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Room-Temperature Electronically-Controlled Ferromagnetism at the $LaAlO_3/SrTiO_3$ Interface[1] FENG BI, MENGCHEN HUANG, University of Pittsburgh, CHUNG-WUNG BARK, SANGWOO RYU, CHANG-BEOM EOM, University of Wisconsin-Madison, PATRICK IRVIN, JEREMY LEVY, University of Pittsburgh — Reports of emergent conductivity, superconductivity, and magnetism at oxide interfaces have helped to fuel intense interest in their rich physics and technological potential. We employ magnetic force microscopy to search for room-temperature magnetism in the well-studied $LaAlO_3/SrTiO_3$ system.[2] Using electrical top gating to deplete electrons from the oxide interface, we directly observe an in-plane ferromagnetic phase with sharply defined domain walls. Itinerant electrons, introduced by a top gate, align antiferromagnetically with the magnetization, at first screening and then destabilizing it as the conductive state is reached. Subsequent depletion of electrons results in a new, uncorrelated magnetic pattern. This newfound control over emergent magnetism at the interface between two nonmagnetic oxides portends a number of important technological applications.

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[2]F. Bi, *et al.*, arXiv:1307.5557

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