Seminar

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Institute for Plasma Research

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Title: Determination and Matching of Antenna-Plasma Coupling Impedance for Ion Cyclotron Range of Frequencies and Its Uses for Plasma Applications

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Date: 29th January 2025 (Wednesday)

Time: 03.30 PM

Venue: Seminar Hall, IPR

Abstract

Interaction of Radio Frequency (RF) waves with plasma is an important phenomena for various applications of electromagnetic wave interaction with plasma. Various auxiliary heating techniques are used for raising the temperature of plasma to obtain reactor grade temperature and density. In order to couple the RF power to plasma, it is essential to measure the plasma impedance and then match it with the source impedance. In the proposed work, measurement of antenna – plasma coupling impedance using voltage probes array along with the loop type directional coupler has been done. Measurement of plasma impedance is very essential for matching purpose in online mode. The usual method of measuring RF impedance using VNA cannot work here because impedance has to be measured while power is being fed to plasma. Slotted section technique also has limitations. So a novel technique of measuring RF impedance in online mode has been implemented. The impedance is then be matched by liquid stub tuner and liquid phase shifter. The liquid stub tuner is a unique technique of impedance matching. In this technique, to produce variable impedance of the stub, the height of liquid dielectric is used as variable and no movement of plunger is used. This is very useful for very high power RF matching in tokamaks where power of the order of few MWs will be required.