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 2021/2022

Terahertz Generation and Acceleration

F. Kärtner-1

Title of PhD Project	Terahertz Generation and Acceleration
Type	Experimental
Supervisor(s)	Prof. Franz X. Kärtner
Affiliation(s):	DESY UHH
Number of positions:	1
Abstract:	We are developing high energy single-cycle and multi-cycle Terahertz (THz) sources with milli-Joule energies based on optical rectification of high energy optical laser pulses. In this project, we will both scale up the energy of these sources to tenth of milli-Joule and use those pulses to generate, accelerate and manipulate ultra-low emittance electron bunches up to relativistic energies. The generated electron bunches will be used for demonstrating compact ultrafast X-ray sources as well as for ultrafast electron diffraction (UED). Jointly with collaborators the generated ultrafast X-ray and electron pulses will be applied to the study of biochemical processes and quantum materials. We seek candidates with a background/experience in at least one of the following fields ultrafast and/or nonlinear optics, laser physics, accelerator physics, beam physics, vacuum technology, programming/numerical skills (Matlab, C++, LabView) are highly advantageous. The successful candidate should be highly 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 ultrafast science. Research is performed within international collaborations, with groups at MIT, Arizona State University, and Uppsala University. D. Zhang et al., "Segmented THz electron accelerator and manipulator (STEAM)," Nat. Photonics 12: (6) 336 (2018). S. W. Jolly et al., "Spectral phase control of interfering chirped pulses for high-energy narrowband terahertz generation ," Nature Communications 10, pp. 872-877 (2019). D. Zhang, et al., "THz-Enhanced DC Ultrafast Electron Diffractometer, "Ultrafast Science (2021); DOI: 10.34133/2021/9848526
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