Long range correlation in complex fluids

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As early as in 1983 a coexistence of an ordered and disordered distribution of charged colloidal dispersions [1,2], as well as the formation of void structures [3,4] were reported. These phenomena imply that there are long range repulsive and attractive potentials, of the order of thousands or even tens of thounsands of Angstroms. However, molecular interaction potentials are relativelly short range [5]. Even for charged fluids, at low concentration, the particles correlation is at most a few hundreds of Angstroms. The nature of these long range correlation is up to now not clear [6].

In the past we have proposed and solved a Modified Collidal Primitive Model (MCPM), to study charged colloidal particles at finite volume fraction, where a long range colloidal correlation is reported [7]. In this presentation we extend our calculation and present, to the best of our knowledge, a new counterintuitive effect of long range overcharging, which may be of relevance in transport studies of charged nano-particles, colloids and/or proteins under the action of an external electrical field, and in other macroions phenomena, as those point out above.

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