

Abstract Submitted
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Nanomechanical Probes of Sketched $\text{LaAlO}_3/\text{SrTiO}_3$ Single-Electron Transistors¹ JESSICA MONTONE, FENG BI, MENGCHEN HUANG, University of Pittsburgh, JUNG-WOO LEE, HYUNGWOO LEE, CHANG-BEOM EOM, University of Wisconsin-Madison, PATRICK IRVIN, JEREMY LEVY, University of Pittsburgh — Nanoscale devices that manipulate single electrons present an exciting platform for the observation of electronic and mechanical effects. By utilizing the locally tunable metal-insulator transition at the interface of $\text{LaAlO}_3/\text{SrTiO}_3$, we can create single-electron transistors using conducting atomic force microscope (c-AFM) lithography. The piezoelectric nature of $\text{LaAlO}_3/\text{SrTiO}_3$ gives way to an expected coupling between mechanical motion and electric charge within the device. We can test this effect by applying pressure to the device using an insulating AFM tip while measuring changes in electron density. A cryogenic AFM system is used to examine these effects, as many of the most interesting properties of these devices are only observed at low temperatures.

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