Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Quantum criticality in the Bose-Fermi Kondo model and the quantum-to-classical mapping STEFAN KIRCHNER, QIMIAO SI, Rice University — The Bose-Fermi Kondo model (BFKM) occurs as the effective quantum impurity model within the Extended Dynamical Mean Field Theory (EDMFT) for quantum critical heavy fermion metals. The quantum critical point (QCP) of the BFK is therefore related to the one in the Kondo lattice model, the relevant low-energy model for heavy fermion compounds. There have been indications that the QCP of the BFKM cannot be described in terms of a local O(3)-symmetric ϕ^4-theory as predicted by the quantum-to-classical mapping, but the issue remains to be settled. In this work we demonstrate that the quantum-to-classical mapping for the spin-isotropic SU(N) BFKM breaks down in a large N limit[1]. We also show that this feature is associated with the Berry phase term of the spin path integral and therefore persists for finite N [2]. We analyzse the influence of this breakdown on the dynamic scaling properties of the Kondo lattice obtained through the EDMFT, and also discuss the connection of our results with those of the Ising-anisotropic BFKM. [1] L. Zhu, S. Kirchner, Q. Si and A. Georges, PRL 93, 267201 (2004). [2] S. Kirchner and Q. Si, arXiv:0808.2647 (2008).

Stefan Kirchner
Rice University

Date submitted: 21 Nov 2008 Electronic form version 1.4