Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Unravelling the Surface-to-Bulk Progression of the Electronic Structure in Sr_2RuO_4 CHRISTIAN N. VEENSTRA, Z.-H. ZHU, B. LUDBROOK, M. CAPSONI, G. LEVY, A. NICOLAOU, J.A. ROSEN, R. COMIN, I.S. ELFIMOV, A. DAMASCELLI, Quantum Matter Institute, UBC, Canada, S. KITTAKA, Y. MAENO, Kyoto University, Japan — We revisit the normal-state electronic structure of Sr_2RuO_4 by angle-resolved photoemission spectroscopy (ARPES) with improved data quality, as well as ab-initio band structure calculations in the local-density approximation (LDA) with the inclusion of spin-orbit coupling (SO). We find that the current model of a single surface layer $(\sqrt{2} \times \sqrt{2})$R45° reconstruction does not explain all detected features. The observed depth-dependent signal degradation, together with the close quantitative agreement with LDA+SO slab calculations based on the surface crystal structure as determined by low-energy electron diffraction (LEED), reveal that – at a minimum – the subsurface layer also undergoes a similar although weaker reconstruction. This model accounts for all features – a key step in understanding the electronic structure - and indicates a surface-to-bulk progression of the electronic states driven by structural instabilities, with no evidence for other phases stemming from either topological bulk properties or the interplay between SO and the broken symmetry of the surface.

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Date submitted: 09 Nov 2012 Electronic form version 1.4