Simulation of Charge particle dynamics in charge particle traps

Abstract

Cylindrical and Toroidal Penning-Malmberg traps offer long-time confinement of charged particles at ultra-high vacuum environment. At IPR, we have cylindrical as well as toroidal Penning-Malmberg trap to confine electrons and ions. Understanding the effect of geometry of trap electrodes on confinement is very important. Simulation of electric field and magnetic field for these traps and investigating the charge particle dynamics will aid in understanding the role of dynamics in confinement. Student's project work will involve the solving for potential, E-field and B-field for the trap geometry, tracing the charge particle trajectory in the solved configuration. Experiments of electron plasma confinement in both geometries will also be performed and results will be compared.

Academic Project Requirements:

1) Required No. of student(s) for academic project: 1

2) Name of course with branch/discipline: M.Sc. Physics

3) Academic Project duration:

(a) Total academic project duration: 24 Weeks
(b) Student's presence at IPR for academic project work: 4 Full working Days per week

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