Proposal Code : PDF – FusionTech -0003	
Title	Adaptive Impedance Profiling for Fusion RF Systems
Abstract	Fusion energy is emerging as a key solution for sustainable power generation, offering a virtually limitless energy source for future generations. Major projects like ITER, supported by institutions such as the Institute for Plasma Research (IPR), aim to demonstrate its viability. IPR contributes through indigenous Tokamaks like Aditya-U and SST-1, advancing plasma confinement and heating research. Tokamaks use magnetic fields to confine high-temperature plasma, with Ion Cyclotron Resonance Heating (ICRH) being a key method for ion heating. An effective ICRH system requires precise matching of antenna load impedance, which varies rapidly with plasma conditions, posing real-time diagnostic challenges. This proposal aims to develop diagnostics for voltage and current profiling—specifically phase and magnitude—under varying plasma load conditions within a tokamak, across different sections of the matching network and antenna. The primary goal is to investigate the plasma load profile for the designing and implementation of strategies for enhancing the efficiency of RF power coupling. The study will also focus on testing and validating the proposed system by emulating different plasma scenarios, thereby contributing to advancements in fusion research and reactor technology.
Research Focus Areas	Proposed work is aligned with the core activities related to RF Science & Technology
Qualifications	Ph.D Physics or Engineering
Desired Experience	RF/Microwave Engineering (RF Active and Passive devices and Antenna)
Other remarks	-