Evolution of spin order across the phase diagram of $Sr_3(Ir_{1-x}Ru_x)_2O_7$

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The oxides of iridium where iridium is in its 4^+ valence state are subjects of recent interest due to presence of multiple exotic interesting phases they host which arise due to complex interplay between spin-orbit interaction, coulomb interaction, and lattice distortion. The Ruddelsden-Popper series oxides [$Sr_{n+1}Ir_nO_{3n+1}$] are some of the key systems to study. Our current study is focused in understanding the electronic and magnetic phase behavior of doped bilayer system $Sr_3(Ir_{1-x}Ru_x)O_7$.

As part of comprehensive transport, magnetization and neutron scattering study, we performed neutron scattering experiments in N-5 and C-5 triple axis spectrometers in CNBC on multiple samples of $Sr_3(Ir_{1-x}Ru_x)_2O_7$ from room temperature down to 4K.

This study mapped out the complete electronic-magnetic phase diagram of this doped bilayer system with the identification of different temperature scales and electronic phases across the phase diagram. The neutron diffraction experiments unambiguously showed that the spin structure remains same across the phase diagram however the variation of ordered moment is non-monotonic. Our study emphasizes the importance of electronic correlations in these families of compounds. This work is recently published in Nature communication paper [Dhital et al. *Nature Communications* **5**, Article number:337 doi:10.1038/ncomms4377].

References

[1] C. Dhital, T. Hogan, W. Zhou, X. Chen, Z. Ren, M. Pokharel, Y. Okada, M. Heine, W. Tian, and Z. Yamani, Nature communications **5** (2014)

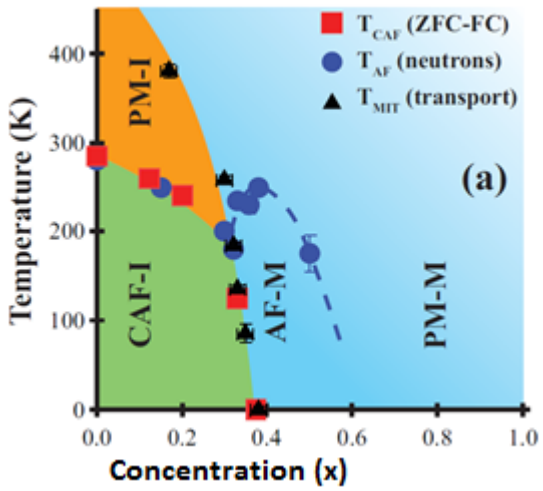

Figure 1 electronic phase diagram of doped bilayer system $Sr_3(Ir_{1-x}Ru_x)_2O_7$ [1]