



IMPRS UFAST Call for PhD applications 2026/2027

JK&ST - Unraveling solvation effects in ultrafast molecular dynamics



Title of PhD Project	Unraveling solvation effects in ultrafast molecular dynamics
Type	Experimental
Supervisor(s)	Jochen Küpper, Sebastian Trippel
Affiliation(s):	IMPRS, CFEL, DESY, UHH
Number of positions:	1
Abstract:	Molecular behavior is deeply influenced by its surroundings —especially the solvent environment—and hydrogen bonds play a pivotal role in chemistry and biochemistry. This project bridges the gap between isolated molecules and those in solution by investigating how a few water molecules interact with the building blocks of life, e.g., nucleo-bases like adenine or uracil. Using cutting-edge techniques developed in our group in Hamburg, we'll prepare size-selected microsolvated-molecule clusters and study their ultrafast electronic dynamics <i>via</i> photoelectron/photoion imaging. By tracking all photo fragments, we can reconstruct the full dynamic picture —even in the molecular frame, i.e., "as if sitting on the mole-cule". We'll also explore specific vs. non-specific hydrogen bonding by adjusting solvent-biomolecule distances during photo-driven processes. Experiments will run in ultrahigh vacuum and utilize ultrashort-pulse high-intensity lasers, synchrotrons, and free-electron lasers (FELs). A university degree in physics/chemical physics (MSc preferred) is required. Expected skills: quantum mechanics, molecular physics/ dynamics, molecular beams, vacuum equipment, ultrafast lasers/ optics, Python. Advantage: synchrotron/FEL experience.
Contact person for scientific questions about the project:	Prof. Jochen Küpper: jochen.kuepper@cfel.de Dr. Sebastian Trippel: sebastian.trippel@cfel.de
Research Group Website:	https://www.controlled-molecule-imaging.org