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Kondo effect and quantum criticality in Ce-based pnictides

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The pnictides have not only triggered enthusiasm in searches for high-T_c superconductors, but also paved a new way for investigating the Kondo effect and quantum criticality. In this talk, I will start with the phase diagram of $CeFeAs_{1-x}P_xO$ which hosts two possible quantum critical points (QCPs) [1]. Due to the entanglement of $3d$ and 4f magnetism, CeFeAsO is not a good candidate for investigating quantum criticality, therefore we turned to CeNiAsO. The Ce-sublattice shows two successive AFM transitions at T_{N1} =9.3 K and T_{N2} =7.3 K, while the Ni-sublattice is nonmagnetic [2]. Under pressure, both AFM transitions are suppressed, and a QCP is obtained at p_c =6.5 kbar. Similar phenomenon was also observed by P/As-substitution, which leads to a critical doping at x_c =0.4. The quantum fluctuations near these QCPs are discussed, and the possibility of a Kondo-destruction type QCP is addressed [3]. Finally, I will briefly talk about the pressure effect on the 122 cousin, $CeNi_2As_2$ [4], which seems to provide a rare paradigm of quantum criticality in the low carrier density limit.

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