Core impurity rotation in TJ-II plasma scenarios in which combined ECRH and NBI heating is used to mitigate impurity accumulation

B. López-Miranda[1], B. Zurro[1], A. Baciero[1], I. Pastor[1], G. Rattá[1] and TJ-II team[1]

[1] *Laboratorio Nacional de Fusión, CIEMAT, Madrid, Spain*

In stellarators and tokamaks, long impurity confinement times, or impurity accumulation, is observed in some regimes [1, 2]. It is well known that avoidance of this deleterious effect is critical for present day devices and future fusion reactors. Electron Cyclotron Resonance Heating (ECRH) has been demonstrated as an effective tool to mitigate this problem, as its application has the capability to avoid impurity accumulation [1].

The goal of the present study is to investigate solid-rigid core rotation, in TJ-II plasma scenarios where Neutral Beam Injection (NBI) heating and ECRH are combined, and its role in particle and impurity confinement mitigation. For this purpose, the main plasma rotation diagnostic has been a high spectral resolution spectrometer [3]. It has been upgraded to permit collection of plasma light emissions without the need for a fibre bundle. Moreover, in order to overcome reduced impurity light emission, long exposure times and flexibility in the number of spatial channels employed (19 to 29) permit compatibility with the purpose of the experiment.

The behaviour of core plasma poloidal rotation, as measured by passive Doppler spectroscopy of emission lines for the carbon ions C^{+4} and C^{+5}, versus line-averaged electron plasma density has been evaluated for reference NBI discharges in which ECRH is applied at different power levels and is focused at different plasma radii. Representative results, obtained for a range of ECRH overlapped with NBI heating scenarios, are shown in order to assess whether changes in radial electric field resulting from this operational method are a key parameter to mitigate impurity confinement in this hybrid heating regimes.

[1] Tamura N *et al*., Phys. Plasma **24** 056118 (2017)
[2] Sertoli M *et al*., Plasma Phys. Contrl. Fusion **57** 7 (2017)
[3] Baciero A, Zurro B *et al*., Rev. Sci. Instr. **72** 971 (2001)