

P5.1065 Studies on carbon content and transport with Charge Exchange Spectroscopy on W7-X

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

See full abstract here <http://ocs.ciemat.es/EPS2019ABS/pdf/P5.1065.pdf>

The first absolute impurity density profiles of the optimised stellarator Wendelstein 7X (W7-X) plasma core will be presented and investigated under different operating scenarios. The profiles are derived from the Charge Exchange Recombination Spectroscopy (CXRS) diagnostic that observes the Neutral Beam Injection (NBI) which is well-suited for determining spatially resolved profiles of fully-stripped low-Z impurities across the entire plasma radius. Understanding the confinement of impurity ions can help optimise the stellarator configuration in order to control their effect on plasma radiation and subsequent power losses. This work concentrates on carbon, the main intrinsic impurity in W7-X, although the radiation of other low-Z impurities, such as oxygen and boron is also measured.

The carbon density profiles and their evolution are investigated in different magnetic configurations, densities and heating scenarios with different NBI and ECRH power ratios. Of particular interest are discharges with pure NBI heating phases or with very low ECRH power, where indications of unusually high impurity confinement times have been observed.

If impurity transport is dominated by neoclassical effects, the carbon profile measurements could give important insight into the optimisation of W7-X. The impurity transport modeling code STRAHL is used to determine the transport coefficients (diffusivity and radial convective velocity) from the measurements which are then compared with neoclassical predictions.

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Session Classification: Poster P5