

# Design of Inner Conductor Joint (ICJ) of high power RF transmission line.

## 1. Background of the problem

High power radio frequency waves in the megahertz frequency range have a wide range of application like tokamak fusion reactor, accelerators, aerospace and defense sector. The RF waves can be transmitted via rigid coaxial transmission lines (TL) at high power. Rigid TLs are made of two coaxial conductors one within another and the inner conductor is concentrically held by inner conductor joint with insulators like Teflon, ceramics etc. At high power these joints are prone to high voltage breakdown and arcing occurs between inner and outer conductor prohibiting power flow. The present problem is about design a new ICJ in Ansys HFSS simulator and fabricate various types of ICJ and test for power handling capability.

## 2. Scope of work

The student would survey available literature about high power TL, study about high voltage breakdown near insulators, design of RF structures in Ansys HFSS, fabricate different types of ICJ and test it.

## 3. Academic gain of the student

Understanding knowhow of high power TL design, high voltage breakdown physics and engineering, Ansys HFSS design, handling different experimental device and to make test setup.

Relevant references:

1. <https://www.ansys.com/en-in/products/electronics/ansys-hfss>
2. Smith et. al Physics of Plasmas **10**, 875 (2003); <https://doi.org/10.1063/1.1531615>
3. K. Mishra et. al. Journal of Physics: Conference Series 208 (2010) 012017

**Eligibility: Only students of Electrical branches can submit their application at**

**Email: [kmishra@ipr.res.in](mailto:kmishra@ipr.res.in) [Guide e-mail address] and [project\\_ee@ipr.res.in](mailto:project_ee@ipr.res.in) [Project Coordinator's e-mail address]**

**Phone Number: 079-2396 2163 [Guide phone number]**