Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Structural origin of apparent Fermi surface pockets in angle-resolved photoemission of $Bi_2Sr_{2-x}La_xCuO_{6+\delta}$ PHIL D.C. KING, W. MEEVASANA, University of St Andrews, J.A. ROSEN, University of British Columbia, A. TAMAI, E. ROZBICKI, University of St Andrews, R. COMIN, G. LEVY, D. FOURNIER, University of British Columbia, Y. YOSHIDA, H. EISAKI, NIAIST, Tsukuba, K.M. SHEN, Cornell University, N.J.C. INGLE, A. DAMASCELLI, University of British Columbia, F. BAUMBERGER, University of St Andrews — We observe *apparent* hole pockets in the Fermi surfaces of single-layer Bi-based cuprate superconductors from angle-resolved photoemission (ARPES). However, from an analysis of their polarization-dependence and detailed low-energy electron diffraction measurements, we show that these are not intrinsic, but due to multiple overlapping superstructure replicas of the main and shadow bands. We demonstrate that the hole pockets reported recently from APRES [Meng *et al.*, Nature **462**, 335 (2009)] have a similar structural origin, and are inconsistent with an intrinsic hole pocket associated with the electronic structure of a doped CuO_2 plane. The true nature of the Fermi surface topology in the enigmatic pseudogap phase therefore remains an open question.

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Date submitted: 05 Nov 2010 Electronic form version 1.4