

ÚSTAVNÍ SEMINÁŘ

ve středu dne **20. dubna 2016** v 15:00

v přednáškovém sále Fyzikálního ústavu AV ČR na Slovance

Program:

L. H. Tjeng

Max Planck Institute for Chemical Physics of Solids, Dresden, Germany

Spin-spin correlations, spin-orbit/Hund's coupling, and metal-insulator transition in Ca_2RuO_4

Abstract:

Single layered perovskite Ca_2RuO_4 has an independent metal-insulator and magnetic phase transition as a function of temperature. Accompanied by crystal structure distortion, Ca_2RuO_4 changes from paramagnetic metal to a paramagnetic insulator below ~ 375 K, transforming later to an antiferromagnetic insulator ~ 110 K. We performed bulk sensitive hard x-ray photoelectron spectroscopy and report the temperature dependent evolution of the valence band spectra across all the three phases in Ca_2RuO_4 . Opening of a gap is observed in the valence band spectra across the metal-insulator transition (MIT), but with an atypically huge transfer of spectral weight. We discover another, hitherto unreported large spectral weight transfer and an additional enhancement of the gap across the magnetic transition. X-ray absorption spectroscopy measurements reveal a strong temperature dependence of the orbital occupation both below MIT and below the magnetic transition, though the latter is not enough to explain the enormous spectral weight transfer observed in the valence band spectra. Using a two-site three-orbital Hubbard model, we demonstrate the relevance of the inter-site spin-spin correlations in comprehending the spectral weight transfer and gap enhancement. An ubiquitous well resolved two-peak structure close to the Fermi level is present at all temperatures, which can be linked to the Ru 4d t_{2g} orbitals that are split as a result of the Hund's coupling between the opposite spin channels. Work done in collaboration with: Yuki Utsumi, Deepa Kasinathan, Stefano Agrestini, Kyung-Tae Ko, Maurits W. Haverkort, Alexander C. Komarek, Yen-Fa Liao, Ku-Ding Tsuei, Daniel Khomskii.

Prof. Dr. Liu Hao Tjeng was born on April 14, 1959 in Medan, Indonesia. He studied physics at the University of Technology Twente in Enschede, The Netherlands (1977-1985), and realized his PhD. thesis with Prof. Dr. G.A. Sawatzky, Solid State Physics Laboratory, University of Groningen, Groningen, The Netherlands (1986-1990). L. H. Tjeng worked as a postdoc at AT&T Bell Laboratories, Murray Hill, USA (1990-1992) and at the University of Michigan, Ann Arbor, USA (1992-1993). Then he returned to the Netherlands and was employed at the Royal Netherlands Academy of Sciences as a researcher (1993-1998), and as university associate professor at the Solid State Physics Laboratory, University of Groningen, Groningen, The Netherlands. He moved to the University of Cologne, Germany in 2001 and worked there until 2009 as C4 Professor, Lehrstuhl für Angewandte Physik. He is the director and scientific member at the Max Planck Institute for Chemical Physics of Solids since October 2009.

Seminář bude přednesen v anglickém jazyce.

prof. Jan Řídký, DrSc.
ředitel