Functional Matter Seminar

4.7.2008 11:00

Institut für Festkörperphysik, Seminarraum E138B, 7. Stock, rot,

Wiedner Hauptstr. 8-10

Quantum Criticality out of Equilibrium: Steady State in a Magnetic Single-Electron Transistor

Stefan Kirchner

Physics and Astronom, Rice University, Houston, USA

Continuous quantum phase transitions are of extensive current interest in a variety of strongly correlated electronic and atomic systems. In such a quantum critical state, there is no intrinsic energy scale in the excitation spectrum and external probes will readily drive the system out of equilibrium, such that the standard notion of linear response breaks down. Quantum critical systems out of equilibrium are therefore of extensive interest, but are in general difficult to study theoretically.

In this talk, I will address the steady state limit of a single electron transistor attached to ferromagnetic leads and subjected to a finite bias voltage. In equilibrium this system undergoes a continuous quantum phase transition with a critical destruction of the Kondo effect. The destruction of Kondo screening here shares similarities with its counterpart discussed in the context of heavy fermion quantum criticality. The current-voltage characteristics covering both the linear and non-linear regimes will be discussed and the scaling properties of the fluctuation-dissipation ratios and the decoherence properties will be elucidated. Finally, I will discuss the feasibility to experimentally measure the scaling functions of the local charge and spin response.

Host: S. Bühler-Paschen