Novel multi-energy soft x-ray camera in the WEST tokamak: first data

and synthetic diagnostic

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During the C6 campaign, the tungsten (W) Environment in Steady-state Tokamak (WEST) tokamak was operated for the 1st time with a water-cooled full tungsten divertor -similar to that of ITER- and long-pulse scenarios, making it an ideal environment for high-Z impurity transport studies. In that context, a compact multi-energy (2-30 keV) soft x-ray diagnostic (ME-SXR) [1] was deployed by PPPL in WEST for high-Z impurity transport studies and electron temperature profile measurements. The ME-SXR consists of the PILATUS3 photon-counting detector manufactured by DECTRIS Ltd. mounted on a pinhole camera with a temporal and spatial resolution of 2 ms and 1-2 cm, respectively. The novelty of this soft x-ray diagnostic lies in the fact that the lower-energy threshold is set independently on each one of the 100k pixels with a high energy resolution (< 1 keV). The design, capabilities and engineering challenges of the ME-SXR diagnostic are briefly presented here.

This contribution mainly presents the first data of the ME-SXR diagnostic acquired during C6. A tentative comparison of the experimental x-ray emissivity with predictions made using the synthetic diagnostic based on the FLYCHK suite [2] for the computation of the charge-state distribution and x-ray emissivity of the plasmas as well as the ToFu [3] open-source python library will also be presented.

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References

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