Dresden University of Technology

Faculty of Physics

PHYSICS COLLOQUIUM

Speaker:

Prof. Markus Gräfe
Professor of Experimental Solid State Quantum Optics,
Institute for Applied Physics,
Technical University of Darmstadt

Topic:

Nonlinear Interferometers for Quantum Imaging with Undetected Light

Time and place:

Tuesday, June 30, 2026, **2:50 pm** – hybrid event
The colloquium will be held in REC/C213.
Online participation possible:
Zoom-Meeting: Meeting-ID: 674 4304 6840 / passcode: PC-SoSe26
https://tu-dresden.zoom-x.de/j/67443046840?pwd=QAEHLWawl2P3iDmQToOSHhNYgu3Fzz.1

Host:

Prof. Jürgen Czarske

Abstract:

Nonlinear interferometers have opened new ways for imaging and sensing beyond the capabilities of conventional optical systems. In this talk, I will introduce the basic working principles of nonlinear interferometers and show how they enable quantum imaging with undetected light. In this approach, information about an object is obtained from lights that never interact with the object itself. At the same time, light that interacts with the object remains undetected. This makes it possible to probe samples in spectral ranges where detectors are inefficient, expensive, or unavailable, while detection is performed where technology is mature and sensitive. I will discuss key experimental demonstrations, including imaging, video-rate operation, and holography with undetected photons, and highlight how these concepts connect fundamental quantum interference with practical imaging applications. Finally, I will outline current perspectives for extending these methods toward robust and versatile quantum imaging platforms.

Bio:

Markus Gräfe is Professor of Experimental Solid State Quantum Optics at the Institute for Applied Physics at the Technical University of Darmstadt. His research focuses on photonic quantum technologies ranging from quantum imaging and sensing to quantum walks of entangled photons. Before joining TU Darmstadt in 2022, he led the Quantum-Enhanced Imaging group at Fraunhofer IOF in Jena. He has contributed to pioneering work in quantum imaging with undetected light and related photonic quantum technologies.