Anisotropic Superconducting Gap Revealed by Angle Resolved Specific Heat, Point Contact Tunneling and Scanning Tunneling Microscope in Iron Pnictide Superconductors

B. Zeng[a], L. Shan[a], C. Ren[a], H. Yang[a,b], B. Shen[a], F. Han[a], P. Cheng[a], C. H. Li[a], Hai-Hu Wen[a,b]

[a]National Lab for Superconductivity, Institute of Physics, Chinese Academy of Sciences, P. O. Box 603, Beijing 100190, China
[b]National Lab of Solid State Microstructures and Department of Physics, Nanjing University, Nanjing 210093, China

Angle resolved specific heat was measured in $FeSe_{0.55}Te_{0.45}$ single crystals with the in-plane magnetic field. A four-fold oscillation of specific heat was observed when the sample was rotated with a 9 T in-plane magnetic field. The minimum of C/T locates at the direction (H||Fe-As bond), which can be understood as due to the gap modulation on the electron pocket when the intra-pocket scattering plays an un-negligible role in the pairing interactions with the scheme of S± pairing manner.[1] Accordingly, by measuring the point contact Andreev reflection spectrum on the $BaFe_{2-x}Ni_xAs_2$ single crystals in wide doping regimes, we found a crossover from nodeless to nodal feature of the superconducting gap. We can also illustrate the systematic evolution of the gap amplitude and the anisotropy on the hole and electron pockets.[2]

In K-doped $BaFe_2As_2$ single crystals, we performed the low temperature STM measurements. We observed a well ordered vortex lattice in local region. In addition, the statistics on over 3000 dI/dV spectra illustrate clear evidence of two gaps with magnitude of 7.6 meV and 3.3 meV, respectively. Detailed fitting to the tunneling spectrum shows an isotropic superconducting gap.[3]

References

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