MAR11-2010-003280

Abstract for an Invited Paper
for the MAR11 Meeting of
the American Physical Society

Dynamics of bi-stripes and a colossal metal-insulator transition in the bi-layer manganite $\mathbf{La_{2-2x}Sr_{1+2x}Mn_2O_7}$ ($x \sim 0.59$)

ZHE SUN, University of Colorado, Boulder

Electronic phases with stripe patterns have been intensively investigated for their vital roles in novel properties of correlated electronic materials. How these real-space patterns affect the conductivity and other properties of materials (which are usually described in momentum space) is one of the major challenges of modern condensed matter physics. By studying the electronic structure of $La_{2-2x}Sr_{1+2x}Mn_2O_7$ ($x \sim 0.59$) and in combination with earlier scattering measurements, we demonstrate the variation of electronic properties accompanying the melting of so-called bi-stripes in this material. The static bi-stripes can strongly localize the electrons in the insulating phase above $T_c \sim 160$K, while mobile electrons grow up and coexist with a significant portion of localized electrons when the static bi-stripes melt below T_c. The presence of localized electrons below T_c suggests that the melting bi-stripes exist as a fluctuating counterpart. From static to melting, the bi-stripes lead to a "colossal" metal-insulator transition in this material. Work was done in collaboration with Q. Wang, A. V. Fedorov, H. Zheng, J. F. Mitchell, D. S. Dessau.