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A comprehensive model for high-T_c based on pair-pair interactions. WILLIAM SACKS, ALAIN MAUGER, IMPMC, Sorbonne Universities, France, YVES NOAT, INSP, Sorbonne Universities, France — The superconducting (SC) state of cuprates is characterized by a dome-shaped T_c versus carrier density and an unconventional *pseudogap* (PG) state above T_c - basic properties remain highly debated. We have recently proposed a mechanism [1] based on the mutual interaction between incoherent Cooper pairs existing above T_c. At the critical temperature, this interaction induces a Bose-like condensation leading to the coherent SC state.

Absent in the conventional BCS case, the mutual pair-pair interaction is proportional to the condensate density $n_{oc}(T)$ but is also related to the quasiparticle excitations. It gives an excellent fit to the DOS as measured by electron tunneling for a wide range of samples and carrier concentration. We conclude that long-range order is achieved by a direct quasiparticle - Cooper-pair coupling.

We then focus on the *temperature dependence* of the thermodynamic functions (condensation energy, entropy, etc.) and of the quasiparticle DOS. We show that these quantities depend on the unique combination of pair (boson) and quasiparticle (fermion) excitations, allowing a qualitative understanding of the phase diagram.

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