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Bulk-like electronic structure at the surface of epitaxial $La_{1-x}Sr_xMnO_3$ films ERIC MONKMAN, CAROLINA ADAMO, DANIEL SHAI, DAWEI SHEN, JOHN HARTER, Cornell University, ILYA ELFIMOV, University of British Columbia, DARRELL SCHLOM, KYLE SHEN, Cornell University — We present direct measurements of the electronic structure of $La_{1-x}Sr_xMnO_3$ (LSMO) using a combined molecular beam epitaxy and angle-resolved photoelectron spectroscopy system. Our results allow for the first comparison between theory and experimental results over the entire Fermi surface in the ferromagnetic-metallic phase. We observe both of the predicted Fermi surface sheets, and find that the evolution of the Fermi surface shape with doping is consistent with a rigid-band shifting of the chemical potential. Measurements in the antiferromagnetic phase at $x > 0.5$ allow us to determine the changes in the low energy electronic structure linked to the magnetic phase transition. The ability of this surface sensitive technique to probe the bulk electronic structure of LSMO limits the possible depth of a surface dead layer. This conclusion is supported by density functional theory calculations for LSMO slabs, which indicate that the polarity of the (001) surface is efficiently screened within $\sim$1 unit cell.

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