Contribution ID: **23** Type: **In-person talk**

Status of the EUROfusion Enabling Research Project Advances in real-time reflectometry plasma tracking, for next generation machines

Monday 13 May 2024 10:15 (30 minutes)

Reflectometry is anticipated to play a significant role in plasma positioning, shaping, and tracking for DEMO, potentially replacing magnetic diagnostics. Initial progress has been made through experiments, theory, and simulations, but there is still much work to be done. Our EUROfusion Enabling Research (EnR) Project, involving experts and developers of reflectometry systems in Europe, aims to address lingering questions and create a unified approach for implementing a reflectometry system.
We are presenting the objectives and associated outcomes, which are divided in two main branches with its own specificities and requiring different approaches: (i) The ability to track and monitor the position and shape of the plasma in the initial stage of the discharge, in the start-up phase and also at the ramp-down phase; (ii) To improve the capabilities of operation in the stationary phase (flattop) in order to provide an accurate and precise substitute to the positioning magnetic diagnostics in real time. Contained in the EnR tasks are also important advances on Finite-Difference Time-Domain (FDTD) simulation codes allowing access to 3D simulations that can accurately depict scenarios such as the antenna prototype of the Divertor Test Tokamak (DTT) plasma position reflectometer tested at IPFN. An important issue that must be addressed is the synchronization between all reflectometers with an experimental validation on the tokamak WEST. The talk will also report on the advances on hardware with a prototype of a compact coherent fast frequency sweeping radio frequency (RF) back-end being developed using commercial Monolithic Microwave Integrated Circuits (MMIC) with Direct Digital Synthesis (DDS).

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