Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Influence of Goldstone modes on the electronic properties of helical magnets YAN SANG, DIETRICH BELITZ, University of Oregon, KWAN-YUET HO, TED KIRKPATRICK, University of Maryland — We have investigated the influence of Goldstone modes on the electronic properties of helical magnets, such as MnSi, in which a Dzyaloshinsky-Moriya term in the action leads to helical order with a pitch wave number q [1]. In the presence of a homogeneous external magnetic field H the helix is superimposed by a homogeneous magnetization, which leads to a conical phase [2]. The Goldstone mode in this conical phase has the form $\Omega^2 \propto c_z k_z^2 + c_\perp k_\perp^4/q^2 + c_H k_\perp^2$, where k_z and $k_\perp$ denote the components of the wave vector parallel and perpendicular to H, respectively. The elastic constants c_z and $c_\perp$ are independent of H for small H, whereas $c_H \propto H^2$. This Goldstone mode couples to the conduction electrons and leads to nonanalytic temperature dependences of various observables. In the conical phase, the strongest effect is on the thermal conductivity and the single-particle relaxation rate, which both are proportional to $T^{3/2}$. We also report results for the specific heat and the electrical resisitivity, both in the conical phase and in other phases of MnSi [3]. [1] P. Bak and M.H. Jensen, J. Phys. C 13, L881 (1980). [2] Y. Ishikawa, G. Shirane, J.A. Tarvin, and M. Kohgi, Phys. Rev. B 16, 4956 (1977). [3] Kwan-yuet Ho, T.R. Kirkpatrick, Yan Sang, D. Belitz, Phys. Rev. B 82, 134427 (2010)

Yan Sang
University of Oregon

Date submitted: 16 Nov 2010 Electronic form version 1.4