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Quantum phase transitions and anomalous Hall effect in frustrated Kondo lattices SILKE PASCHEN, Institute of Solid State Physics, Vienna University of Technology, SARAH ELAINE GREFE, Rice University, WENXIN DING, University of California Santa Cruz, QIMIAO SI, Rice University — Among the pyrochlore iridates, the metallic compound $Pr_2Ir_2O_7$ (Pr-227) 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-227 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 systems electronic properties. In this work, we study the effects of Kondo coupling on candidate time-reversal-symmetry-breaking spin liquid states on frustrated lattices. Representing the f-moments as slave fermions Kondo-coupled to conduction electrons, we study the competition between Kondo-singlet formation and chiral spin correlations. 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-227 and related frustrated Kondo-lattice systems.

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