Seminar/Talk

Towards an On-chip Optomechanical Quantum Interface

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Interfacing a single photon with various quantum degrees of freedom is an outstanding problem in quantum information science. It allows for long-distance quantum communication and entanglement distribution between distant quantum systems such as spin states of atoms, atomic ensembles or solid-state qubits. Recently, micro-fabricated optomechanical devices have been considered as a new type of optical quantum interfaces for quantum networks. They utilize versatility of mechanical degrees of freedom which can coherently couple to a variety of physical systems. This then allows for transducing quantum information between optical photons and other stationary quantum systems by means of mechanical motions.
In this talk, I will present our experimental works on realizing on-chip optical quantum interfaces based on optomechanical devices. We utilize nanofabricated silicon photonic and phononic crystals as our on-chip optomechanical devices. With these structures, we demonstrated the generation of quantum correlated pairs of single (optical) photons and single (mechanical) phonons, which is the first step towards photon-phonon quantum interface. Based on this work, I will discuss the implementation of a protocol for generating entanglement between two remote optomechanical devices.

Monday, March 27, 2017 09:30am - 10:30am

Seminar room Ground floor / Office Bldg West (I21.EG.128)

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