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P4.070 Performance evaluation of a hypothetical core density fluctuation measurement on the ITER diagnostic beam.

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Understanding core MHD activities is of particular interest on ITER. The fast measurement of core density fluctuations might be a viable avenue for the exploration of plasma core activities in some of the ITER operational scenarios. Fluctuation beam emission spectroscopy (BES) would utilize the diagnostic neutral beam shot into the plasma, where beam atoms get to excited states due to collisional processes, and cause spontaneous light emission.

The feasibility of a pedestal density fluctuation measurement by BES on the ITER diagnostic beam has been recently demonstrated for the observation of edge turbulence and MHD activities [1], and previous work indicated promising results for a core density fluctuation measurement concept [2]. Aim of present contribution is to evaluate the expected performance of a hypothetical system that would operate in conjunction with the core charge exchange recombination spectroscopy system located on upper port 3 [3].

Forward modelling was used to estimate the signal to background and signal to noise ratios, as well as the spatial resolution of the hypothetical system by use the RENATE 3D BES modelling code, which handles realistic magnetic geometries and accounts for the spatial effects of the diagnostic. Simulation of Spectra was used to calculate spectrum of the beam emission, and estimate the corresponding theoretical filter throughput. Fluctuation response analysis was performed on the system and evaluated in view of possible applications of the diagnostic with regard to observable density fluctuation amplitudes and mode numbers.

The views and opinions expressed herein do not necessarily reflect those of the ITER Organization.

[1] O. Asztalos et.al. EPS submitted to (2018)
[2] G.I. Pokol et.al Fusion Eng. Des. 88 1386 (2013)
[3] A. Krimmer et.al. SOFT submitted to (2018)

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