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Field effect tuning of superconductivity at the $LaAlO_3/SrTiO_3$ interface

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At interfaces between complex oxides, electronic systems with unusual properties can be generated [1]. As reported first by Ohtomo and Hwang [2], a highly mobile electron gas is formed at the interface between $LaAlO_3$ and $SrTiO_3$, two insulating dielectric perovskite oxides. It will be shown that the ground state of this system is superconducting [3]. The superconducting critical temperature is about 200mK. The field effect allows the normal state and superconducting state properties to be spectacularly tuned. The characteristics of the observed superconducting transitions are consistent with a superconducting sheet as thin as a few nm.

[1] "When oxides meet face to face". E. Dagotto, Science **318**, 1076 (2007)
[2] "A high mobility electron gas at the $LaAlO_3/SrTiO_3$ heterointerface". A. Ohtomo, H. Y. Hwang, Nature **427**, 423 (2004).
[3] "Superconducting interfaces between insulating oxides". N. Reyren, *et al.*, Science **317**, 1196 (2007).