Paderborn Photonics Lecture

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Online*
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Parametric frequency conversion in micro- and nanostructured lithium niobate: Towards the generation of tailored photon pairs

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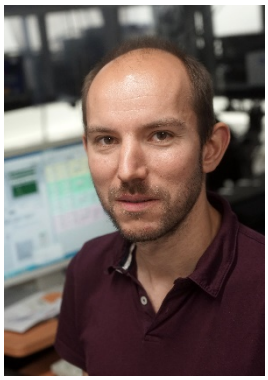

Lithium niobate is one of the most interesting materials for nonlinear optics, owing to its high transparency in a wide spectral range, high second-order nonlinearity, and the ability for quasi-phase matching. These enticing properties have been utilized many times for classical frequency-conversion processes, like second-harmonic generation. At the same time, these properties are also highly interesting for quantum-optic applications, which often rely on photon pairs with tailored properties generated by the second-order nonlinear process of spontaneous parametric down conversion (SPDC).

Controlling all properties of photon pairs generated by SPDC is possible by precisely controlling the geometry of the nonlinear system they are generated in on the micro- and nanometer scale. The classical structuring approach for lithium niobate is the creation of waveguides with low index contrast. However, in the last decade technologies to also realize high-index-contrast nanowaveguides and resonant nanostructures in lithium niobate have been developed, enabling now to fully utilize the potential of this material system.

In my talk, I will discuss some of our recent work using or aiming at SPDC in structured lithium niobate. This will include the use of SPDC in lithium niobate waveguides for quantum spectroscopy applications, the design and implementation of lithium niobate nanowaveguides for the control of entanglement, and the realization of resonant nanostructures for photon-pair generation truly at the nanoscale.

*** The lecture will take place as online format in Zoom**

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TRR 142
Tailored Nonlinear Photonics