MAR07-2006-000470

Abstract for an Invited Paper
for the MAR07 Meeting of
the American Physical Society

Anti-Jahn-Teller effect and d-wave phonon mechanism in cuprates

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Undoped cuprates are Jahn-Teller (JT) Materials [1] and Mott AF insulators [2]. When holes are doped, the octahedrons or pyramids elongated by the JT effect shrink. We call such distortion against the JT effect "***anti-Jahn-Teller effect***"[3]. By the interplay of the *anti-Jahn-Teller effect* and *Mott physics*, the two multiplets, the Zhang-Rice singlet and the Hund's coupling triplet, become nearly degenerate, and thus the hole-carriers in the underdoped regime form a metallic state, by taking the two multiplets alternately in the presence of the local AF order without destroying it [3,4]. On the basis of this two-component K-S model with small Fermi surfaces, the mechanism of superconductivity is discussed by the interplay of the electron-phonon interactions and local AF order [5,3]. It is shown that (1) the phase difference of wave functions between up- and down-spin carriers leads to the gap of dx^2-y^2 symmetry, and (2) the calculated concentration dependences of Tc and of isotope effects for LSCO are consistent with recent experimental results including anomalous isotope effects [6]. Finally the origin of the high-energy pseudogap is discussed based on the K-S model [3].

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