

Abstract Submitted  
for the MAR12 Meeting of  
The American Physical Society

**Origin of the Heavy-Fermion behavior in  $\text{Ca}_{2-x}\text{Sr}_x\text{RuO}_4$**  NAOYA ARAKAWA, MASAO OGATA, Department of Physics, The University of Tokyo — We investigate the electronic states in  $\text{Ca}_{2-x}\text{Sr}_x\text{RuO}_4$  for  $0.5 \leq x \leq 2.0$  on the basis of the three-orbital Hubbard model in the Gutzwiller approximation. We take the dominant effects of the Ca-substitution into account as the changes of the hybridizations, whose squares are proportional to the nearest-neighbor hopping integrals of the Ru- $t_{2g}$ -orbitals, between the Ru- $4d$ - and O- $2p$ -orbitals. In this presentation, we show the renormalization factors for the Ru  $t_{2g}$ -orbitals as a function of the intraorbital Coulomb interaction or an angle of the rotation of RuO<sub>6</sub>-octahedra and discuss the origin of the heavy-fermion behavior around  $x = 0.5$ . Our calculation suggests that moderately strong Coulomb interaction and the orbital-dependent modifications of the electronic structures for the Ru- $t_{2g}$ -orbitals due to the Ca-substitution cause the heavy-fermion behavior in  $\text{Ca}_{2-x}\text{Sr}_x\text{RuO}_4$ .

Naoya Arakawa  
Department of Physics, The University of Tokyo

Date submitted: 30 Nov 2011

Electronic form version 1.4