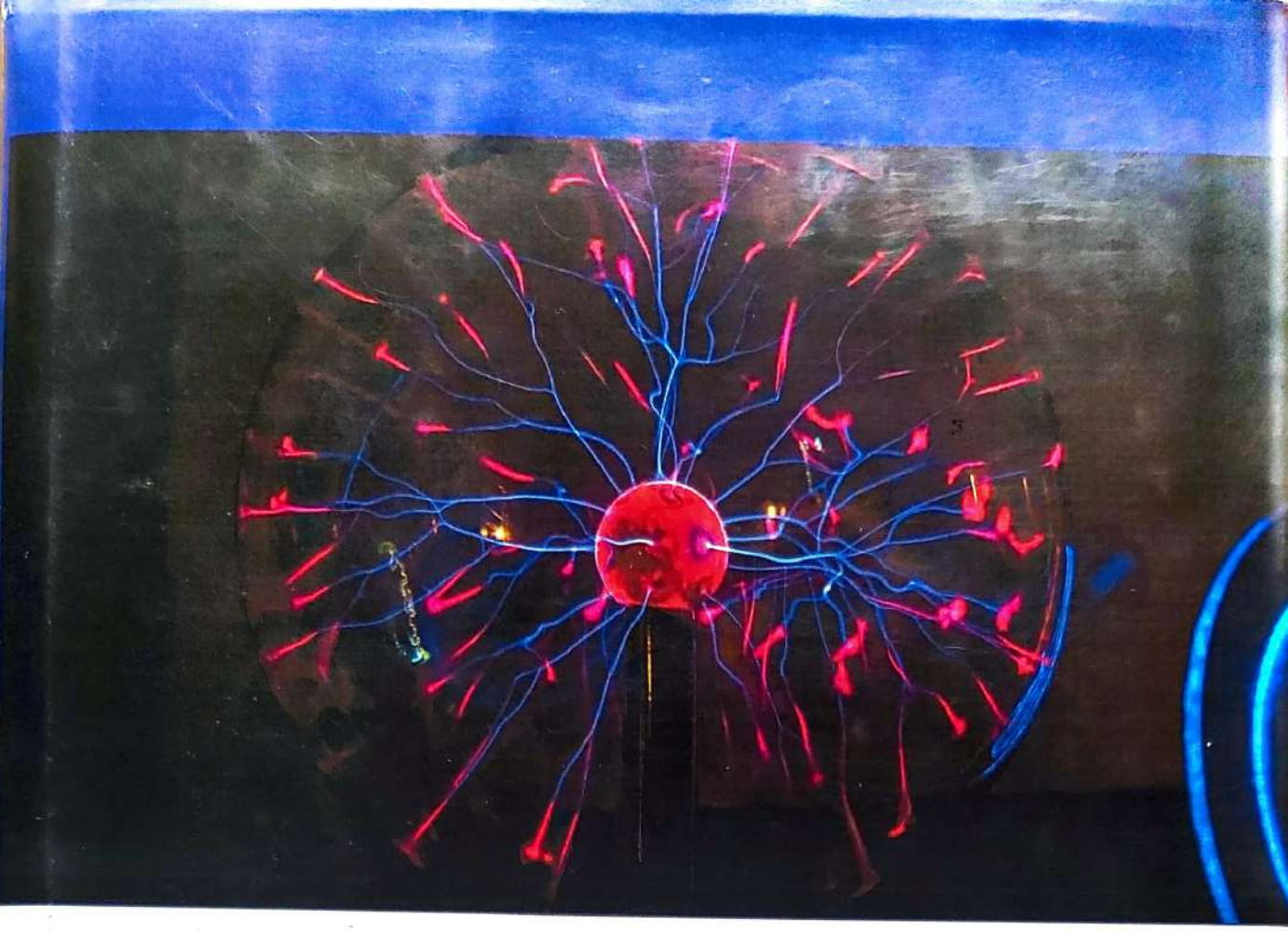

Dima Rani Borgohain
Mukunda Madhab Borah
Dipraj Saikia

Recent Researches in Advanced Physics

Plasma sheath, Solid State Physics and Biomolecules

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This books aims to cover some recent research work in the field of physics including theoretical plasma physics, solid state physics and vibrational studies of biomolecules. It has been estimated that 99.9% matter in the universe is in plasma state. Fluorescent lamp, Neon lamp, lightning, Aurora Borealis, twinkling stars and Sun are the sources of plasma around us. Nowadays Plasma is a growing field of research due to its wide range of applications such as cleaning, waste treatment, Food Processing, skin treatment, sterilization and many more. Now plasma fusion energy is a hope for future energy and ITER is going to fulfill this dream. The vibrational study of biomolecules is very important in the biological point of view. In this multi research book in physics we try to present some original research work which will help the researchers to enhance their knowledge in recent research trends of plasma sheath, solid state physics and vibrational studies of biomolecules

Dr. Borgohain is currently working in the field of plasma physics at North Eastern Regional Institute of Science and Technology. Dr. Borah is working in the field of computational Raman spectroscopy and is working at Rajiv Gandhi University. Dr. Saikia is working at NIT, Nagaland and is working in the field of solid state physics.

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Phase Transition and Thermodynamic Characteristics of Dusty Plasma Using Molecular Dynamics Simulation

[1]Mahmuda Begum,

[1]*Department of Physics, Lakhimpur Girls' College, Khelmati, Lakhimpur, Assam-787031, India*

Email: mbegumtu@gmail.com

Abstract:

The study of Dusty plasma physics is now regarded as a promising field of research with a very broad range of interdisciplinary facts. The strongly coupled system is very much important to study many physical phenomena like crystal formation, phase transition, transfer process etc. The main perspective of this project is to study different properties introduced by charge particulates in a complex plasma medium and to study the formation of plasma crystal and hence the phase transition in such a system. In order to observe the plasma crystal formation, a Molecular Dynamics simulation code has been used. From the Radial Distribution functions (which are denoted by g(r)) the structural properties are investigated. The interaction mechanism involves this process is repulsive Yukawa (Debye-Hückel) potential. To observe the phase transition in such a system, a Brownian Dynamics simulation code has been used. The controlling parameters involved in the phase transition process are two dimensionless parameters-screening constant κ which is the ratio of the mean interparticle distance to the Debye length, and Coulomb coupling parameter Γ which is the ratio between interparticle potential energy to the thermal kinetic energy, which have direct contact with the dust temperature T_d, ion temperature T_i , and dust density n_d and the Debye screening length λ_D respectively. By using an external magnetic field (B~0.05T), the dynamics of the particles is studied. Presence of magnetic field affects the system dynamics. In presence of magnetic field, ions get modified and it affects the coupling strength. By keeping T_i fixed in each set for different values T_d (all other parameters are unaffected), a 3-D phase diagram is obtained for corresponding values of Lattice correlation factor. A point is found at κ=1.53 and