Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Determining the depth distribution of RIXS excitations through standing-wave excitation S. C. LIN, C.-T KUO, UC, Davis, G. GHIRINGHELLI, Y. Y. PING, Lab. Politecnico di Milano, G. DE LUCA, D. DI CASTRO, Lab. CNR-SPIN, N. BROOKES, ESRF, M. HUIJBEN, Lab. University of Twente, L. MORESCHINI, A. BOSTWICK, J. KORTRIGHT, J. MEYER-ILSE, E. GULLIKSON, LBNL, A. TALEB-IBRAHIMI, J. RAULT, Soleil synchrotron, S.-H. YANG, IBM Korea, L. BRAICOVICH, Lab. Politecnico di Milano, C. FADLEY, UC, Davis — The interface properties of oxide heterostructures exhibit novel physical effects that are due to the coupling of the charge, spin and orbital states. Resonant inelastic x-ray scattering (RIXS) is a powerful technique for studying in an element- and orbital specific way for charge transfer, *d*-*d*, magnetic, and other excitations, but it lacks depth resolution. Here we combine soft x-ray RIXS at the Cu L3 resonance with SW excitation to provide depth resolution and interface sensitivity, with first application to superconductor/half-metallic ferromagnetic multilayers of $(La_{1.85}Sr_{0.15}CuO_4)_n/(La_{0.66}Sr_{0.33}MnO_3)_m$ (LSCO/LSMO). The standing wave was swept along the direction normal to the sample surface by varying the incidence angle around the multilayer Bragg angle, producing "rocking curves" (RCs) of the intensities of individual excitations. The RCs of RIXS excitations are significantly different for samples grown on SrO- and TiO_2- terminated $SrTiO_3$, indicating different depth distributions. For the dd excitations of the TiO_2-terminated sample, the z^2 orbital excitations arise from the interface, while the xy and xz/yz orbital excitations arise from the bulk region of the LSCO layer.

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Date submitted: 14 Nov 2016 Electronic form version 1.4