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**3D Acoustic Modes, Shot Noise and Strain Displacements in a Radio Frequency Quantum Point Contact**[1] J. STETTENHEIM, Dartmouth College, M. THALAKULAM, U. Wisconsin-Madison, F. PAN, M. BAL, Dartmouth College, L.N. PFEIFFER, K.W. WEST, Bell/Lucent, A.J. RIMBERG, Dartmouth College — As previously reported, our broadband frequency resolved measurements of shot noise in a radio frequency QPC (RF-QPC) reveal a remarkable frequency dependence absent from theoretical predictions. Based on piezoelectric coupling in GaAs, our data suggest a feedback loop in which shot noise drives resonant acoustic vibrations that in turn create correlations in electron tunneling. The feedback concentrates the initially white noise in a narrow band around the sample's resonant frequency, allowing shot noise spectrum engineering. We solve for the 3D acoustic modes of our samples, finding close correspondence with measured frequencies. We have determined that the geometry and magnitude of the polarization field selects the acoustic mode excited. As polarization fields and strain displacements are linked in GaAs, we estimate the ultimate mechanical displacement sensitivity of our RF-QPC.

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