

Comparison of Different Methods to Measure Trapped Charge in Cylindrical Non-Neutral Plasma

Abstract

Non-Neutral Plasma, which is a collection of charged particles of single species (electrons or ions) are very well confined in the cylindrical trap. Charged particles in the trap are confined axially using electro-static fields and radially using magnetic fields. Electrons are injected in the trap using thermionically heated Tungsten source and trap operates in 'inject-hold-launch/dump' phase. Electron plasma is routinely confined in the trap for a few hundred milliseconds. In this project, the student will implement and compare various techniques for measuring total stored charge a) Fast charge dump with the help of MOSFET based circuit, b) Slow charge dump with the help of Power Amplifier based circuit c) Integrated charge dump on capacitor. The pros and cons of each technique will be evaluated, and a suitable method will be used to measure the evolution of total stored charge for chosen plasma parameters.

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: 18 Weeks

(b) Student's presence at IPR for academic project work: 5 Full working Days per week

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