

P5.1054 Investigation of the toroidal propagation of lithium injected by laser blow-off into TJ-II plasmas to measure edge ion temperature

Friday, 12 July 2019 14:00 (2 hours)

See full abstract here <http://ocs.ciemat.es/EPS2019ABS/pdf/P5.1054.pdf>

Wall conditioning in TJ-II, is regularly performed by Glow Discharge deposition of B films and Li evaporation from ovens located inside the vacuum chamber [1]. In order to tests in-situ, real-time conditioning techniques, a Nd-YAG laser (normally used for Laser Blow-Off studies [2] and LIBS [3]) is used to ablate lithium off the inner wall of the chamber, in line with previous attempts using Li powder droppers [4] or DOLLOP [5]. For this purpose, the laser beam is focussed onto the vacuum chamber wall directly opposite its entry window while laser spot power density is controlled by varying the position of a focussing lens.

The Li source, highly localized both in position and time, opens up the possibility for transport studies at the plasma periphery in TJ-II. This is possible because the laser-ablated Li is quickly ionized by the plasma and transported along the field lines. In its toroidal travel, collisions with plasma particles lead to the thermalization of the initially cold Li⁺ ions. This equilibration process can be followed by time-of-flight (TOF) measurements at different distances from the source. Li⁺ emission monitors (at 538 nm), X-ray detectors and bolometers are used to collect plasma radiation. The goal of this work is to demonstrate the viability of injecting Li, using a Nd-YAG laser, to study its subsequent toroidal propagation. It should be noted that ion temperature, Ti, measurements at the periphery of fusion plasmas have traditionally been obtained using passive spectroscopy [6], ion sensitive probe (ISP) diagnostics [7] or retarding field analysers (RFA) [8]. Here, it is hypothesized that an alternative method for measuring Ti at the plasma periphery could be developed, which simultaneously allowing localized condition of the wall that is in close contact with the plasma.

References

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Session Classification: Poster P5