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Parallel electron-hole bilayer conductivity from electronic interface reconstruction: Experiment ALEXANDER BRINKMAN, MARK HUIJBEN, JOSEE KLEIBEUKER, JEROEN HUIJBEN, HANS BOSCHKER, DAAN KOCKMANN, WOLTER SIEMONS, GERT KOSTER, HAROLD ZANDVLIET, GUUS RIJNDERS, DAVE BLANK, HANS HILGENKAMP, MESA+ Institute for Nanotechnology, University of Twente, The Netherlands — Electronic reconstruction at polar interfaces is the change in electronic properties to compensate an otherwise diverging electric potential. For the perovskite oxide $SrTiO_3$-$LaAlO_3$ model system we show that an additional capping $SrTiO_3$ layer prevents structural or chemical reconstruction at the $LaAlO_3$ surface and provides a possibility to accommodate holes. Magnetotransport, scanning tunneling microscopy and in situ ultraviolet photoelectron spectroscopy provide evidence for electronic reconstruction and for the presence of two spatially separated sheets with electron and hole carriers, that are as close as 1 nm, forming an excitingly versatile system to realize and study 2D excitonic phenomena.

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