Valence bands and Fermi-surface topology of untwinned single-crystal YBa2Cu3O6.9

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The cleaved surfaces of untwinned, single-crystal YBa2Cu3O6.9 have been probed with synchrotron-radiation photoemission, utilizing both high energy and angular resolution. Acute spectral structure was observed, both at the Fermi energy and at higher binding energies, particularly near the high-symmetry points of the two-dimensional Brillouin zone, Γ-bar, X-bar, Y-bar, and S-bar. Many band crossings of the Fermi energy were seen, with obvious and important differences between the bands near X-bar and those near Y-bar. A large superconducting gap was not observed: The data are consistent with a gap of less than 10 meV. The assignment of bands and Fermi-level crossings to chain and plane states will be discussed, including comparisons to the predictions of theory, particularly local-density-approximation calculations.


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