

# Quantum communication and single photon sources

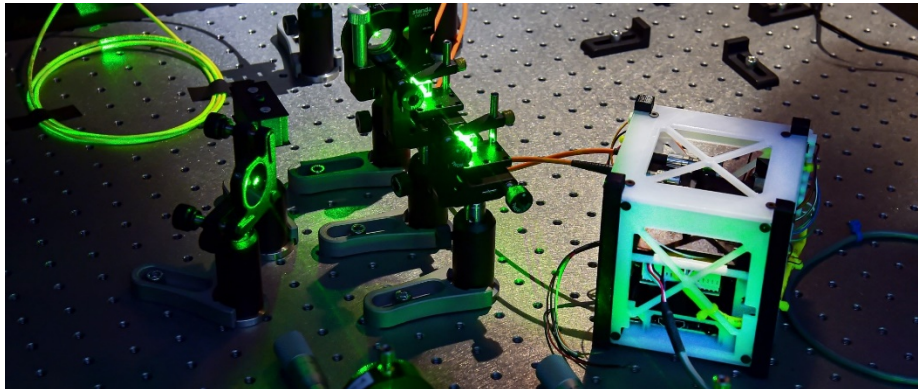
Solid-state single photon sources on the basis of defect centers in 2D-materials have matured to the point that they have demonstrated their application potential for quantum communication systems. They are small, lightweight, robust and produce a large number of single photons at very high quality. They can be integrated with optical systems and packaged into devices for usage in quantum communication systems.

In a next step we plan to use hBN-based (hexagonal boron nitride) single photons sources in a payload for a small satellite, demonstrating their feasibility for space-based QKD-systems (quantum key distribution). The payload will also be used to interface with a vapor-based quantum memory unit, the interaction of which must be simulated and characterized in multiple ground-based proof-of-principle experiments. Moreover, we will also integrate the source with on-board interferometric experiments, to demonstrate the quantum advantage in optical sensing and to test fundamental concepts on quantum mechanics in micro-gravity.

The task of the scientist is the development and optimization of single-photons sources, based on single photon emitters in hBN and the conduction of experiments in QKD and quantum sensing in the lab and on a local free-space communication test facility. The scientist will also work in the development and integration of quantum photonic payload for a demonstrator and/or a flight-model for a quantum-optical satellite mission.

**Depending on the abilities and preferences of the candidate the following subjects would be covered**

- Development of single photon sources and their integration with plasmonic pump schemes as well as their integration with guided wave systems
- Demonstration of experiments in QKD and quantum sensing based on single photon sources
- Development and characterization of a quantum payload for a satellite mission and/or a demonstrator thereof



*Demonstrator for a single-photon source in a 1U-cubesat package together with an experiment in quantum sensing.*

## References

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