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**Improving the quality factor of microwave-frequency mechanical resonators** K. J. SATZINGER, G. PEAIRS, A. VAINSENER, Univ 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 an alternative resonator design, using a hybrid combination of low-loss single crystal silicon with an electromechanical transducer based on aluminum nitride, a strong piezoelectric. We can measure gigahertz-frequency mechanical modes that are among the overtones of the hybrid structure. We describe the resonator design and fabrication, including finite-element simulations, as well as measurements of the mechanical response.

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