

# Physics and Electromagnetic design of a multi-strap antenna for HHFW experiments on Spherical Tokamak.

## Abstract

High power radio frequency waves in the megahertz frequency range have a wide range of application like tokamaks, accelerators, aerospace and defense sector. The RF waves can be transmitted via rigid coaxial transmission lines (TL) at high power and fed to antenna to radiate the RF power.

In tokamaks, ions can be directly heated by resonating wave electric field when injected by external launchers called antenna. For spherical tokamaks, due to their operating conditions, an attractive branch of wave power deposition to electrons is available at very high harmonics. High Harmonic Fast Waves can heat electrons in the plasma core. By choosing the wave direction, they can also drive plasma current without induction. These systems are also less sensitive to plasma conditions.

This project work involved basic physics understanding of wave plasma interaction at high harmonic and designing a suitable launcher within a space constraint. There shall be some task of EM design of the antenna and parameter optimization.

Scope of work:

1. Literature study of HHFW physics and experiments in STs.
2. Calculations of required parameters for a suitable antenna.
3. Design a simple antenna using standard electromagnetic softwares.
4. Prepare report and submit.

Project duration : 6 months to 12 months, Full time

## 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: 36 Weeks**

**(b) Student's presence at IPR for academic project work: 3 Full working Days per week**

**Email to: kmishra@ipr.res.in[Guide's e-mail address] and project\_phy@ipr.res.in [Academic Project Coordinator's e-mail address]**

**Phone Number: 079 -2137 [Guide's phone number]**