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Anisotropic Superconducting Gap Revealed by Angle Resolved Specific Heat, Point Contact Tunneling and Scanning Tunneling Microscope in Iron Pnictide Superconductors[1]

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Angle resolved specific heat was measured in $FeSe_{0.55}Te_{0.45}$ single crystals. A four-fold oscillation of C/T, with the minimum locating at the Fe-Fe bond direction, was observed when the sample was rotated at 9 T, which can be understood as due to the gap modulation on the electron pocket within the scheme of S$\pm$ pairing. 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. In K-doped $BaFe_2As_2$ single crystals, we performed the low temperature STM measurements and 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. Work collaborated with B. Zeng, C. Ren, L. Shan, Y. L. Wang, B. Shen, G. Mu, H. Q. Luo, T. Xiang, H. Yang, I. I. Mazin and P. C. Dai. References:

[1] B. Zeng, et al., arXiv:1007.3597, Nature Communications, 2010, in press.
[2] C. Ren, et al., to be published.
[3] L. Shan, et al., arXiv:1005.4038.

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