation.

We are looking for BSc and MSc students who are highly motivated to work in the field of experimental Atomic and Molecular Physics. Different projects are possible which could include working with the He droplet beam apparatus, with ultrafast laser systems and in nonlinear optics.



The project is linked to the DFG-funded International Research Training Group (IRTG 2079) "Cold Controlled Ensembles in Physics and Chemistry" (<http://www.irtg-coco.uni-freiburg.de/>)

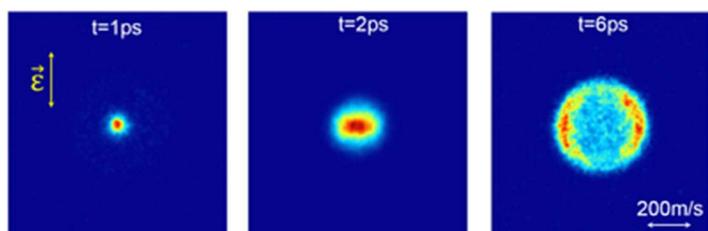
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RbHe⁺ Velocity-map ion images recorded at different pump-probe delays between excitation and ionization.