Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Sorting Category: 11.7 (E)

Fragile Magnetic Ground State in Half-Doped Manganite $LaSr_2Mn_2O_7$: Orbital Instability J.-S. LEE, C.-C. KAO, SSRL/SLAC, C.S. NELSON, BNL, S.B. KIM, Y.J. CHOI, S.-W. CHEONG, Rutgers Univ., S. SMADICI, P. ABBAMONTE, UIUC, H. JANG, K.-T. KO, J.-H. PARK, POSTECH — Recently, a careful doping control study, however, reported that the $La_{2-2x}Sr_{1+2x}Mn_2O_7$ material has an exotic phase diagram very near the half doping with extremely narrow antiferromagnetic phase boundaries at x$\simeq 0.5 \pm 0.005$ – the CE-type within the boundaries but the A-type outside.[1] To understand a complexity on this material's phase diagram, we investigated the orbital and antiferromagnetic ordering behaviors of the half-doped bilayer manganite $La_{2-2x}Sr_{1+2x}Mn_2O_7$ (x $\simeq$ 0.5) by using Mn $L_{2,3}$-edge resonant soft x-ray scattering. We confirmed the predicted CE-type antiferromagnetic order for the true half-doped (x = 0.5) case. Moreover, we found that such a narrow phase boundary is due to the close competition of the two antiferromagnetic ordering phases via $3d$ Mn e_g orbital instability. Our study reveals the spin and orbital orders of electrons in the sample as well as information about their ground states.[2]

[1]Q. Li *et al.*, Phys. Rev. Lett. 98, 167201 (2007).
[2]J.-S. Lee *et al.*, Phys. Rev. Lett. 107, 037206 (2011).

Jun-Sik Lee
jslee@slac.stanford.edu
SSRL, SLAC National Accelerator Laboratory

[X] Prefer Oral Session
[ ] Prefer Poster Session

Date submitted: 20 Jan 2012 Electronic form version 1.4