Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Electronic phase diagram in double layered ruthenates $(Sr_{1-x}Ca_x)_3Ru_2O_7$ Z.Q. MAO, Z. QU, J. PENG, T.J. LIU, D. FOBES, B. QIAN, Tulane University, L. SPINU, University of New Orleans — We previously established a magnetic phase diagram for $(Sr_{1-x}Ca_x)_3Ru_2O_7$ ($0 \leq x \leq 1$) using high quality single crystals grown by a floating-zone method [1]. This phase diagram exhibits rich magnetic properties. The magnetic ground state ranges from an itinerant metamagnetic state ($0 \leq x < 0.08$), to an unusual heavy-mass, nearly ferromagnetic (FM) state ($0.08 < x < 0.4$), and finally to an antiferromagnetic (AFM) state ($0.4 < x \leq 1$). In this talk we report the electronic properties of these magnetic states. We will show that the electronic and magnetic properties are strongly coupled in this system. The electronic ground state evolves from an AFM quasi-two-dimensional metal for $x = 1.0$, to an Anderson localized state for the AFM region $0.4 < x < 1.0$, and then to a weakly localized state, induced by magnetic scattering, for the nearly FM region $0.08 < x < 0.4$. When x approaches the critical composition 0.08, the localization weakens and non-Fermi liquid (FL) behavior occurs. The system eventually transforms into a FL ground state when the magnetic ground state switches to the itinerant metamagnetic state for $x < 0.08$. These results demonstrate the delicate balance among the charge, spin, lattice and orbital degrees of freedom in ruthenates.
[1] Z. Qu *et al.*, Phys. Rev B **78**, 180407 (2008).

Z.Q. Mao
Tulane University

Date submitted: 20 Nov 2008 Electronic form version 1.4