Max-Planck-Institut für
Struktur und Dynamik der Materie

Max Planck Institute for the Structure and Dynamics of Matter

IMPRS ULTRAFAST IMAGING & STRUCTURAL DYNAMICS

IMPRS UFAST Call for PhD applications 2022/2023

JK1- Spatial separation of bio-macromolecular conformers using electric fields

Title of PhD Project	**Spatial separation of bio-macromolecular conformers using electric fields**
Type	Experimental
Supervisor(s)	Prof. Dr. Jochen Küpper, Dr. Amit Samanta
Affiliation(s):	UHH, DESY,CFEL
Number of positions:	1
Abstract:	We are seeking for a new graduate student to become part of our team working on novel sample preparation and control concepts for structural biology at x-ray free-electron lasers. You will develop and implement experimental methodology that allows the spatial separation of macromolecular conformers in sample-injection pipelines for XFEL experiments. This extends our previous demonstration of such control for small molecules to structural biology and applications in the life sciences. The electric deflector exploits the separation of individual molecular and nanoparticle species such as different conformers by their mass-to-dipole moment ratio in an inhomogeneous electric field. 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 are aiming to exploit this strong background and to extend these methods to bio-macromolecules, e.g., proteins, and to create high-density beams of individual conformers. We will also exploit the cryogenic buffer-gas cooling technique to control the protein beam temperature and improve their spatial separation. These experiments will be accompanied by state-of-the-art data analysis and computational modeling. The high-density, spatially separated beams of bio-macromolecular conformers will be beneficial to a wide range of experiments in structural biology, including high-resolution single particle x-ray and electron diffractive imaging. To this end we are closely collaborating with colleagues in (time-resolved) structural biology, infection biology, and the life sciences.
Contact person for scientific questions about the project:	Dr. Amit Samanta amit.samanta@cfel.de Prof. Jochen Küpper jochen.kuepper@cfel.de