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Microwave-frequency electromechanical resonators incorporating phononic crystals K. J. SATZINGER, G. PEAIRS, A. VAINSENCHER, University of California, Santa Barbara, A. N. CLELAND, University of Chicago — Piezoelectric micromechanical resonators at gigahertz frequencies have been operated in the quantum limit, with quantum control and measurement achieved using superconducting qubits. However, experiments to date have been limited by mechanical dissipation, due to a combination of internal and radiative losses. In this talk, we explore the incorporation of phononic crystals into resonator designs. In phononic crystals, periodic patterning manipulates the acoustic band structure of the material. Through appropriately chosen geometries, these periodic patterns lead to full acoustic bandgaps which can be used to greatly reduce radiation losses from resonant structures. Alternatively, the crystal geometry can be manipulated to allow isolated modes within the bandgap, giving fine control over the spatial structure of the resonator modes. In this talk, we will describe the design, fabrication, and measurement of resonators with phononic crystals.

Kevin Satzinger
University of California, Santa Barbara

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