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2D Superconductivity at the LaAlO₃/SrTiO₃ interface

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In 2004 Ohtomo and Hwang [1] discovered that the interface between two insulating oxides, LaAlO₃ and SrTiO₃ (both band insulators), is metallic with a high mobility. This publication triggered a lot of work around the world (see for instance [2, 3]). We have studied the ground state of this system and discovered superconductivity [4]. The studied LaAlO₃ samples are grown epitaxially by pulsed laser deposition on TiO₂-terminated SrTiO₃ substrates and are annealed in situ in oxygen. The superconducting properties in the LaAlO₃/SrTiO₃ heterostructures display signatures of 2D superconductivity and agree with the Beresinskii-Kosterlitz-Thouless (BKT) predictions. However, for low currents, IV curves show some deviation from the expected behavior of a perfect infinite 2D system. These deviations are attributed to the finite lateral size of the measured path. Experiments to probe this size effect have been done to check this interpretation.

[1] A. Ohtomo, H. Y. Hwang, *Nature* **427**, 423 (2004)

[2] S. Thiel, G. Hammerl, A. Schmehl, C. W. Schneider, J. Mannhart, *Science* **313**, 1942 (2006)

[3] A. Brinkman *et al*, *Nature Materials* **6**, 493 (2007)

[4] N. Reyren *et al*, *Science* **317**, 1196 (2007)