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## **Influence of long-range coulomb interaction and on-site hubbard repulsion on the formation of d-wave copper-pairing in High- Tc cuprates**

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### **Abstract**

We develop a diagram technique for the self-consistent treatment of the long-range Coulomb interaction and on-site Hubbard repulsion in the normal and superconducting state of high- $T_c$  cuprates. The resultant analytical expression for the "screened" matrix elements taking into account long-range and on-site repulsion has been derived. In particular, it accounts for processes with and without spin-flip due to an exchange of spin and charge density fluctuations. Furthermore, we derive the expressions for the normal and anomalous self-energy parts near the superconducting transition temperature  $T_c$  that takes into account the vertex corrections including crossing diagrams. The contribution of the crossing parts is taken within the ladder approximation (similar to Fluctuation-Exchange approximation) where the role of Hubbard on-site interaction is replaced by the Coulomb matrix element with a spin-flip averaged over the momentum. Finally, the developed scheme allows to analyze the formation of d-wave superconductivity and its stability in presence of the long-range Coulomb repulsion within a self-consistent anisotropic Eliashberg-like approach. © 2004 Plenum Publishing Corporation.

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### **Keywords**

High- $T_c$  cuprates, Hubbard model, Long-range Coulomb repulsion