**2018 Helmholtz – OCPC – Program**

**for the involvement of postdocs in bilateral collaboration projects**

**DESY\_OCPC\_2018-04**

**PART A**

**Title of the project: Imaging ultrafast chemical dynamics directly in the molecular frame**

**Helmholtz Centre and Research Group: DESY / CFEL Controlled Molecule Imaging**

**Project leader: Dr. Sebastian Trippel, Prof. Dr. Jochen Küpper**

**Web-address:** https://www.controlled-molecule-imaging.org

**Description of the project:**

A molecule’s chemical behavior is governed by its electronic and nuclear properties. Imaging the temporal evolution of the positions of the atoms and the valence electrons during a chemical reaction provides direct insight into fundamental chemical processes such as bond formation and breaking or internal rotations. State-selected, strongly aligned and oriented molecular ensembles serve as ideal samples to study such ultrafast chemistry directly in the molecular frame. Possible probing mechanisms include the investigation of molecular-frame photoelectron angular distributions, the detection of structural changes via x-ray or electron diffraction, and the investigation of the charge redistribution upon side specific core shell ionization.

You will unravel the structural and electronic dynamics of molecular switches such as ultrafast internal rotation dynamics, ring-opening reactions, and the forming and breaking of hydrogen bonds, both in the ground electronic as well as in electronically excited and ionized states. The molecules are state selected by the electrostatic deflector and fixed in space by strong-field laser alignment. You will work in a small team on a recently developed setup, which allows for the complete control of the gaseous molecular systems. The molecules will be studied directly in the molecular frame by laser induced electron diffraction (LIED) in the mid infrared, which allows a simultaneous mapping of the electrons and nuclei during the reaction.

**Description of existing or sought Chinese collaboration partner institute:**

**Required qualification of the post-doc:**

* PhD in Experimental Physics, Physical Chemistry, or related field
* Extensive background in molecular physics and quantum mechanics is required.
* Experience with molecular beams, high-vacuum equipment, and short-pulse lasers is envisioned; experience with large-scale/x-ray facilities would be a plus.
* Fluent in written and spoken English

**PART B**

**Documents to be provided by the post-doc, necessary for an application to OCPC via a postdoc-station:**

* + Detailed description of the interest in joining the project (motivation letter)
  + Curriculum vitae, copies of degrees
  + List of publications
  + 2 letters of recommendation
  + Proof of command of English language

**PART C**

**Additional requirements to be fulfilled by the post-doc:**

* Max. age of 35 years
* PhD degree not older than 5 years
* Very good command of the English language
* Strong ability to work independently and in a team