

Abstract Submitted
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Andreev bound state at a strongly correlated oxide interface¹

GUANGLEI CHENG, MICHELLE TOMCZYK, Univ. of Pittsburgh, ALEXANDRE TACLA, ANDREW DALEY, Univ. of Strathclyde, SHICHENG LU, JOSH VEAZEY, MENGCHEN HUANG, PATRICK IRVIN, Univ. of Pittsburgh, SANGWOO RYU, HYUNGWOO LEE, CHANG-BEOM EOM, Univ. of Wisconsin-Madison, DAVID PEKKER, JEREMY LEVY, Univ. of Pittsburgh — Strongly correlated electrons at oxide interfaces give rise to a set of novel physics phenomena including superconductivity and magnetism. At the $\text{LaAlO}_3/\text{SrTiO}_3$ (LAO/STO) interface, signatures of strong electron pairing persist even for conditions where superconductivity is suppressed. Meanwhile, an Andreev bound state (ABS) is a single quasiparticle excitation that mediates pair transport in confined superconductor-normal systems. Here we report a transition from pair resonant transport to ABS in sketched single electron transistors at the LAO/STO interface. This transition is consistent with a change of electron-electron interaction from attractive to repulsive, occurring at or near the Lifshitz transition. Such new electronically tunable electron-electron interaction may be useful for quantum simulation and engineering of novel quantum states in oxide materials.

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