

**Universität Leipzig**

Fakultät für Physik und Geowissenschaften

Institut für Theoretische Physik

**Seminar**

# **Festkörperphysik**

Am Donnerstag, **09.06.2011**, um **15:15 Uhr** spricht

**Prof. Dr. Dirk K. Morr**

Department of Physics, University of Illinois, Chicago

über

## **"Quantum Interference, Hidden Order and Defects in Heavy-Fermion Materials"**

**Abstract:** Heavy fermion materials exhibit a plethora of unconventional phenomena, ranging from a *hidden order state* to *quantum criticality*. Recent groundbreaking scanning tunnelling spectroscopy (STS) experiments have provided unprecedented insight into the complex electronic structure of these materials, and might therefore hold the key to identifying the microscopic origin of their puzzling properties. In this talk, I focus on three important theoretical issues raised by these experiments. First, I demonstrate that  $dI=dV$  and the quasi-particle interference pattern measured below the hidden order transition in URu<sub>2</sub>Si<sub>2</sub> are consistent with the emergence of a coherent Kondo lattice, whose formation is driven by a significant reduction in the quasiparticle decoherence. Second, I show that defects provide insight into the electronic and magnetic structure of heavy-fermion materials. In particular, I demonstrate that defects lead to bound states and hybridization waves, which have recently been observed for the very first time. Third, I will discuss the effects of magnetic fields and show how they alter the spatial form of hybridization waves.

**Ort:** SR 224, Linnéstraße 5

*Interessenten sind herzlich eingeladen!*

gez. Prof. Haase und Prof. Rosenow