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Quasi-degenerate superconductivity in the ‘122’ iron-pnictide superconductors KENICHIRO HASHIMOTO, Kyoto University, ALESSANDRO SERAFIN, ANTONY CARRINGTON, University of Bristol, SIGERU KASAHARA, SHO TONEGAWA, KOSUKE IKADA, MINORU YAMASHITA, HIROAKI IKEDA, TAKAHITO TERASHIMA, TAKASADA SHIBAUCHI, YUJI MATSUDA, Kyoto University — In iron-based superconductors, especially so-called ‘122’ systems, the superconducting gap symmetry is still a debated issue both theoretically and experimentally. Most early experimental studies in BaK-122 and BaCo-122 families including ARPES, thermal conductivity, and penetration depth measurements indicate a fully-gapped superconducting state, although the consensus for the gap structure is still lacking. Here we report the magnetic penetration depth measured down to $0.01T/T_c$ clearly shows the presence of line nodes on the superconducting gap structure in some ‘122’ iron-pnictide superconductors. This result indicates that non-universal gap symmetry is realized in the ‘122’ systems, depending on the substituting materials and/or its doping levels.

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