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Quantum Transport in $LaAlO_3/SrTiO_3$ Nanowire Cavities[1] GUANGLEI CHENG, MICHELLE TOMCZYK, SHICHENG LU, MENGCHEN HUANG, JOSH VEAZEY, PATRICK IRVIN, University of Pittsburgh, SANGWOO RYU, CHANG-BEOM EOM, University of Wisconsin-Madison, JEREMY LEVY, University of Pittsburgh — Hybrid superconductor-nanowire devices have attracted extensive interest for quantum computation based on electron spins, superconducting quantum bits and Majorana fermions. Such devices, which regulate the flow of single Cooper pairs and electron quasiparticles, are conventionally created by aligning normal nanowires in intimate contact with superconductors. New opportunities for creating such devices exist using a new class of complex-oxide interfaces. In particular, the interface of two insulating oxides, $LaAlO_3$ and $SrTiO_3$, exhibits a rich set of gate-tunable phases including intrinsic superconductivity, metal-insulator transition, and spin-orbit interaction. Here we investigate a superconducting nanowire cavity created by reversible "write" and "erase" processes using a conductive atomic force microscope (c-AFM) tip.[2] Low-temperature magnetotransport experiments show that electrons can be subject to Coulomb blockade, Cooper pair tunneling, Andreev reflection and Fabry-Perot interference in a single device.

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[2]C. Cen *et al.* Nat. Mater. **7**, 298 (2008)

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