Dynamical Cluster Approximation results for the effect of long range hoppings on $T_c$ in Cuprates

EHSAN Khatami, Alexandru Macridin, Mark Jarrell, University of Cincinnati — The Dynamical Cluster Approximation along with the Quantum Monte Carlo (QMC) algorithm are employed to study the effect of long-range hoppings on the superconducting critical temperature of Cuprates. A two-dimensional $t-t'-t''-U$ Hamiltonian describes the physics of copper oxide planes in this model. We perform calculations on 4-site and 16-site clusters. The results show a weak dependence of the maximum $T_c$ on the long-range hoppings. We see a suppression of $T_c$ due to $t'$ in the hole-doped systems. $t'$ increases the critical doping (the doping beyond which the superconducting phase disappears) in the hole-doped regime, but this doping value is decreased by including $t''$. 

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