Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Electronic structure modulations in the stripe phase of $\mathbf{La_{1.475}Nd_{0.4}Sr_{0.125}CuO_4}$ ANDREW ACHKAR, University of Waterloo, FEIZHOU HE, Canadian Light Source, RONNY SUTARTO, University of British Columbia, JOCHEN GECK, Leibniz Institute for Solid State and Materials Research IFW Dresden, HARRY ZHANG, YOUNG-JUNE KIM, University of Toronto, DAVID HAWTHORN, University of Waterloo — A prevailing description of the stripe phase in underdoped cuprate superconductors is that the charge carriers (holes) phase segregate into hole rich regions that form anti-phase boundaries between regions of anti-ferromagnetic order. I will present resonant elastic x-ray scattering measurements of stripe-ordered $La_{1.475}Nd_{0.4}Sr_{0.125}CuO_4$ at the Cu $L_{3,2}$ and O K absorption edges that point to an alternate interpretation of the stripe phase. Analysis of the energy dependence of the scattering intensity reveals that the dominant feature of the charge density wave state is a spatial modulation in the energies of Cu $3d$ and O $2p$ states rather than the large modulation of the valence (charge density) envisioned in the common stripe paradigm. These energy shifts are interpreted as a spatial modulation of the electronic structure, possibly involving a modulation of the Cu $3d$ – O $2p$ hopping, t_{pd}, the onsite Coulomb repulsion, U_{dd}, and other local electronic structure parameters. This result may point towards a valence-bond-solid interpretation of the stripe phase, where translational symmetry can be broken with minimal modulation of the charge density.

Andrew Achkar
University of Waterloo

Date submitted: 11 Nov 2011 Electronic form version 1.4