Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

ARPES evidence for a unidirectional bond-direction order in La-based curates RUI-HUA HE, ALS-Stanford, M. HASHIMOTO, Stanford, K. TANAKA, S.-K. MO, ALS, T. SASAGAWA, TIT, M. FUJITA, T. ADACHI, K. YAMADA, Y. KOIKE, Tohoku, Z. HUSSAIN, ALS, Z.-X. SHEN, Stanford — Lattice translational symmetry breaking has wide implications with a variety of emergent quantum phases of condensed matters. In cuprate superconductors, various types of shadow bands have been observed in ARPES as band replicas that are displaced from the main bands by specific wave vectors in momentum space, suggestive of the breaking of lattice translational symmetry in different forms. Shadow bands associated with a wave vector along the Cu-O bond direction, were recently observed in a Y-based cuprate, which are ascribed to the unique occurrence of oxygen ordering in the CuO chains of the material. In contrast, the shadow bands reported so far in other cuprates without CuO chains in their crystal structures are associated with some wave vectors all along the bond-diagonal direction and it remains controversial, in most cases, whether they are due to some orderings of primarily structural or electronic origins. Here we report the first clear observation of shadow bands in ARPES associated with a bond-direction wave vector in the La-based cuprates (without CuO chains). These shadow bands were observed under various polarization conditions over a wide doping range in La2-xSrxCuO4 and are associated with a unidirectional order. We will present a doping and temperature dependence study of this order and discuss the results in relation to the complementary bulk-sensitive scattering experiments on the same system.

Rui-Hua He
ALS & Stanford

Date submitted: 21 Nov 2011 Electronic form version 1.4