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Transport Measurements of Mesoscopic Hall Bars on Strontium Titanate SAM STANWYCK, Department of Applied Physics, Stanford University, Stanford, CA, 94305, USA, PATRICK GALLAGHER, JAMES WILLIAMS, DAVID GOLDHABER-GORDON, Department of Physics, Stanford University, Stanford, CA, 94305, USA — We report low-temperature transport measurements of a two-dimensional electron system (2DES) at the surface of Strontium Titanate. We use electrolyte gating to create the 2DES, and then use nanopatterning techniques to define submicron constrictions with gate tunability. We observe features characteristic of superconducting transport through these small constrictions, including a critical current and critical field, but measure a nonzero resistance at zero bias. We consider possible explanations in light of these results, including large spatial inhomogeneities in the order parameter, as well as finite-size effects.

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