

# Launching of $M = 2$ diocotron wave in Non-Neutral Plasma Experiment

## Abstract

Plasma demonstrates collective behaviour in various forms, such as Debye shielding and the generation of different types of waves. Nature of waves supported by plasma depends on the type of plasma and its properties. This aspect has been utilized to diagnose and characterize the plasma, by launching of a wave it can support. Here in this project, Non-Neutral Plasma will be investigated by launching an electrostatic flute wave namely diocotron wave, which has a mode number 2. Non-Neutral plasma is a collection of charged particles of like sign, it is confined radially by steady state magnetic field and axially by electric fields applied on ends. Project work includes the experimental work of launching of  $m = 1$  and  $m = 2$  diocotron modes in the cylindrical trap and tight aspect ratio toroidal trap. Characterisation of the  $m = 2$  in toroidal trap is an important aspect to understand and master the launching of wave successfully. The frequencies of  $m = 1$  and 2 diocotron waves along with amplitude can be used to directly infer various plasma properties such as, total stored charge, plasma density, plasma radius, self-rotation frequency, equilibrium position of toroidal non-neutral plasma. Student will carry out the project work and learn the above aspects of toroidal non-neutral plasma.

## 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: 10 Weeks

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

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