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Investigations of a voltage-biased microwave cavity for quantum measurements of nanomechanical resonators[1] FRANCISCO ROUXINOL, HUGO HAO, MATT LAHAYE, Syracuse University — Quantum electromechanical systems incorporating superconducting qubits have received extensive interest in recent years due to their promising prospects for studying fundamental topics of quantum mechanics such as quantum measurement, entanglement and decoherence in new macroscopic limits, also for their potential as elements in technological applications in quantum information network and weak force detector, to name a few. In this presentation we will discuss ours efforts toward to devise an electromechanical circuit to strongly couple a nanomechanical resonator to a superconductor qubit, where a high voltage dc-bias is required, to study quantum behavior of a mechanical resonator. Preliminary results of our latest generation of devices integrating a superconductor qubit into a high-Q voltage biased microwave cavities are presented. Developments in the circuit design to couple a mechanical resonator to a qubit in the high-Q voltage bias CPW cavity is discussed as well prospects of achieving single-phonon measurement resolution.

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