Abstract Submitted
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**Spin orbit coupled magnetism and transport in double perovskites**[1] ARUN PARAMEKANTI, ASHLEY COOK, University of Toronto — We consider a model of the double perovskite $Ba_2FeReO_6$, a room temperature ferrimagnet with correlated and spin-orbit coupled Re $t_{2g}$ electrons moving in the background of Fe moments stabilized by Hund's coupling. We show that for such 3d/5d double perovskites, strong correlations on the 5d-element (Re) are essential in driving a half-metallic ground state. Incorporating both strong spin-orbit coupling and the Hubbard repulsion on Re, we uncover (i) Weyl nodes in the band structure, (ii) a significant anomalous Hall effect with hole doping, and (iii) a large spin polarization at the Fermi level. We also obtain a semi-quantitative understanding of (i) the saturation magnetization of $Ba_2FeReO_6$, (ii) X-ray magnetic circular dichroism data indicating a significant orbital magnetization, and (iii) the tetragonal distortion accompanying ferrimagnetic order. Strong correlations also lead to local moment formation on Re, and the calculated dynamic spin structure within a local moment picture is in good agreement with neutron scattering experiments. We will also discuss generalizations to other 3d/5d oxides.

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