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Pairing symmetry of iron-based superconductors revealed by ARPES

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The recent discovery of superconductivity in iron-arsenic compounds with a transition temperature (T_c) as high as 56 K ended the monopoly of copper oxides in the family of high-T_c superconductors. In this talk I will report our angle-resolved photoemission observation of the superconducting gap, including its momentum, temperature, and Fermi surface (FS) dependence in single crystals $Ba_{0.6}K_{0.4}Fe_2As_2$ ($T_c = 37$ K). We found two nodeless and nearly isotropic superconducting gaps around their respective FS sheets: a large gap ($\Delta \sim 12$ meV) on the two small hole-like and electron-like FS sheets, and a small gap (~ 6 meV) on the large hole-like FS. The isotropic pairing interactions are strongly orbital dependent, as the ratio $2\Delta/k_BT_c$ switches from weak to strong coupling on different bands. In addition, we have observed a dispersion kink that is likely related to a spin mode. These results reveal the importance of inter-band interactions in the pairing mechanism, and support the anti-phase s-wave pairing symmetry in the Fe-based superconductors.