2020 HGF – OCPC – Programme
for the involvement of postdocs in bilateral collaboration projects

Title of the project:

Attosecond Science

Helmholtz Centre, division/group:

DESY - Center for Free-Electron Laser Science

Project leader:

Prof. Dr. Franz X. Kärtner

Contact Information of Project Supervisor:

(franz.kaertner@desy.de, +49 40 8998 6350)

Web-address:

https://ufox.cfel.de/

Department/Group:

Photon Science / Ultrafast Optics & X-rays Group

Programme Coordinator (Email, telephone and telefax)

Dr. Frank Lehner
DESY Head of Directorates Office
Phone: +49 40 8998 3612
Email: frank.lehner@desy.de

Description of the project (max. 1 page)**:**

State-of-the-art laser systems, such as optical sub-cycle waveform synthesizers available in our group, permit the generation of attosecond pulses in the VUV to soft-X-ray wavelength range including the water window. We aim for the observation and control of the fastest electronic dynamics in atoms, molecules, liquids, solids and nanostructures occurring on the time scale of the light period. In this project, we build up a unique high flux water window soft-X-ray source driven by carrier-envelope phase controlled sub-cycle optical waveforms of 2-3 femtosecond duration spanning 650 – 2200 nm. These pulses enable the direct generation of attosecond pulses in the VUV up to the water window wavelength range without the need for gating. We will use these sources to perform transient absorption spectroscopy triggered by strong IR-fields or sub-femtosecond VUV pulses to investigate electron transfer processes in molecules and water, as well as water related energy conversion processes.

We seek candidates with strong background/experience in few-cycle pulse generation, ultrafast nonlinear optics, atomic, molecular and solid-state physics; experience in attosecond science, high-vacuum technology, programming/numerical skills (Matlab, C++, LabView) are highly advantageous. The successful candidate should be self-motivated and will work in a team with PhD students and other postdocs in a first-class scientific environment on cutting-edge topics at the current frontiers of laser technology, extreme light-matter interactions and attosecond science. Research is performed within international collaborations, e.g., with groups at MIT, Politecnico Milano, RIKEN, Toronto, and CFEL.

Description of existing or sought Chinese collaboration partner institute (max. half page)**:**

Institute of Physics, Chinese Academy of Sciences, Beijing

Required qualification of the post-doc:

- PhD in Physics, Chemistry of electrical Engineering
- Experience with Ultafast Lasers and Attosecond Science
- Additional skills in Programming
- Language requirement: English fluent in writing and speaking