

EFFECT OF LIFSHITZ QUANTUM PHASE
TRANSITIONS ON THE NORMAL
AND SUPERCONDUCTING
STATES IN CUPRATES

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S u m m a r y

We study the doping evolution of the electronic structure in the normal phase of high- T_c cuprates. The electronic structure and the Fermi surface of cuprates with a single CuO_2 layer in the unit cell like $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ have been calculated by the LDA+GTB method in the regime of strong electron correlations (SEC) and compared to ARPES and quantum oscillations data. We have found two critical concentrations, x_{c1} and x_{c2} , where the Fermi surface topology changes. Following I.M. Lifshitz's ideas of the quantum phase transitions (QPT) of the 2.5-order, we discuss the concentration dependence of the low-temperature thermodynamics. The behavior of the electronic specific heat $\delta(C/T) \sim (x - x_c)^{1/2}$ is similar to the Loram and Cooper experimental data in the vicinity of $x_{c1} \approx 0.15$. In the superconducting state of cuprates, we consider both magnetic and phonon contributions to the d -wave pairing and found that there is no dominant mechanism of superconductivity. Magnetic and phonon contributions to the critical temperature are of the same order.