

Abstract Submitted  
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**Topological phases in  $R_2Ir_2O_7$**  GANG CHEN, MICHAEL HERMELE, CU Boulder — We construct and analyze a theoretical model for the pyrochlore iridates  $R_2Ir_2O_7$  with R (= Pr, Nd, Sm, Gd, Tb, Dy, Ho, Yb) magnetic. The electrons on trivalent rare earth ions  $R^{3+}$  form local Ising doublets due to the local crystal field. Based on a space group symmetry analysis, we write down the generic Kondo coupling between the Ising spin at R sites and the effective spin at Ir sites. Besides this interaction, we also include direct electron tunneling between Ir sites and indirect electron tunneling via intermediate oxygens for Ir-Ir coupling. This simple minimal model gives a rich phase diagram with broad regions of topological semi-metal and axion insulator phases. Based on these findings, we propose  $R_2Ir_2O_7$  to be one of the most promising candidates to realize the topological semi-metal and axion insulator phases. Implications for existing and future experiments are discussed.

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