# 北京大学量子材料科学中心

# International Center for Quantum Materials, PKU

## Special Seminar

## 4f QUANTUM CRITICALITY: IN SEARCH FOR MODEL SYSTEMS


**Sergey L. Bud'ko**

*Ames Laboratory US DOE and Department of Physics and Astronomy, Iowa State University*


**Time: 10:00am, May 5, 2016 (Tursday)**

**时间: 2016年5月5日 （周四）上午10:00**

**Venue: w563, Physics building, Peking University**

**地点：北京大学物理楼，西563会议室**

### Abstract


A brief overview of our recent studies of quantum criticality in 4f-based intermetallics will be given.

Ytterbium-based heavy fermion systems that could be tuned to the quantum critical point by application of magnetic field have been limited to relatively few examples. In the first part of the talk magnetic field induced quantum criticality in two stoichiometric compounds, hexagonal YbAgGe and cubic YbPtBi will be examined. Whereas the former exhibits reach and complex H - T phase diagram with a number of magnetic phases, the latter has a fragile, antiferromagnetic, SDW-like ground state. Transport and thermodynamic measurements in both compounds indicate existence of a crossover magnetic field associated with QCP (possibly associated with changes in the Fermi surface at the QCP). Both materials clearly show a non-Fermi liquid region adjacent to QCP. Position of YbAgGe and YbPtBi on a global phase diagram for heavy fermions that combines effects of Kondo coupling and magnetic frustration will be discussed.

Pressure induced quantum criticality in the $YbTM_2Zn_{20}$ (in particular, $YbFe_2Zn_{20}$) will be addressed in the second part of the talk, followed by presentation of the substitutional study in the $Ce_{1-x}La_xCu_2Ge_2$ family that shows remarkably robust and correlated coherence and antiferromagnetism.


### About the Speaker

Sergey Bud'ko is a staff scientist in Ames Lab. He received M.S. and Ph.D. in Solid State Physics, Moscow Institute of Physics and Technology. He had worked at Texas Center for Superconductivity, University of Houston (1991-93) and Centro Brasileiro de Pesquisas Fisicas, Rio de Janeiro (1993-95) before joining Ames Lab in 1995. Sergey Bud'ko interests in the thermodynamic (magnetization, heat capacity, thermal expansion) and transport (resistivity, Hall effect, thermoelectric power) properties of novel materials and materials with novel ground states in multi-extreme conditions (low temperatures, high magnetic fields, high pressure), Mossbauer spectroscopy; quantum oscillations, density waves, metamagnetism, strong electronic correlations, quantum criticality.