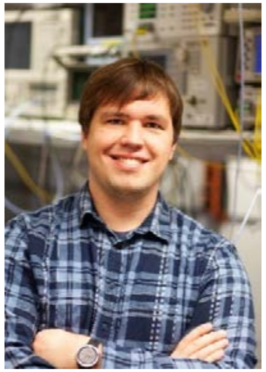
SFB 767
Seminar

Universität Konstanz

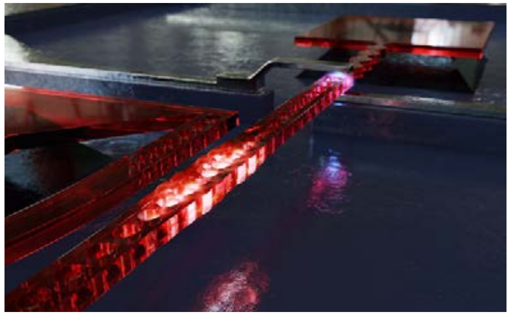
Wed Dec 11,2019
13:30
P 912



MSc Simon Hönl

IBM Zürich

Integrated Cavity Optomechanics – a Resource for Quantum Computing



Quantum computing is an emerging technology with a plethora of applications to ‘hard’ computational problems in fields ranging from quantum chemistry to machine learning to forecasting for the financial sector. Today’s quantum computers based on superconducting qubits already achieve impressive results with less than 100 physical qubits. However, future quantum machines that can solve practical problems will require error-corrected logical qubits, each consisting of many physical qubits, resulting in a dramatic increase in the size of the system to $O(10^6)$ or more physical qubits. From the perspective of contemporary hardware, this immense scaling seems almost intractable, and novel solutions must be found to tackle this challenge.
Our approach to this scaling problem makes use of coherent optical links between individual quantum computers, such that future systems would consist of nodes interacting coherently in a quantum network. For this, devices are required that can quantum coherently transduce information from the microwave domain, the operating range of superconducting qubits, to the optical domain, where fiber-optic cables provide a means for robust, long-distance transmission of single photons. I will talk about how such a quantum link can be created with photonic crystal cavities made of GaP monolithically integrated on state-of-the-art hardware for superconducting qubits.

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