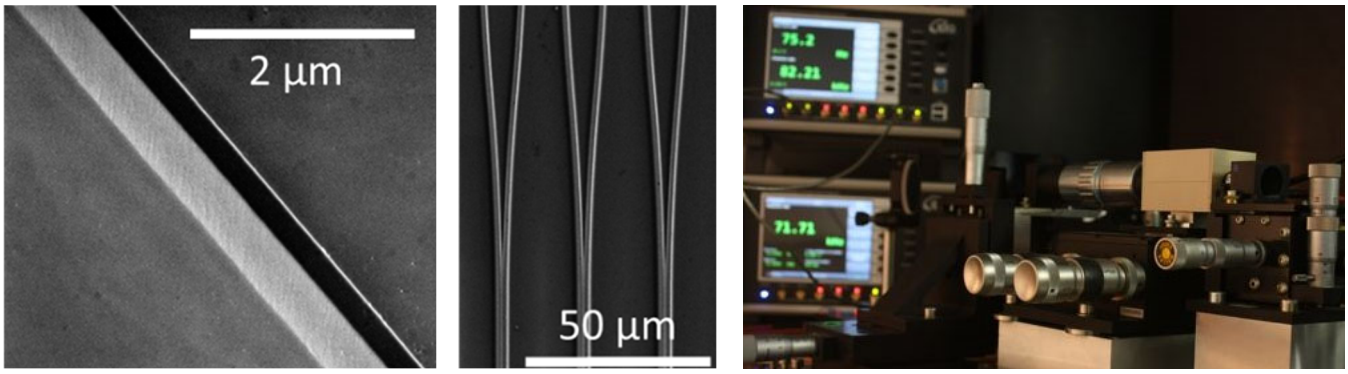
Abbe School of Photonics | JENA
Friedrich-Schiller-Universität

PhD or PostDoc position in the subject area of "Integrated Optics for Photonic Quantum Computing"

Nanoscale waveguides in lithium niobate on insulator systems are an emerging platform for integrated quantum optics and quantum computing that offers unrivalled properties like small absorption losses in a wide spectral range, high optical nonlinearities, and the ability for ultrafast modulation of material properties. Based on these exceptional properties, a number of basic elements for integrated quantum optics, e.g. sources of photon pairs, low-loss quantum interference elements, fast modulators, and nonlinear frequency converters have been demonstrated. These demonstrations of individual functional elements used waveguides with cross-sections in the range of a few hundred nm, showing the large potential of this platform to realize integrated and scalable quantum computers.

We aim to adapt these elements to the specific requirements of photonic quantum computing and integrate several functionalities like sources for photonic quantum states, optical elements to modify and control these states as well as single-photon detectors on a single optical chip. This will enable to realize different quantum functionalities in lithium niobate nanowaveguides, with the final aim to build photonic quantum simulators and computers.

The project comprises the development, optimization, and test of individual quantum elements in such circuits, the implementation of basic quantum interference experiments to gauge the performance of complex lithium niobate quantum circuits and the design and realization of large-scale circuits that perform applicable functionalities.



Left: Lithium niobate rib waveguide. Center: Y waveguide splitters. Right: Setup for characterization of integrated quantum circuits.

PhD position requirements

Applications are invited for candidates with a good understanding of quantum optics and integrated optics. A proven ability to tackle scientific problems independently and simultaneously work cooperatively is highly desirable.

Your qualifications:

- Very good master's degree in physics, optics, or a related discipline
- Background knowledge in quantum optics, experimental optics, waveguides or quantum computing
- Very good communication skills in written and spoken English

Supervisor, affiliation: Dr. Frank Setzpfandt, Institute of Applied Physics

Further information

Further information on our research, publications, and group members can be found at www.iap.uni-jena.de/setzpfandt. For further information about the position, please contact Frank Setzpfandt, f.setzpfandt@uni-jena.de.