**Updates of Coherence Imaging Spectroscopy at Wendestelstein 7-X for scrape-off layer measurements**

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Coherence Imaging Spectroscopy (CIS) is a camera-based polarization interferometer [1]. Given its capability of delivering 2D measurements of plasma parameters with high spatial resolution, it has proven itself suitable for studying the complex 3D scrape-off layer (SOL) of the Wendelstein 7-X (W7-X) stellarator [2]. The fusion experiment is equipped with two CIS systems, one featuring a broad overview of the SOL thanks to a toroidal field of view, the other focusing on one divertor module and overlapping with dispersive spectroscopy lines of sight. After successful impurity flow measurements acquired during the last operational campaign (OP1.2b in 2018) [3] [4] [5], the two W7-X CIS systems have undergone upgrades to either cope with the W7-X steady state operation or to deliver additional physics information. The toroidal system, measuring routinely impurity flow velocities thanks to a well-established calibration technique, now features new plasma facing components capable to withstand the 18 GJ operation foreseen for W7-X. A combination of a water cooled front plate and a movable shutter with copper straps dissipates the heat loads expected from the plasma. On the other hand, the divertor viewing system is used to implement at W7-X the recently developed multi-delay CIS technique [6], in order to obtain reliable SOL ion temperature measurements in addition to the well-known velocity measurements. The multi-delay technique utilizes a micropolarized camera and multiple birefringent crystals, which have been optimized to deliver information about the non-negligible contributions of Zeeman splitting and bremsstrahlung to the measured line broadening and wavelength shift. This new CIS implementation is characterized with fine-tuned laser scans and is validated by exploiting the overlap of lines of sight with dispersive spectroscopy.

# **References**

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