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**Vibronic Effects in Superconducting Niobium Nanowires**[1] BRANDON DONEHOO, ZHENTING DAI, ALEXEI MARCHENKOV, Georgia Institute of Technology — Research of superconducting transport through microscopic objects with intrinsic vibrational degrees of freedom is a frontier research avenue. Here we report on experimental studies of a few-atom niobium nanowires prepared in a mechanically-controlled break junction set-up. We present evidence for the resonant interaction between the ac Josephson effect and the mechanical motion of atoms in niobium dimer nanowires at frequencies up to about 8 THz. This is application-rich, but a largely unexplored frequency range ("terahertz gap"), which interrogates the lowest frequency vibrational modes of complex organic and biological molecules. We also discuss supercondicting transport and noise in niobium nanowires with oxygen contamination.

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