

The coexistence of superconductivity and antiferromagnetism in the single band model

K. Kucab, J. Mizia and G. Górski

Institute of Physics, University of Rzeszów, Poland

The extended Hubbard model is used to analyze the coexistence of antiferromagnetism (AF) and superconductivity (SC) in YBaCuO. While departing from the half-filled point concentration the band expands rapidly due to the hopping interaction. This expansion causes disappearance of AF already close to the half-filled point, in agreement with the experimental situation. The s-wave superconductivity disappears under the action of strong Coulomb on-site repulsion. The d-wave SC is created by the charge-charge interaction. Treating strong Coulomb on-site repulsion in the CP approximation (all other weaker interactions are treated in the Hartree-Fock approximation) pushes critical curve for this type of superconductivity further away from the half-filled point in agreement with the experimental evidence. As a result we obtain diagram for the Néel and the superconducting critical temperature which is close to the experimental outcome.

9.7 cm

13.4 cm

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Corresponding author :

Krzysztof Kucab

Address for correspondence :

dr Krzysztof Kucab
Institute of Physics
University of Rzeszów
35-310 Rzeszów

Email address :

kkucab@univ.rzeszow.pl