平成 28 年度第 2 回 VBL セミナー

2nd VBL Seminar, 2016

日時：平成 **28** 年 **11** 月 **10** 日（木）**10** 時 **00** 分～**12** 時 **00** 分

場所：**VBL** ミーティングルーム**(VBL 3** 階**)**

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題目： **Novel phase transitions in Fe-based superconductors**

Abstract: It is generally accepted that parent compounds of Fe-based superconductors (FBS) are antiferromagnets with the long-range spin density wave phase (SDW) at temperatures below Néel temperature (T_N) (usually ~ 100K). Chemical doping, pressure or strain suppress SDW phase and induce superconductivity. In the first part of the talk, I will discuss our recent study of the multi-band effects in the vicinity of the quantum critical point in P-doped $BaFe_2As_2$ thin films.

Usually, FBS have tetragonal crystal structure at high temperatures above the structural transition temperature (T_s), which is quite close to T_N in most of cases. However, in some classes T_s and T_N differ considerably. In the temperature range $T_s < T < T_N$ exotic electronic nematic phase was found. This phase brakes the rotational symmetry of the lattice and results in in-plane anisotropic physical properties. The $Ca_{10}(Pt_3As_8)((Fe_{1-x}Pt_x)_2As_2)_5$ (10-3-8) system is different from this picture. 10-3-8 has a triclinic crystal structure up to room temperature. Therefore, the rotational symmetry of the lattice is broken already at room temperature. We show that this results in a high temperature electronic nematicity. As the temperature decreases, the pseudo gap opens which finally coexists with superconductivity and low temperature SDW phase.

Typically, electronic nematic phase of iron pnictides is magnetic in origin. In this phase the magnetic moments have a preferred orientation in the *ab*-plane but without long-range magnetic order in contrast to SDW phase. On the other hand, in FeSe it is believed that nematic phase is non-magnetic and electronic nematicity is related to the orbital order. In this talk I will show the muon spin rotation and relaxation (μSR) result of a clean FeSe single crystals with negligibly small amount of Fe excess < 0.1%. The μSR data clearly demonstrate the presence of short-range static magnetism with a very low magnetic moment appeared above the structural transition T_s ~ 90 K. The possible scenarios for the magnetism in FeSe are discussed.

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