CFEL SCIENCE

SEMINAR

23th March 2020, 11:00–12:00h

Cisco virtual meeting room “CFEL MUSS (seminar)”

Jolijn Onvlee

Controlled Molecule Imaging group, CFEL DESY

Unraveling the ultrafast dynamics in indole-water

Molecular and chemical properties strongly depend on the environment. For a protein in an aqueous solution, for instance, hydrogen bonds between the protein and surrounding water molecules strongly affect its folding and thereby also its function. When hydrogen bonds between a protein and surrounding water molecules break, for instance via absorption of UV radiation, the protein structure changes and inactivation of the protein can occur.

We investigated the ultrafast dynamics of the hydrogen-bond breaking between proteins and water in a bottom-up approach. Therefore, we studied the indole molecule — the chromophore of tryptophan, which is the most strongly near-UV absorbing common amino acid — and its binary indole-water complex. The latter serves as a model system for the interaction between proteins and water. We produced pure samples of indole and the indole-water complex in the gas phase using a molecular beam and the electrostatic deflector, with which we spatially separated molecular species. For some of the experiments, we also aligned the species in space such that we could study processes directly in the molecular frame. These pure and controlled samples were used to study the femtosecond and picosecond dynamics upon UV absorption in a pump-probe experiment. We also performed laser-induced electron diffraction experiments, with which we aim to record a molecular movie of the hydrogen bond breaking in indole-water with atomic spatial and femtosecond temporal resolution.

Host: Jochen Küpper/ CFEL Molecular and Ultrafast Science Seminar