

21st joint workshop on electron cyclotron emission (ECE) and electron cyclotron resonance heating (ECRH)

Contribution ID: 118

Type: **Poster**

First measurements of WEST ECEI diagnostic

Thursday, 23 June 2022 14:00 (2h 30m)

First measurements of WEST ECEI diagnostic

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Electron Cyclotron Emission imaging (ECEI) diagnostic system is a unique tool for visualizing the magnetohydrodynamic (MHD) or turbulent instabilities [1]. For WEST tokamak, teams from Korean universities UNIST and POSTECH and IRFM have collaboratively developed an ECEI diagnostic system that can withstand the accessibility and thermal constraints of the WEST tokamak [2]. The diagnostic is made of:

- two in-vessels mirrors. They focus and redirect the ECE beam toward the man-access flange
- a compact optical enclosure. The optical components are vertically aligned to take advantage of the height of Tore Supra equatorial and fit in the limited space between [3].
- three cubicles in the basement. They house the video modules and the acquisition system

The diagnostic was installed and aligned in 2019. Unsuccessful vacuum qualification of the large vacuum window prevented plasma measurements, but we were able to validate the diagnostic system and perform acquisitions to evaluate the noise level. Analysis of the C4 and C5 campaign data showed that the diagnostic was plagued by large parasitic signals and high level noise.

During the last shutdown, the diagnostic was modified to improve the cubicle shielding: an isolator transformer was installed; the 24 cables linking the optical enclosure to the cubicles are now connected on a connector panel fixed on the cubicle top to reduce the ground loop impact. We also successfully tested the vacuum window assembled with a polymer joint.

The diagnostic was realigned at the end of the shutdown and the ECEI flange with the vacuum window was bolted on the tokamak vessel. The commissioning of the C6 campaign should start in May and we are looking forward for the first ECEI signals on plasma.

References

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[3] Y. Nam, et al, Rev. Sci. Instrum., 87, 11E135 (2016) <https://doi.org/10.1063/1.4962941>

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Session Classification: Poster Session 2