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Gated nonlocal transport in sketched oxide nanostructures[1]
SHICHENG LU, GUANGLEI CHENG, JOSHUA P. VEAZEY, PATRICK IRVIN, FENG BI, MENGCHEN HUANG, JEREMY LEVY, University of Pittsburgh, CHUNG-WUNG BARK, SANGWOO RYU, KWANG-HWAN CHO, CHANG-BEOM EOM, University of Wisconsin-Madison — The oxide heterostructure $LaAlO_3/SrTiO_3$ supports a two-dimensional electron liquid (2DEL) with a variety of competing phases including magnetism, superconductivity and weak antilocalization due to Rashba spin-orbit coupling. Further confinement of this 2DEL into quasi-one-dimensional regime can provide insight into the underlying physics of this system and reveal new behavior. Prior magnetotransport experiments on narrow $LaAlO_3/SrTiO_3$ structures created by a conductive atomic force microscope lithography technique have revealed large nonlocal resistances (as large as $10^4\Omega$), with separations between current and voltage that are large compared to the 2D mean-free path. To help understand the origin of this remarkable behavior, we perform electric gating of nanowire structures in order to vary the carrier density and possibly other interactions such as spin-orbit coupling strength.

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