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Observation of symmetry-distinct states proximate to the Fermi level in a high-Tc cuprate family RUI-HUA HE, Stanford U/Boston College, M. HASHIMOTO, Stanford U/SLAC, K. TANAKA, Osaka U, A. SORINI, Stanford U, S.-K. MO, ALS/LBNL, T. SASAGAWA, TIT, M. FUJITA, T. ADACHI, M. ENOKI, S. IIKUBO, Tohoku U, N. MANNELLA, U Tennessee, HONG YAO, Tsinghua U, M. YI, Stanford U, W. MEEVASANA, SUT, Y. HE, Stanford U, K. YAMADA, Y. KOIKE, Tohoku U, T. P. DEVEREAUX, SLAC, Z. HUSSAIN, ALS/LBNL, Z.-X. SHEN, Stanford U/SLAC — Current understanding of cuprate superconductivity is based exclusively on an effective one-band electronic band structure formed by states of in-plane dx2-y2 symmetry. By studying the La-based cuprates with polarization-dependent angle-resolved photoemission spectroscopy, here we uncovered another group of states of distinct c-axis symmetry that coexists with the dx2-y2-symmetry states near the Fermi level and eluded previous detection. As functions of momentum and doping, these new states show overall different dispersion relations yet a qualitatively similar low-energy (pseudo)gapping behavior as the dx2-y2-symmetry states, until they become closely degenerate above ∼20% doping.

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