

Heavy-Fermion: an ideal platform to study superconductivity and other quantum states



- Time: 4:00pm, Oct. 9, 2013(Wednesday)
- 时间: 2013年10月9日 (周三) 下午4:00
- Venue: Conference Room 607, Science Building 5
- 地点: 理科5号楼607

Heavy-Fermion materials have displayed rich physics ever since their discovery and unconventional superconductivity usually emerge as the system is tuned to a magnetic quantum critical point, suggesting magnetic spin fluctuations as the pairing glue. Superconductivity in CeIrIn₅, sometimes considered as the unique member in the CeMIn₅ family, is proposed to be related to a valence-instability. However, we demonstrate a unified pairing picture among CeMIn₅ with field-rotating heat capacity measurements. The salient textured superconductivity in CeIrIn₅ is also commonly observed in other heavy-Fermion materials in the presence of competing orders such as magnetism in CeRhIn₅. For CeCoIn₅, Cd doping and pressure act as reversible tuning parameters between magnetism and superconductivity. In contrast, a local droplet model is more consistent with the absence of quantum criticality as observed in the experiment, indicating an inhomogeneous electronic state in the Cd-doped CeCoIn₅. If time permits, I will also discuss the application of point-contact spectroscopy in heavy fermion systems.

LU Xin () has joined the center for correlated center at Zhejiang University since early 2013 as a Special Researcher. He received his bachelor's degree in physics from Peking University in 2003 and his Ph. D in condensed matter physics from University of Illinois at Urbana-Champaign in 2009. He has worked in Dr. Joe Thompson's group in Los Alamos National Laboratory as a postdoc researcher. His research focus now is on heavy-Fermion systems to study their quantum criticality and superconducting behaviors under extreme conditions (high pressure and low temperature...) through novel transport and thermodynamic measurements such as ac calorimetry and point-contact spectroscopy under pressure.