

# Condensed Matter Theory Center Seminar



Friday, February 8  
11:00 am – 12:30 pm, Physics Building 2205

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### “Double Perovskites: From Half-Metals to Multi-orbital Mott Insulators”

Double perovskites (DPs)  $A_2BB'O_6$  are two interpenetrating perovskites  $ABO_3$  and  $AB'O_3$  arranged on a 3D checkerboard lattice, with a wide range of properties. In this talk, I will focus on theoretical analysis of two DPs that show interesting magnetism well above room temperature.

First, I will discuss the half-metallic behavior of  $Sr_2FeMoO_6$  which has a ferromagnetic  $T_c = 420K$ . I will derive a new effective Hamiltonian and present finite temperature calculations incorporating the effects of disorder, ubiquitous in these materials. I will conclude with a proposal to increase  $T_c$  without sacrificing spin polarization [1].

Second, I will focus on  $Sr_2CrOsO_6$ , which has the highest  $T_c = 720K$  among all perovskites with a net moment. I will derive a new Mott criterion for this multi-band material and argue that it is an insulator. I will show that the unusual magnetic properties of this material arise from frustrated exchange couplings, and its high  $T_c$  has its origins in an effective interaction arising from a combination of 3d and 5d transition metals [2].

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Work done in collaboration with O. N. Meetei, A. Mukherjee, M. Randeria, N. Trivedi, and P. Woodward

[1] Phys. Rev. Lett. **107**, 257201 (2011); arXiv:1210.6689; arXiv:1210.6689.

[2] arXiv:1205.1811.

(All are welcome to attend)

