

Localized and itinerant dichotomy of electrons in Iron pnictides

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We systematically studied the transport properties of single crystals $\text{Ba}(\text{Fe}_{1-x}\text{Co}_x)_2\text{As}_2$ ¹, LaFeAsO and NaFeAs in a pulsed magnetic field up to 60T. Common features were revealed in their magnetoresistance and Hall resistance. Above the structural transition temperature T_S , the magnetoresistance is negligible and the Hall resistivity follows regular linear field dependence. Upon cooling down below T_c , huge magnetoresistance develops and the Hall resistance deviates from the conventional linear field dependence. These findings indicate a dramatic change of the electronic structure at T_S . Remarkably, we found that the magnetic transition in these samples is extremely robust against magnetic field up to 60T, providing evidence of local-moment magnetism in iron pnictides. We argue that the 3d-electrons of Fe in the iron based superconductors bear a dual nature and the magnetic/structural transitions are driven by magnetic interactions.

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