



IMPRS UFAST Call for PhD applications 2025/2026

TH2 – Chip-integrated ultrafast sources at visible wavelengths



Title of PhD Project	Chip-integrated ultrafast sources at visible wavelengths
Type	Experimental
Supervisor(s)	Tobias Herr
Affiliation(s):	UHH / DESY
Number of positions:	1
Abstract:	<p>Femtosecond laser sources provide access to ultrafast timescales and are a cornerstone of experimental ultrafast science. Traditionally derived from table-top mode-locked lasers, it is now possible to integrate femtosecond sources on micrometer-scale photonic chips, achieving record-high pulse repetition rates reaching the terahertz regime. This thesis will explore and uncover pathways for chip-based femtosecond sources operating at visible wavelengths, unlocking new opportunities for ultrafast biomolecular sensing and quantum photonics.</p> <p>The thesis will leverage experimental, numerical, and analytical techniques at the forefront of integrated photonic technology, ultrafast lasers and nonlinear optics. It includes the design of advanced chip-integrated laser systems as well as experiments in our state-of-the-art laboratory. It combines exploration of unknown physics with the development of immediately relevant and meaningful optical technologies. We present our work frequently at international conferences and work closely with other research groups across scientific disciplines.</p> <p>Ulanov et al., Nature Photon. 18, 294-298 (2024), DOI: 10.1038/s41566-023-01367-x. Wildi et al., Optica 10, 650-656 (2023), DOI: 10.1364/OPTICA.480789. Brasch et al., Science 351, 357-360 (2016), DOI: 10.1126/science.aad4811. Herr et al., Nature Photonics 8, 145-152 (2014), DOI: 10.1038/nphoton.2013.343.</p>
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