A transducer to couple microwaves to light

Andrew Cleland

University of California
Department of Physics
Santa Barbara, USA

We have been developing a microwave-to-optical converter, based on a piezoelectrically-actuated optomechanical crystal. The device is a nanoscale patterned thin film of aluminum nitride, a strong piezoelectric, which includes an optomechanical crystal with co-localized optical and mechanical modes and electrodes to permit electromechanical actuation. We plan to use this device to generate optical frequency entangled photons from a superconducting qubit, enabling the coherent transfer of quantum information from a millikelvin cryostat to a fiberoptic transmission line, with the potential of coupling hybrid quantum systems; providing high-speed quantum communications; and ultimately reading and writing to a quantum memory, such as might be provided by a surface code quantum computer. I will report on our progress in developing this novel device.