

REMARKS ON SMOLUCHOWSKI-POISSON SYSTEMS

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ABSTRACT

Thermodynamics of a self-gravitating system describes various phenomena, such as gravitational collapses, star formations, phase transitions, etc. 3D Smoluchowski-Poisson systems have been studied in order to theoretically analyze the thermodynamics of self-gravitating particles. In this talk, we concern radially symmetric solutions of 3D Smoluchowski-Poisson system in a micro-canonical ensemble setting (μ SP). Depending on whether an initial data lies in a basin of attraction, a μ SP system can relax towards a metastable equilibrium state (local entropy maximum) or collapse (gravothermal catastrophe). Thus, if the energy is larger than a critical energy, a collapse of μ SP system occurs only if a gravitational attraction overcomes a stabilizing effect. We show a gravitational collapse under an arbitrary energy, which implies possibility of gravothermal catastrophe of a self-gravitating system even in a high energy level.

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