Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Develop of a quantum electromechanical hybrid system YU HAO, Syracuse University, FRANCISCO ROUXINOL, Institute of Physics Gleb Wataghin, University of CampinasUNICAMP, FREDERICO BRITO, Instituto de Fsica de So Carlos, Universidade de So Paulo, AMIR CALDEIRA, Institute of Physics Gleb Wataghin, University of CampinasUNICAMP, ELINOR IRISH, Physics and Astronomy, University of Southampton, MATTHEW LAHAYE, Syracuse University — In this poster, we will show our results from measurements of a hybrid quantum system composed of a superconducting transmon qubit-coupled and ultra-high frequency nano-mechanical resonator, embedded in a superconducting cavity. The transmon is capacitively coupled to a 3.4GHz nanoresonator and a T-filter-biased high-Q transmission line cavity. Single-tone and two-tone transmission spectroscopy measurements are used to probe the interactions between the cavity, qubit and mechanical resonator. These measurements are in good agreement with numerical simulations based upon a master equation for the tripartite system including dissipation. The results indicate that this system may be developed to serve as a platform for more advanced measurements with nanoresonators, including quantum state measurement, the exploration of nanoresonator quantum noise, and reservoir engineering.

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Date submitted: 06 Jan 2017 Electronic form version 1.4