

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Magnetic domains in itinerant metamagnets BENEDIKT BINZ, Department of Physics, University of California, 366 Le Conte Hall #7300, Berkeley, CA 94720-7300, HANS-BENJAMIN BRAUN, Department of Mathematical Physics, University College Dublin, National University of Ireland Dublin, Belfield, Dublin 4, Ireland, T. MAURICE RICE, MANFRED SIGRIST, Theoretische Physik, ETH-Honggerberg, CH-8093 Zurich, Switzerland — Experimental results of the metamagnetism in $\text{Sr}_2\text{Ru}_2\text{O}_7$ give strong evidence for a new type of quantum critical behavior, namely a quantum critical end point [S. A. Grigera *et. al.*, *Science* **294**, 329 (2001)]. Our study shows that this behavior can be caused by band structure effects, e.g. by the vicinity of a van Hove singularity. Based on a mean field analysis, a phase diagram for the multi-layer ruthenates is developed as a function of magnetic field and band filling, showing the presence of a quantum critical end point which terminates a first-order phase boundary. At the end point, the Fermi level of the majority-spin band is precisely located at the Van Hove singularity. Thus, the system is rather susceptible to disorder effects. We investigate the possible appearance of Condon-domain like structures in a metamagnetic system. Condon-domains are the result of the coexistence of two magnetic phases at a first-order phase transition and may influence the motion of carriers via domain-wall scattering. We discuss the physical consequences and propose new test experiments.

Benedikt Binz
Department of Physics, University of California
366 Le Conte Hall #7300, Berkeley, CA 94720-7300

Date submitted: 04 Dec 2004

Electronic form version 1.4