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# Short_Oral_16: Study for a tangential dispersion interferometer/polarimeter for DTT

*Tuesday, 7 September 2021 17:00 (10 minutes)*

The Divertor Tokamak Test (DTT) facility [1], whose construction is starting in Frascati, will require robust and reliable diagnostics for the correct operation of the machine and the characterization of the plasma discharge.

For this purpose, we are studying a common-path dispersion interferometer/polarimeter for the detection of plasma electron density and magnetic field in 2 different tangential chords in the equatorial plane. The physical principle is based on the generation of a second harmonic which crosses the plasma collinearly with the beam at its fundamental. Being the plasma a dispersive medium, the two beams are subject to different dephasing from which it is possible to retrieve the plasma free electron density. Besides, the unconverted part of the fundamental can be used for polarimetric measurement.

Two different implementations of the interferometer have been considered, one with a CO2 laser ($\lambda$ = 10.6/5.3 μm) and another one with Nd:YAG ($\lambda$ = 1.064/0.536 μm). The former is more sensitive to lower plasma densities and to Faraday rotation, while the latter is more robust to fringe jumps.
We have studied the key advantages and disadvantages of both for the experimental conditions expected in DTT. In particular, we analysed the optical propagation of the beams at the different wavelengths, considering the effects of the plasma and the criticality of the main components. The comparison between these solutions, as well as a tentative draft of the final layout for DTT, will be presented.

[1] R. Martone, R. Albanese, F. Crisanti, A. Pizzuto, P. Martin. Eds "DTT Divertor Tokamak Test facility Interim Design Report, ENEA (ISBN 978-88-8286-378-4), April 2019 ("Green Book")"
https://www.dtt-dms.enea.it/share/s/avvglhVQT2aSkSgV9vuEtw.

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