Laser-ARPES study on Fe-pnictide superconductors

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We studied $(Ba_{1-x}K_x)Fe_2As_2$ using high resolution laser ARPES. For $BaFe_2As_2$, we found a drastic transformation in Fermi surface (FS) topology with the rearrangement of its orbital component across the transition at T_N = 140 K[1]. Polarization-dependent ARPES enables us to separately observe the electronic structure from single domains in the low-temperature twinned structure. It is suggested that single Fe 3d orbital component dominates the highly 3-dimensional FSs in antiferromagnetic (AF) state. We conclude that $BaFe_2As_2$ shows AF state coexisting with orbital-polarized metallic state.

We will also discuss on the superconducting gap and its anisotropy of each Fermi surface on $(Ba_{1-x}K_x)Fe_2As_2$ [2,3], and KFe_2As_2 [4] measured by polarization-dependent laser-ARPES. We found that orbital fluctuation mechanism is also important as well as the spin fluctuation mechanism in the superconductivity. We found nodes in the superconducting gaps of KFe_2As_2 [4]. We discussed about them by d or s+- mechanism

1. Shimojima et al., PRL **104**, 57002(2010).
2. Shimojima et al., Science **332**, 564(2011).
3. Malaeb et al., arXiv:1204.0326
4. Okazaki et al., unpublished.

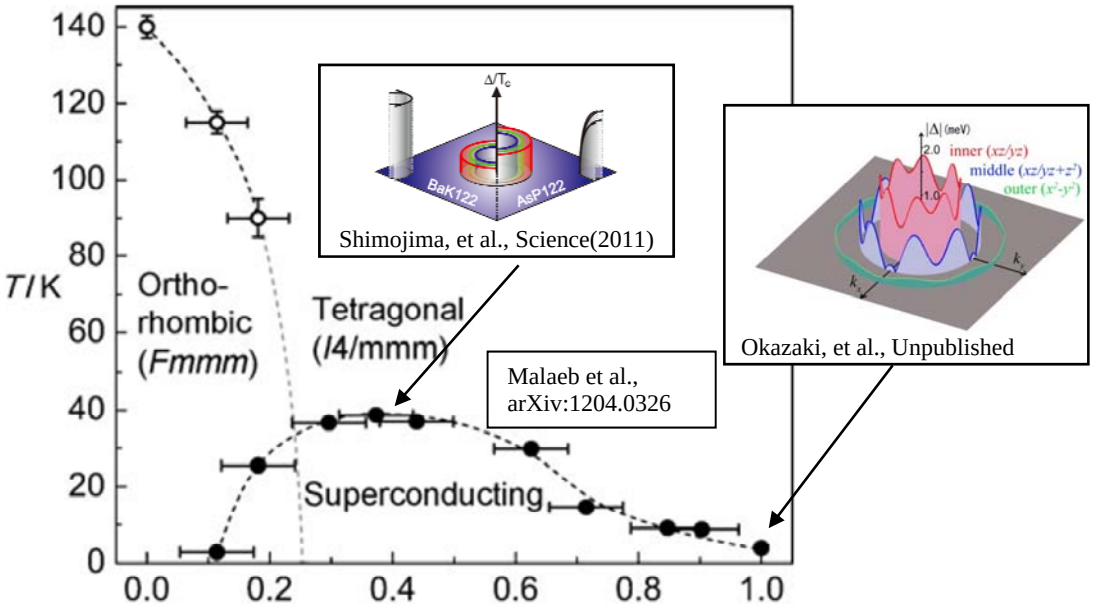

Fig1. SC symmetry changes in the same 122 system