

Max-Planck-Institut für Struktur und Dynamik der Materie

Max Planck Institute for the Structure and Dynamics of Matter



IMPRS UFAST Call for PhD applications 2025/2026



TH3 – Chip-integrated quantum light sources

Title of PhD Project	Chip-integrated quantum light sources
Type	Experimental
Supervisor(s)	Tobias Herr
Affiliation(s):	UHH / DESY
Number of positions:	1
Abstract:	<p>The generation of squeezed light, entangled photons, and other quantum states of light relies on nonlinear optical processes. These processes can be realized with high efficiency in integrated photonic chips. Moreover, the ability to tailor nonlinear dynamics through on-chip nanostructures opens unprecedented opportunities for quantum light engineering. This thesis will explore how broadband quantum light sources with unique properties can be integrated on a chip, with immediate relevance for quantum-enhanced sensing and quantum information processing.</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., arXiv: 2502.17337 (2025) Ulanov et al., Nature Photon. 18, 294-298 (2024), DOI: 10.1038/s41566-023-01367-x. Wildi et al., Optica 10, 650-656 (2023): 10.1364/OPTICA.480789.</p>
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