(B) Design and Development of an ECRH stray radiation protection system for the ECE Diagnostics

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, RF stray radiation protection system needs to be developed to protect the sensitive components of the diagnostic system. This protection system includes sensors to monitor the RF stray radiation level, a band stop notch filter and a shutter to stop the RF stray radiation from being incident on the sensitive components. The stray radiation is monitored continuously. If the signal level of these sensors increases beyond a certain predefined level, the shutter will get closed and it will stop the RF stray radiation from propagating further. The notch filter will notch (or reflect) 170 GHz frequency while allowing all other frequencies to pass through. The sensors will be positioned along the transmission line which transmits the ECE radiation. The shutter will be placed at the input of polarization splitter unit, and the notch filter will be put in front of the FTS detector.

In this project, the student will be required to develop a prototype of the stray radiation protection system. This will include designing and developing sensor, shutter, and notch filter. All these will then be first individually tested for their performance. These will then they be integrated with the transmission line and the FTS, and integrated performance testing shall be done. The project requires understanding of the microwaves.

Relevant references [Publications, web links etc.]:

[1] Preliminary design proposal for RF stray radiation protection : IDM UID PKZCAZ

**Eligibility: Only students of Electronics and Communication branches can submit their application at**

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