

Impurity Effects on the Superconducting Transition Temperatures of Fe pnictides and Superconducting Symmetry of the Order Parameter

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We focus on effects of nonmagnetic impurities on the superconducting transition temperatures T_c and point out, using various experimental evidences obtained for $\text{LnFe}_{1-y}\text{M}_y\text{AsO}_{0.89-x}\text{F}_{0.11+x}$ (Ln=La, and Nd; M=Co, Ni, Mn, Ru) systems, that the sign reversing of the order parameters Δ pointed out theoretically at the early stage of the study does not exist between disconnected Fermi surfaces around Γ and M points.¹ We also show that other kinds of the experimental results, which have been believed as the evidences for the sign reversing, can be understood well without the sign reversing. These results imply that a new pairing mechanism, which is different from the spin-fluctuation exchange and possibly related to the orbital degrees of freedom, should be considered seriously.

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