

Materials and pairing mechanism in iron pnictides/chalcogenides: what we have learnt and what are left

Hai-Hu Wen

Center for Superconducting Physics and Materials, Physics Department, Nanjing University,
China

I will give a brief survey of the material and experimental status in the new iron based superconductors. The transport, thermodynamics, penetration depth and tunneling experiments have revealed clearly the existence of multiband superconductivity. The NMR, inelastic neutron scattering, etc., have uncovered the intimate relationship between the superconductivity and the fluctuating antiferromagnetism. In many measurements a full-gap feature is favored, although a distinction remains still between the angle resolved photo-emission spectroscopy and the bulk measurements. It seems that the ingredients for supporting the well documented S_{\pm} pairing manner are sufficient. While, however, I will raise some concerns based on the recent progress, mainly on the unexpected weak (nonmagnetic) impurity scattering, and the possible absence of the hole pockets in some systems, like the recently discovered $KxFe_2Se_2$. All these suggest that to reach a consensus about the superconducting mechanism needs still further efforts.