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**Momentum dependence of superconducting gap, strong-coupling dispersion kink, and tightly bound Cooper pairs in the high-T<sub>c</sub> (Sr,Ba)<sub>1-x</sub>(K,Na)<sub>x</sub>Fe<sub>2</sub>As<sub>2</sub> superconductors** LEWIS WRAY, DONG QIAN, DAVID HSIEH, YUQI XIA, ALI YAZDANI, N. PHUAN ONG, Princeton University, NANLIN WANG, Beijing National Laboratory for Condensed Matter Physics, M. ZAHID HASAN, Princeton University — We present a systematic angle-resolved photoemission spectroscopic study of the high-T<sub>c</sub> superconductor class (Sr/Ba)<sub>1-x</sub>(K/Na)<sub>x</sub>Fe<sub>2</sub>As<sub>2</sub>. By utilizing a photon-energy-modulation contrast and scattering geometry we report the Fermi surface and the momentum dependence of the superconducting gap,  $\Delta(\vec{k})$ . A prominent quasiparticle dispersion kink reflecting strong scattering processes is observed in a binding-energy range of 25-55 meV in the superconducting state, and the coherence length or the extent of the Cooper pair wave function is found to be about 20 Å, which is uncharacteristic of a superconducting phase realized by the BCS-phonon-retardation mechanism. The observed 40±15 meV kink likely reflects contributions from the frustrated spin excitations in a J<sub>1</sub>-J<sub>2</sub> magnetic background and scattering from the soft phonons. Results taken collectively provide direct clues to the nature of the pairing potential including an internal phase-shift factor in the superconducting order parameter which leads to a Brillouin zone node in a strong-coupling setting.

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