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Fermi surface splittings in multilayered high-T_c cuprates with charge imbalance M. MORI, T. TOHYAMA, S. MAEKAWA, IMR, Tohoku Univ; CREST, JST — Cuprate superconductors have layered structure of CuO_2 planes, which makes conducting blocks separated by an charge- reservoir block. Multi-layered high-T_c cuprates, e.g., $Ba_2Ca_3Cu_4O_8(O_{1-y}F_y)_2$ and $HgBa_2Ca_4Cu_5O_y$, have two kinds of CuO_2 planes in a unit cell; the outer-pyramidal-coordinated-planes (OP's) and the inner- square-coordinated-planes (IP's). The carrier density in the OP is generally different from that in the IP. We call such an inhomogeneous charge-distribution 'charge imbalance'. We study doping dependence of interlayer hoppings, $t_\perp$, in such a charge-imbalance system in the Gutzwiller approximation. When the double occupancy is forbidden in the CuO_2 plane, an effective amplitude of $t_\perp$ is shown to be proportional to the square root of the product of doping rates in adjacent two planes. Therefore, the charge imbalance in more than three-layered cuprates results in two different values of $t_\perp^{\rm eff}$, i.e., $t_{\perp 1}^{\rm eff} \propto t_\perp\sqrt{\delta_{\rm IP}\delta_{\rm IP}}$ between IP's, and $t_{\perp 2}^{\rm eff} \propto t_\perp\sqrt{\delta_{\rm IP}\delta_{\rm OP}}$ between IP and OP, where $\delta_{\rm IP}$ ($\delta_{\rm OP}$) is the doping rates in IP (OP). Fermi surfaces are calculated in the four-layered t-t'- t''-J model by the mean-field theory. The order parameters, the renormalization factor of $t_\perp$, and the site- potential making the charge imbalance between IP and OP are self-consistently determined for several doping rates. We show the interlayer splitting of the Fermi surfaces, which may be observed in the angle resolved photoemission spectroscopy measurement. *cond-mat/0511249.

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