Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Developement of an optomechanical device for microwave to telecom wavelength quantum state transfer[1] J.M. FINK, A. PITANTI, C.U. LEI, J.T. HILL, A.H. SAFAVI-NAEINI, O. PAINTER, California Institute of Technology — A promising hardware platform for quantum computers is based on solid-state superconducting circuits which offer fast processing times and scalability. Circuit QED systems can however only operate in ultra-cold environments where thermal noise and resistive losses are negligible. We are working on an integrated optomechanical microwave-photonic device which has the potential to efficiently convert microwave excitations to telecom wavelength photons. Such a device would put within reach the realization of hybrid and long distance quantum communication networks. We have designed and fabricated slot mode photonic crystal cavities which share a mechanical mode with the capacitance of a lumped element microwave resonator. A continuously pumped state transfer protocol should enable efficient wavelength conversion even in the absence of strong optomechanical and electromechanical coupling [1] and has recently been demonstrated within the optical domain [2]. We will present our latest progress with the design, fabrication and characterization of our electro-optomechanical wavelength conversion device.

[1] A. H. Safavi-Naeini and O. Painter, New J. Phys. 13, 013017 (2011)
[2] J. T. Hill, A. H. Safavi-Naeini, J. Chan and O. Painter, arXiv:1206.0704

[1]JMF acknowledges support from the Institute for Quantum Information and Matter at Caltech.

Johannes M. Fink
California Institute of Technology

Date submitted: 18 Nov 2012 Electronic form version 1.4