

Advances in Quantum Light Generation for Quantum Networking

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Quantum communication offers unprecedented security in data transmission via quantum key distribution, an application that benefits from high-performance quantum dot (QD) single-photon sources [1]. Especially for fiber-optical data links and networks, emission in the telecom C-Band is highly favorable due to the low absorption losses in this spectral range.

This poster, will review our advances in the generation of single photons at telecom C-band wavelengths and their implementation in testbeds for quantum communication. First, we will summarize our efforts on the coherent on-demand generation of single photons and correlated photon pairs with high single-photon purity [2]. Next, we present advances in the fast dynamic polarization-state preparation as well as a simple QKD testbed between different laboratories serving the benchmarking of different QD devices. Finally, we share our visions towards the realization of local quantum networks in Berlin city and beyond.

[1] Vajner, Daniel A., et al. "Quantum communication using semiconductor quantum dots." *Advanced Quantum Technologies* 5.7 (2022)

[2] Vajner, Daniel A., et al. "On-Demand Generation of Indistinguishable Photons in the Telecom C-Band Using Quantum Dot Devices." *ACS Photonics* 2024 11 (2), 339-347