

Abstract Submitted
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Strain control of electronic structure in $\text{La}_{2/3}\text{Sr}_{1/3}\text{MnO}_3$ ERIC MONKMAN, CAROLINA ADAMO, DANIEL SHAI, Cornell University, DAWEI SHEN, Shanghai Institute of Microsystem and Information Technology, JOHN HARTEK, Cornell University, CHARLES BROOKS, Pennsylvania State University, ILYA ELFIMOV, University of British Columbia, RICHARD HENNIG, DARRELL SCHLOM, KYLE SHEN, Cornell University — Introducing biaxial strain into complex oxide thin films by epitaxial growth on lattice mismatched substrates is a powerful approach to engineering electronic and magnetic properties not attainable in bulk materials. Due to the strong many-body interactions characteristic of transition metal oxides, a microscopic understanding of the mechanisms underlying strain-driven phase transitions remains unclear. Here we utilize an integrated oxide molecular-beam epitaxy and angle-resolved photoelectron spectroscopy system to directly measure the electronic structure of colossal magnetoresistive $\text{La}_{2/3}\text{Sr}_{1/3}\text{MnO}_3$ on four substrates, spanning -2.3% to +1.6% biaxial strain and two strain driven metal-insulator transitions. Contrary to conventional expectations of a bandwidth driven metal-insulator transition in strongly correlated systems, we find widely dispersive states in both insulating phases with finite weight at the Fermi level under compressive strain and a narrow gap under tensile strain. Our results point to two distinct mechanisms behind the metal-insulator transitions, and highlight the importance of phase coexistence and charge or orbital ordering in oxide thin films.

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