

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Kondo and spin-Peierls phases and Berry phase effects in Heisenberg-Kondo chain¹ PALLAB GOSWAMI, QIMIAO SI, Rice University — Recent theoretical and experimental results on heavy fermion systems have motivated a global phase diagram, as a function of the Kondo coupling and the strength of quantum fluctuations of the local moments. Correspondingly, there has been growing interest in understanding the phase transition from a small Fermi surface antiferromagnet to large or small Fermi surface paramagnets with or without Kondo screening respectively. Because a perturbative nonlinear sigma model analysis only accesses the small Fermi surface antiferromagnetic phase, the transition into the paramagnetic phases must involve non-perturbative effects. We consider here the effect of the instanton configurations of the nonlinear sigma model and the associated Berry's phase for the Kondo singlet formation, and for concreteness focus on the one dimensional Heisenberg Kondo lattice model. Using semiclassical nonlinear sigma model and bosonization techniques both at and away from half-filling, we demonstrate how the competition between the Kondo singlet and spin Peierls phases are manifested through the effects of such a Berry phase. Based on these results we comment upon similar effects that may be realized in higher dimensional Kondo lattice models.

¹NSF

Pallab Goswami
Rice University

Date submitted: 19 Nov 2010

Electronic form version 1.4