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Experimental progress toward single phonon creation in a mechanical resonator AARON O'CONNELL, M. ANSMANN, R. C. BIALCZAK, M. HOFHEINZ, E. LUCERO, M. NEELEY, D. SANK, H. WANG, J. WENNER, J. M. MARTINIS, A. N. CLELAND, University of California, Santa Barbara, Physics — Coupling a high frequency (~ 6 GHz) mechanical resonator to a Josephson phase qubit may enable the creation and manipulation of single phonons. Previously, we have shown the creation of arbitrary photon states in a superconducting coplanar waveguide (CPW) resonator coupled to a phase qubit (Max Hofheinz et al., Nature 454, 310-314, 2008). That experiment illustrated the capability of the phase qubit to controllably create and measure quantum states in a capacitively coupled resonator. By replacing the CPW resonator with a film bulk acoustic resonator (FBAR) we can potentially transfer the quantum state of the phase qubit to a vibrational mode of the FBAR. This talk will focus on our experimental progress to date in realizing this aim.

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