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Origins and Electronic Structure of the 2D Electron Gas at the LaAlO₃/SrTiO₃ Interface

Friday, 16 September 2011 14:30 (25 minutes)

A unique system at the SIS beamline combines two powerful condensed matter experimental tools: a pulsed laser deposition (PLD) growth chamber and high-resolution angle-resolved photoemission spectroscopy (ARPES), connected by in situ UHV transfer. The PLD-ARPES system allows us to study the momentum-resolved electronic structure of novel materials that have not previously been accessible to standalone ARPES. Recently we have investigated the metallic 2D electron gas (2DEG) formed at the interface of the bulk band insulators LaAlO₃ (LAO) and SrTiO₃ (STO). Our work has achieved the first correct, full determination of the Fermi surface of the 2DEG at the surface of electron-doped STO. Moreover, after depositing LAO over STO, we have directly observed the interfacial 2DEG. The side-by-side comparison of bare STO and LAO/STO gives important clues about the origins and physics of the electronic states at the interface.

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