

Abstract Submitted
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Local imaging of the superfluid density at the LAO/STO interface as a function of gate voltage JULIE A. BERT, BEENA KALISKY, CHRIS BELL, YASUYUKI HIKITA, HAROLD Y. HWANG, KATHRYN A. MOLER, Stanford Institute for Materials and Energy Sciences, Stanford University — The interface between two insulating oxides, LaAlO_3 and SrTiO_3 , exhibits a two-dimensional electron system with high mobility, magnetism, superconductivity at low temperatures, and an electric-field-tuned superconductor-insulator transition. This interface has been studied extensively using transport and magnetization, which do not directly probe potential variation on a local length scale. We use a scanning SQUID microscope to locally probe superconductivity and magnetism in LAO/STO heterostructures. We measure the local diamagnetic susceptibility and critical temperature of as a function of position and gate voltage. Our local susceptibility measurement is related to the density of superconducting carriers which gives us a map of superfluid density. We find that the superfluid density is inhomogeneous, showing regions of susceptibility that varies over a large fraction of the total response while the critical temperature remains relatively uniform across the sample. Tracking the evolution of both of these parameters as a function of gate voltage and position enables investigation of the local onset of the superconductor-insulator transitions on both sides of the dome.

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