

P4.1012 Spectroscopic diagnostics for deriving electron temperature and density from an Argon plasma in GyM

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See full abstract here

<http://ocs.ciemat.es/EPS2019ABS/pdf/P4.1012.pdf>

A non-intrusive diagnostic based on Optical Emission Spectroscopy (OES) is under study in GyM for measurements of electron temperature (T_e) and density (n_e) to complement Langmuir probes. This technique provides values of T_e and n_e averaged along the line-of-sight through the analysis of spectral line pairs, as emitted by the plasma, which depend on T_e and n_e and the comparison with the reconstructed emission calculated within the ADAS (Atomic Data and Analysis Structure) project. The multiplets at 487.6 nm and 489.9 nm arising from Ar⁺ for the n_e and the lines at 751.6 nm and 738.6 nm from Ar⁰ for the T_e have been used. Further line pairs have been also investigated and the results compared to local values obtained using Langmuir probes in the range $T_e \sim 1\text{--}10$ eV, $n_e \sim 10^{10} - 2 \cdot 10^{11}$ cm⁻³ on the machine axis at different longitudinal positions. Since accurate estimates of T_e and n_e depend critically on atomic data and modelling used for the theoretical calculations, a great effort has been devoted to revise the available atomic coefficients and to apply them to the experimental data. In this framework GyM is used as facility to test atomic data in a specific range of T_e and n_e to identify the critical issues to be improved for accurate estimate of the plasma parameters. The OES method, here applied to GyM, has the potential to be extended to other plasmas where Ar impurities can be added as tracers or injected to cool radiatively the SOL or divertor plasma.

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