Model of charge triplets for high-T_c cuprates

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Starting with a minimal model for the CuO_2 planes with the on-site Hilbert space reduced to only three effective valence centers $[CuO_4]^{7-,6-,5-}$ (nominally $Cu^{1+,2+,3+}$) with different conventional spin and different orbital symmetry we propose a unified non-BCS model that allows one to describe the main features of the phase diagrams of doped cuprates within the framework of a simple effective field theory. Unconventional bosonic superconducting phase (BS) related with a composite (two-hole) on-site boson quantum transport is shown to compete with antiferromagnetic insulating phase (AFMI), charge order (CO), and metallic Fermi liquid (FL) via phase separation regime. All the phases AFMI, CO, BS are separated from the 100% coherent metallic FL phase by the "third order" phase transition line $T^\star(p)$, which is believed to be responsible for the onset of the pseudogap phenomena as a main candidate for the upper "pseudogap" temperature. Puzzlingly, but it is the electron-lattice interaction, which in the BCS model determines s-wave pairing, in the model of local composite bosons gives $d_{x^2-y^2}$-symmetry of the superconducting order parameter, thus showing once again a substantial involvement of the lattice in the cuprate's HTSC.