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Hastatic order in the two-channel Kondo-Heisenberg model GUANGHUA ZHANG, REBECCA FLINT, Iowa State Univ Ames Lab — Understanding Kondo physics in materials with non-Kramers doublets requires understanding the two channel Kondo effect, as valence fluctuations are from a non-Kramers doublet ground state to an excited Kramers doublet. Here, the development of a heavy Fermi liquid requires a channel symmetry breaking hybridization. This order, which breaks both single and double time-reversal symmetry was recently introduced as hastatic order. Here we employ an SU(N) fermionic mean-field treatment of the two-channel Kondo-Heisenberg model on a square lattice to explore properties of hastatic order and particularly the competition between the hastatic order and magnetism, as embodied by a spin liquid phase in our model. For simplicity, only a momentum independent hybrization between the non-Kramers f^2 states and conduction electrons is considered. Upon varying the RKKY coupling and conduction electron density, we find both uniform and staggered[$\mathbf{Q} = (\pi, \pi)$] hastatic order, in addition to the spin liquid phase, with metal-insulator transitions, including Lifshitz transitions inside the staggered phase. As the band degeneracy of the conduction electron bands is broken, the uniform hastatic order is partially suppressed compared to the staggered phase.

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