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Constriction based superconducting quantum interference devices at the $LaAlO_3/SrTiO_3$ interface EMRE MULAZIMOGLU, SRIJIT GOSWAMI, ANA M. R. V. L. MONTEIRO, Kavli Institute of Nanoscience, Delft University of Technology, The Netherlands, ROMAN WOELBING, DIETER KOELLE, REINHOLD KLEINER, Physikalisches Institut - Experimentalphysik II, Eberhard Karls Universitat Tuebingen, Germany, YAROSLAV BLANTER, LIEVEN M. K. VANDERSYPEN, ANDREA D. CAVIGLIA, Kavli Institute of Nanoscience, Delft University of Technology, The Netherlands — The two-dimensional (2D) superconductor formed at the interface between $LaAlO_3$ (LAO) and $SrTiO_3$ (STO) has been studied extensively and shows many intriguing properties. However, to date there exist no measurements which are sensitive to the phase of the superconducting order parameter, a fundamental prerequisite to understand the microscopic mechanism of the superconductivity. Here, we realize superconducting quantum interference devices (SQUIDs) at the LAO/STO interface. Using nanoscale patterning, we define sub-100 nm physical constrictions, which serve as weak links between superconducting reservoirs. The SQUIDs show clear flux-periodic oscillations in the critical current. Back gate and temperature dependent studies, in combination with numerical simulations, show that the low superfluid density of this 2D superconductor results in an exceptionally large, gate controllable kinetic inductance of the SQUID. This ability to perform phase-sensitive measurements opens up a completely new approach to study this unique interfacial superconductor.

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