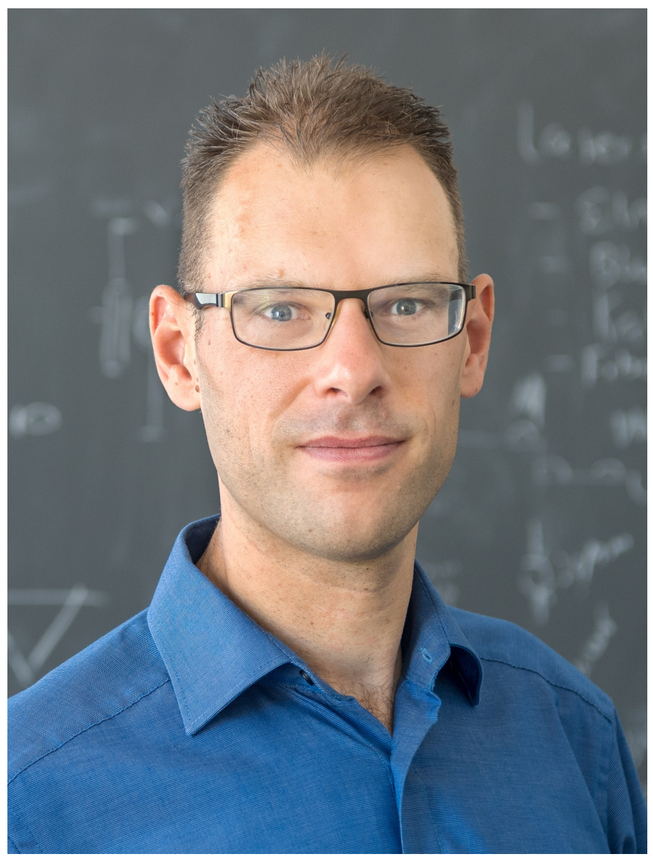
physikalisches Kolloquium



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On-chip optomechanics and integrated quantum optics

Mo. 27.11.23
16:00 Uhr
Ort: H34

In this talk, I will give an overview of the research activities of my group. Two examples from our optomechanics projects are the efficient mode mapping of membranes in the linear and the nonlinear regime, and the geometric tuning of stress in pre-displaced string resonators which provides insights in the damping mechanisms of SiN.

In the second part, I will discuss our efforts towards fully integrated quantum optics chips (qPICs). We show the design, fabrication, and characterization of the essential building blocks of this platform, including tunable directional couplers, photonic CNOT circuits, and superconducting single photon detectors. All of these components are monolithically embedded on the same chip and are fabricated in house.

Special focus will be on our recent work on hybrid AlN-on-SiN waveguides, which is an important step for co-integrating single photon sources on the chip. For complex quantum circuits, such as the dual rail implementation of Tofolli gates, SWAP operations are required. We show that these can be implemented efficiently using adiabatic waveguide crossings. For the large-scale photonic quantum circuits that we envision, the use of automated layout generation becomes imperative and we show how this is implemented in our linear optics quantum compiler.