Colloidal Solution In a Spherically-Symmetric Electric Field

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A system of N mobile negatively charged colloidal particles, under a confining electric field produced by a spherical-capacitor apparatus, is studied. An approach applied to the equations of motion leads to a nonlinear Fokker-Planck equation associated with an entropic functional of Tsallis type; these analytical results are supported by molecular-dynamics simulations. The definitively non-Yukawa equilibrium position distribution, which emerges from first principles, opens the door to new experiments on a system characterized by long-range repulsive interactions.