北京大学量子材料科学中心

Weekly Seminar

Weiqiang Yu

Renmin University of China

Time: 4:00pm, Sept. 24, 2014 (Wednesday)

2014 9 24 4:00

Venue: Room 607, Conference Room A , Science Building 5

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In iron-based high-temperature superconductors, the correlations between orbital ordering, spin fluctuations and superconductivity are believed to be very important ingredients for understanding the pairing mechanism. Nuclear magnetic resonance (NMR), as a local probe, reveals rich information on electron spin, charge, and orbital properties of this class of materials, and therefore allows for investigating the couplings among different electron degrees of freedom.

In the last several years, our NMR studies have established clear evidences for the existence of either low-energy or high-energy spin fluctuations in many iron-based superconductors, which supports the magnetic origin of superconductivity. In particular, the high-pressure NMR on several very different systems, including an electron overdoped compound $NaFe_{1-x}Co_xAs$ and a hole overdoped compound KFe_2As_2, revealed their closeness to a magnetic quantum critical point under structure tuning, whereas long-range order antiferromagnetism is absent. Most intriguingly, both the superconducting transition temperature T_C and the low-energy spin fluctuations have identical non-monotonic dependences on pressure, although with reversed trends for the electron-doped and the hole-doped case. Orbital ordering instability is also suggested to enhance the low-energy spin fluctuations significantly. These observations link the strong electron correlation effects with a magnetic origin, and also indicate large contributions to superconductivity from spin fluctuations, and also possibly orbital ordering, in these compounds.

Dr. Weiqiang Yu graduated from Beijing Normal University with a Batcher in 1996 and with a Master's degree in 1999. In 2004, he received his PhD degree in Condensed matter Physics at UCLA. He then worked as a research associate at the University of Maryland and at the McMaster University. In 2008, he became a full professor at the physics department of Renmin University of China.

Dr. Yu uses condensed-matter NMR spectroscopy, combined with low-temperature and high-pressure techniques, to study unconventional superconductors and quantum magnets. He has published more than 50 papers, with eight in physical review letters and with over 1400 citations. He is currently supported by the "Excellent Young Scientist Foundation of NSFC (2012)".