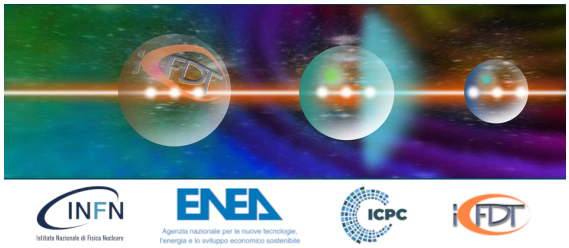

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Overview of the studies towards a Plasma Position Reflectometry System for Divertor Test Tokamak (DTT)

Wednesday, 23 October 2024 11:20 (10 minutes)

Plasma Position Reflectometry (PPR) is taking an important role in next generation fusion machines, such as DEMO, as a diagnostic to monitor the position and shape of the plasma, complementing magnetic diagnostics. The Divertor Test Tokamak Facility (DTT) presents itself as the perfect machine to implement, develop and test PPR systems, contributing in this way to the gain of a knowledge database in position reflectometry needed for DEMO. Important assessment work is being done to evaluate the performance of a tentative PPR system in DTT. Part of these efforts is integrated in the EUROfusion Enabling Research Project (ENR-TEC.01.IST), These efforts involve the design of two- and three-dimensional synthetic diagnostics for the Low (LFS) and High Field Sides (HFS), using Finite-Difference Time-Domain codes capable of simulate the propagation in the plasma but also to describe the system location in the vacuum vessel and characterize its access to the plasma (waveguides and antennas) [1,2]. This simulation exercise works in parallel with the design of antennas for the LFS and HFS. Their integration in the synthetic diagnostics is done through the use of a CAD conversion pipeline [3]. An overview of the progress achieved together with future work planned is offered in the present work together with an analysis of the accuracy on the localization of the separatrix at different positions around the vessel.

[1] F. da Silva, J. Ferreira, J. Santos, S. Heuraux, E. Ricardo, G. De Masi, et al. (2021). Assessment of measurement performance for a low field side IDTT plasma position reflectometry system. Fusion Engineering and Design, 168, 112405. http://doi.org/10.1016/j.fusengdes.2021.112405.
[2] F. da Silva, E. Ricardo, J Ferreira, J. Santos, S. Heuraux, A. Silva, et al. (2022). Benchmarking 2D against 3D FDTD codes for the assessment of the measurement performance of a low field side plasma position reflectometer applicable to IDTT. Journal of Instrumentation, 17(01), C01017. http://doi.org/10.1088/1748-0221/17/01/C01017.
[3] J. M. Santos, E. Ricardo, F. da Silva, T. Ribeiro, S. Heuraux and A. Silva. (2021). A 3D CAD model input pipeline for REFMUL3 full-wave FDTD 3D simulator. Journal of Instrumentation, 16(11), C11013. http://doi.org/10.1088/1748-0221/16/11/C11013.

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