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Surface acoustic wave resonators with strong electromechanical coupling K. J. SATZINGER, G. A. PEAIRS, Dept. of Physics, UC Santa Barbara; IME, University of Chicago, E. DUMUR, Y. ZHONG, A. N. CLELAND, IME, University of Chicago — Surface acoustic wave (SAW) devices are heavily used in classical signal processing applications. SAWs have also been proposed as a method of coherently coupling disparate quantum systems. Several groups have reported experimental results with SAWs at gigahertz frequencies and millikelvin temperatures. In this talk, we explore important design and fabrication considerations for building SAW resonators with strong electromechanical coupling. We examine the implications of material properties, such as piezoelectric coupling strength and acoustic velocity. We also discuss design decisions that determine the resonance frequency, free spectral range, and various bandwidths in the device response. We present experimental results in SAW resonators, at room temperature and low temperature, considering various loss mechanisms.

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