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Seminar

Institute for Plasma Research

Title : Design and Analysis of Stray Radiation Detection System for ECE Diagnostic

Speaker: Dr. Sheetal Punia

ITER-India, Institute for Plasma Research,
Gandhinagar

Date : 17th March 2022 (Thursday)

Time : 10.30 AM

Venue : Online - Join the talk:

<https://tinyurl.com/52n3rssa>

Abstract :

The ECE diagnostic system consists of a Transmission line, Polarization splitter unit, and detection instruments like Radiometer and Fourier Transform Spectrometer (FTS). There is an RF stray radiation due to the high power RF beam of Electron Cyclotron (EC) wave with frequency of 170 GHz incident on the plasma for plasma heating and current drive. This stray radiation is potentially harmful to the diagnostics system as some of the diagnostic system components are sensitive to these RF stray radiation and may get damaged or even destroyed by power levels as low as 100 mW. Therefore, a high frequency (~ 170 GHz) sensor which is typically a Schottky diode rectenna is designed and simulated to protect the sensitive components of the diagnostic system. The sensors will be positioned along the transmission line which transmits the ECE radiation. The rectenna is designed using microstrip technology concerning its miniaturization and cost-effectiveness. The designed antenna offers low-directivity to receive radiation from all directions, high bandwidth, low side-lobe-level, and return loss of -50 dB. Whereas the rectifying circuit consists of low-pass filter, impedance matching circuit and Schottky diode is designed with detection sensitivity of 1000V/W.
