

Abstract Submitted
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Strong coupling limit of superconductivity in anti-ferromagnetic phase: Extended hardcore boson picture of d-wave order and phase fluctuation YUCEL YILDIRIM, WEI KU, Brookhaven National Laboratory — Strong coupling limit (local-pairing \gg kinetic energy) of the superconductivity in High- T_c superconductors is investigated within the anti-ferromagnetic phase. An extended hardcore boson picture consisting of paired holes results from general considerations of paired fermions, in which directional near-neighbor occupations of bosons are forbidden. By use of Wannier function of the low-energy sector of the bosonic Hilbert space, our simple picture provides a natural separation of the phase of the superconducting order parameter into local and external ones. Within a realistic parameter range, the local structure is found to be of d-wave symmetry, driven by the kinetic energy. On the other hand, the genuine behavior of the superconductivity is controlled by the phase coherence of the external phase, which leads to experimentally observed linear reduction of super fluid density. Interestingly, due to the competition with p-wave symmetry, the effective mass of the boson is enormously enhanced from that of the Fermion, explaining the very small stiffness. Connections to recent observation of 4-period d-wave CDW in the “stripe” phase, and C2-symmetry bond-centered charge profile will also be addressed.

Yucel Yildirim
Brookhaven National Lab.

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