Carl von Ossietzky
Universität
Oldenburg

Institut für PHYSIK

PHYSICAL COLLOQUIUM

INVITATION

Monday, 30.01.2023, 4.15 p.m., Room W02 1-148 and per
video conference: https://meeting.uol.de/b/anj-2vc-j6s-fwe

speaks

Dr. Tobias Heindel,
Institute of Solid State Physics - Technische Universität Berlin

About

"Towards Quantum Networks using Engineered Solid-State Quantum-Light Sources"

In recent years, tremendous progress has been achieved in the engineering of solid-state-based quantum light sources. In this context, semiconductor quantum dots (QDs) are among the most promising candidates for implementations of quantum information [1]. In my talk, I will review our progress in the field, ultimately striving towards quantum networks at global scales (see Fig. 1). I will discuss the development of novel building blocks, including fiber-pigtailed quantum devices [2,3] and plug&play benchtop single-photon quantum key distribution (QKD) systems [4]. I show how to optimize and certify the performance of QKD systems [5] and report on our most recent efforts on the implementation of emerging quantum emitter platforms [7] as well as advanced protocols. Assembling these building blocks to functional multi-partite quantum networks is a grand challenge in quantum technologies which will be tackled in my group together with our collaborators.

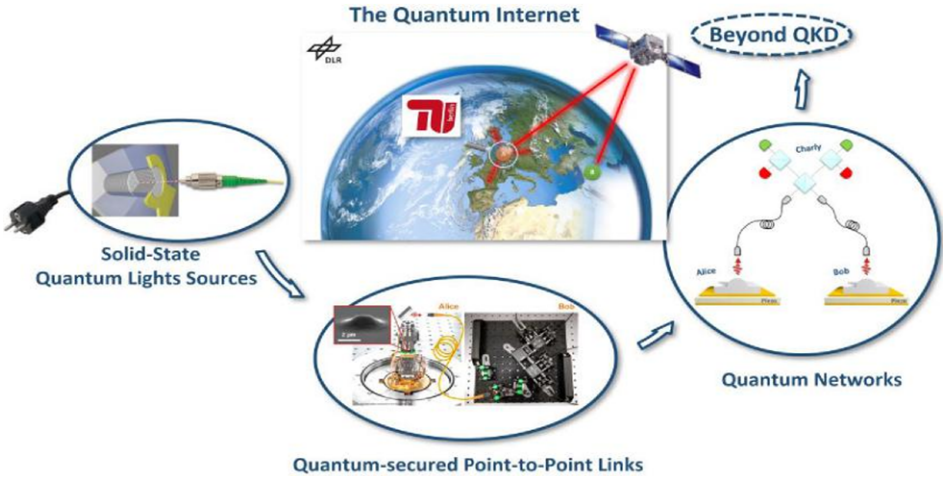

Fig. 1. Overview of research topics in our group: we are working on the development of engineered quantum light sources, the implementation of quantum cryptographic protocols, and their assembly and scaling to quantum networks.

[1] D. A. Vajner et al., *Advanced Quantum Technologies* 2100116, (2022) **Invited Review Article**
[2] L. Rickert et al., *Optics Express* 27, 36824 (2019)
[3] L. Rickert et al., *Applied Physics Letters* 119, 131104 (2021)
[4] T. Gao et al., *Applied Physics Reviews* 9, 011412 (2022)
[5] T. Kupko et al., *npj Quantum Information* 6, 29 (2020)
T. Gao, M. von Helversen, C. Anton-Solanas, C. Schneider, and T. Heindel, Atomically-thin Single-photon Sources for Quantum Communication, arXiv:2204.06427 (2022)

All interested persons are cordially invited.

Prof. Dr. Christian Schneider