Abstract Submitted
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Improved optical cavity design for a microwave-mechanical-optical transducer[1] MAXWELL URMEY, BENJAMIN BRUBAKER, PETER BURNS, SARANG MITTAL, ANDREW HIGGINBOTHAM, KONRAD LEHNERT, CINDY REGAL, JILA, University of Colorado, Boulder — A quantum-coherent transducer between optical and microwave frequencies could integrate superconducting qubits into a spatially distributed quantum network by exploiting the ability of optical fields to transmit quantum information over long distances. By coupling an optical Fabry-Perot cavity and a microwave LC resonator to the same MHz-frequency mechanical mode of a SiN membrane, we have developed a converter with 47% efficiency and 38 photons of added noise [1]. This talk will treat a portion of the noise which currently prohibits quantum operation, that associated with optical heating of the superconducting circuit. Improvements to the optical cavity are designed to reduce this noise and loss in the optical cavity.

[1] Higginbotham, A. P., et. al. "Harnessing electro-optic correlations in an efficient mechanical converter, Nature Physics 14, 1038-1042 (2018)

[1]AFOSR MURI, NSF, DURIP, AFOSR PECASE

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