

IMPRS UFAST Call for PhD applications 2023/2024

JK1- Cryogenically cooled and controlled beams of proteins for single-particle diffractive imaging

Title of PhD Project	Cryogenically cooled and controlled beams of proteins for single-particle diffractive imaging
Type	Experimental
Supervisor(s)	Prof. Jochen Küpper Dr. Amit Samanta
Affiliation(s):	DESY, CFEL, UHH
Number of positions:	1
Abstract:	<p>We are looking for a new doctoral student to join our team working on novel sample preparation and control concepts for structural biology at x-ray free-electron lasers (XFELs). You will implement and advance techniques to shock-freeze solvated biological macromolecules to image and characterize these samples, to implement control techniques such as species selection and laser alignment, and to exploit the controlled biomolecular samples in single-particle diffractive-imaging experiments at free-electron lasers. This work focuses on developing and implementing experimental methodology that allows for the spatial separation of macromolecular conformers in sample-injection pipelines for XFEL experiments.</p> <p>In the Controlled Molecule Imaging group, we have extensive experience in developing novel approaches to cool and control polyatomic molecules, to spatially separate individual species, to align and orient them in space, and to create well-defined quantum-mechanical wavepackets and novel states of molecular matter. We will exploit this strong background and extend the methods to bio-macromolecules, e.g., proteins, to create high-density beams of individual conformers. We will also exploit our cryogenic buffer-gas cooling technique to control the protein beam temperature and improve the spatial separation of individual species. These experiments will be accompanied by state-of-the-art data analysis and computational modeling.</p> <p>The created high-density beams of spatially separated bio-macromolecular conformers will benefit a wide range of experiments in structural biology, including high-resolution single-particle x-ray and electron diffractive imaging. To this end, we collaborate closely with colleagues in (time-resolved) structural biology, infection biology, and the life sciences.</p> <p>A university degree in physics, chemistry, or in a comparable relevant field is required. Preference will be given to candidates with a completed MSc. We expect experience in areas covering vacuum equipment, short-pulse lasers and optics, data analysis and (Python) programming. Experience with large-scale facilities such as synchrotrons or free-electron lasers is an advantage.</p>
Contact person for scientific questions about the project:	<p>Dr. Amit Samanta: amit.samanta@cfel.de</p> <p>Prof. Jochen Küpper: jochen.kuepper@cfel.de</p>