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In-situ Angle-Resolved Photoelectron Spectroscopy through the Metal-Insulator Transition in $(LaMnO_3)_{2n}(SrMnO_3)_n$ Superlattices ERIC MONKMAN, Physics Department, Cornell University, CAROLINA ADAMO, Department of Material Science and Engineering, Cornell University, JOHN HARTER, DAWEI SHEN, DANIEL SHAI, Physics Department, Cornell University, DARRELL SCHLOM, Department of Material Science and Engineering, Cornell University, KYLE SHEN, Physics Department, Cornell University — We report in-situ Angle-Resolved Photoelectron Spectroscopy (ARPES) studies of $(LaMnO_3)_{2n}(SrMnO_3)_n$ superlattices. Our combined Molecular Beam Epitaxy and ARPES system permits the growth and measurement of $(LaMnO_3)_{2n}(SrMnO_3)_n$ under ultra-high vacuum conditions, permitting high-resolution ARPES to be performed on these materials for the first time. Superlattices of this form exhibit a variety of electronic states as a function of "n" and temperature, including a transition from metallic to insulating behaviour for $n < 3$ to $n \geq 3$. We present ARPES measurements of the Fermi surface and remnant Fermi surface for metallic and insulating superlattices, and discuss the suppression of spectral weight at the Fermi level across the metal-insulator transition. We have directly observed band-mass renormalization in high-resolution ARPES data on metallic samples, and will discuss the implications to interactions with collective modes.

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