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Quantum phase transitions and anomalous Hall effect in a pyrochlore Kondo lattice SARAH GREFE, Rice University, WENXIN DING, University of California Santa Cruz, QIMIAO SI, Rice University — The metallic variant of the pyrochlore iridates $Pr_2Ir_2O_7$ has shown characteristics of a possible chiral spin liquid state [PRL **96** 087204 (2006), PRL **98**, 057203 (2007), Nature **463**, 210 (2010)] and quantum criticality [Nat. Mater. **13**, 356 (2014)]. An important question surrounding the significant anomalous Hall response observed in $Pr_2Ir_2O_7$ is the nature of the f-electron local moments, including their Kondo coupling with the conduction d-electrons. The heavy effective mass and related thermodynamic characteristics indicate the involvement of the Kondo effect in this system's electronic properties. In this work, we study the effects of Kondo coupling on candidate time-reversal-symmetry-breaking spin liquid states on the pyrochlore lattice. Representing the f-moments as slave fermions Kondo-coupled to conduction electrons, we study the competition between Kondo-singlet formation and chiral spin correlations and determine the zero-temperature phase diagram. We derive an effective chiral interaction between the local moments and the conduction electrons and calculate the anomalous Hall response across the quantum phase transition from the Kondo destroyed phase to the Kondo screened phase. We discuss our results' implications for $Pr_2Ir_2O_7$ and related frustrated Kondo-lattice systems.

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