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Quantum PhaseTransitions and Exotic Phases in Metallic Helimagnets[1]

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I will review some of the current theoretical understanding of the exotic properties of chiral magnets, in particular the metallic helimagnet MnSi. In the ordered phase, a helical Goldstone mode leads to corrections to Fermi-liquid behavior, and to a non-Fermi liquid single-particle relaxation rate [1]. On the phase boundary, a tricritical point pushes the quantum critical point to a nonzero external magnetic field, where the quantum critical behavior has been determined exactly [2]. In the disordered phase, an analogy with chiral liquid crystals suggests a first-order transition from a chiral liquid to a chiral gas as an explanation for neutron scattering data [3]. The observed non-Fermi-liquid transport behavior in the disordered phase [4] remains an open problem.

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[4] C. Pfleiderer, S.R. Julian, and G.G. Lonzarich, Nature **414**, 427 (2004).

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