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*From single- to bi-polarons with Jahn-Teller character
and metallic cluster-stripes in hole doped cuprates.*

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Abstract:

Experiments published in the past dozen years will be in part reviewed which are considered as relevant in hole doped cuprates. They range from those which are wavevector dependent, such as photoemission and inelastic neutron scattering, to those which probe local properties as EXAFS, XANES, and EPR. Of importance is the time scale the different techniques probe, which also include optical picosecond excitations. All of them point in a consistent way to the presence of two kinds of quasi-particles of Fermi ionic and vibronic character. The latter are deduced by symmetry theoretically to be of intersite Jahn-Teller type. Central are also the substantial oxygen isotope effects found at the pseudo gap temperature T^* , and for the London penetration depth λ , both as function of hole doping. The former are ascribed to the bipolaron formation and the latter are quantitatively reproduced theoretically by a model complementary to the quasiparticle picture: a two band model. From the latter it follows necessarily that the lattice distortions in the vibronic groundstate are of the local ϵ Jahn-Teller conformation. Finally the most recent findings are reviewed, regarding the agglomerations of bipolarons in forming clusters or stripes with metallic character, even at very low dopings and temperatures