

P1.1019 Doppler coherence imaging of puffed nitrogen SOL flows

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See the full abstract here:

<http://ocs.ciemat.es/EPS2019ABS/pdf/P1.1019.pdf>

The new Doppler Coherence Imaging Spectroscopy (CIS) system from Wendelstein 7-X (W7X) [1] is temporarily installed at ASDEX Upgrade (AUG) for a first extensive investigation of puffed nitrogen flows in the SOL and divertor. CIS is a powerful tool to measure 2D images of line-integrated, emission-weighted impurity ion and neutral flows in plasma regions that emit visible spectral lines [2]. It is a camera-based, passive optical diagnostic that detects the emission of a selected spectral line, for which an interferometric pattern is produced by a set of birefringent crystals. By the Fourier analysis of this pattern and comparison with a reference image of known wavelength, spectral information such as the Doppler shift can be determined. This work will present the CIS diagnostic set-up on AUG, that comes with the new addition of a tunable laser (called C-Wave [3]) as calibration source, which was successfully implemented and tested for the first time on W7-X [4]. With C-wave, direct calibration for several spectral N lines becomes possible, significantly simplifying the N flow analysis.

CIS has been successfully tested on AUG already, and flows of intrinsic carbon and helium as well as neutral deuterium flows could be investigated in cases of attached regimes [5]. By the puffing of nitrogen, fully detached regimes can be reliably achieved in the tungsten divertor of AUG [6]. Assisted with the data of other diagnostics, the line-integrated SOL flow data from CIS allows a detailed characterization of an H-mode power exhaust scenario to further constrain numerical modeling of power exhaust in AUG by codes such as SOLPS. This work will present the diagnostic preparation and set-up for first N flow measurements with CIS on AUG.

References

- [1] V. Perseo et al., 44th EPS Conf. on Plasma Phys. 41F, 5.103 (2017)
- [2] J. Howard, J. Phys. B: At. Mol. Opt. Phys. 43, 144010 (2010)
- [3] J. Sperling and K. Hens, Optik und Photonik 13 (Issue 3), Best of Applications, 22-24 (2018)
- [4] D. Gradic, V. Perseo, R. Konig et al., Fus. Eng. Des. (accepted) (2019)
- [5] D. Gradic, O.P. Ford, A. Burckhart et al., Plasma Phys. Control. Fusion 60, 084007 (2018)
- [6] A. Kallenbach, M. Bernert, M. Beurskens et al., Nucl. Fusion 55, 053026 (8pp) (2015)

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