DIELECTRIC SCENARIO OF CUPRATES PHYSICS

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I present a novel scenario for cuprates in which its unconventional phase state evolves from a parent insulator as a result of the self-trapping of the charge transfer excitons (CT) accompanied by a self-consistent lattice polarization and appearance of the "negative-U" effect. Parent insulating cuprates appear to be unstable with regard to a self-trapping of the low-energy one- and two-center CT excitons [1,2] with a nucleation of electron-hole (EH) droplets being actually the system of coupled electron CuO_4^{7-} and hole CuO_4^{5-} centers having been glued in lattice due to a strong electron-lattice polarization effects. Such a system can be regarded as an electron-hole Bose liquid described by the generalized Bose-Hubbard Hamiltonian.

Doping, or deviation from half-filling in EH Bose liquid is accompanied by the formation of multi-center topological defect such as charge order (CO) bubble domain(s) with Bose superfluid (BS) and extra bosons both localized in domain wall(s), or a *topological* CO+BS *phase separation*, rather than an uniform mixed CO+BS supersolid phase [3,4]. The long-wavelength behavior of the system is believed to reveal many properties typical for granular superconductors, CDW materials, Wigner crystals, and multi-skyrmion system akin in a quantum Hall ferromagnetic state of a 2D electron gas. With decreasing the temperature we deal with isotropic liquid phase, liquid crystal, and crystallization of the multi-skyrmion system, respectively. Novel state of cuprate matter is characterized by a multicomponent order parameter including charge density, U(1) global phase, electric dipole and quadrupole moments, circular orbital current generated by oxygen holes. We discuss the detailed electronic structure of electron and hole CuO_4 centers, its magnetic and electric properties, the optical response of EH droplets, (pseudo)Jahn-Teller effect, hyperfine interactions.
I address the numerous unconventional properties of novel phase and cuprate experimental data supporting the scenario in a broad doping range beginning from parent insulator to overdoped systems.

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Subject: Magnetism of strongly correlated electron systems. Presentation (desirable): oral