

Abstract Submitted
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Dynamics of charged micro-particle clusters in a plasma medium.

SRIMANTA MAITY, AMITA DAS, Physics Department, IIT Delhi, Hauz Khas, New Delhi - 110016, India — The study of charged particle system trapped in an external potential well is of fundamental interest over the decades concerning its metastable configurations, particle ordering, cluster formations, phase transitions, and a rich variety of structures and dynamical properties. Dusty plasma medium is demonstrated to be an ideal model system to study the structures and dynamics of finite charge particle systems where the background plasma is itself responsible for the confinement of particles. In the present study, we have investigated the possible relaxation states of charged micro-particles in a plasma environment using Molecular Dynamics (MD) simulations. The charged micro-particles interacting via screened Coulomb pair potential. An external two-dimensional (2-D) parabolic potential has been applied to confine the particles in a 2-D plane. The equilibrium configuration of this trapped charge particle system has been explored over a wide range of system parameters i.e., the total number of particles, N_p , relative confinement strength. It has been shown that for a low N_p , particles are arranged in multiple shell/ring structures where for some specific configurations such an arrangement is stationary. However, it has been shown that, for several cases, particles relax to a state where they display inter-shell rotation along with a radial oscillation in the individual rings. For a larger cluster configuration (higher N_p), a novel equilibrium state with coherent rigid angular oscillation of particles around the center of mass of the configuration has been observed and characterized.

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