Effects of the ICRH resonance position on the profile shape of the W density in JET-ILW H-mode discharges

M. Sertoli[1,2], F. J. Casson[2], R. Bilato[1], J. Flanagan[2], J. Boom[1], A. Shaw[2], E. Delabie[3] and JET Contributors*

[1] *Max-Planck-Institut für Plasmaphysik, Boltzmannstrasse 2, D-85748 Garching, Germany*
[2] *CCFE, Culham Science Centre, Abingdon, Oxon, OX14 3DB, UK*
[3] *Oak Ridge National Laboratory, Oak Ridge, TN 37830, USA*

Ion cyclotron resonance heating (ICRH) with the power deposited close to the plasma centre is necessary in JET-ILW to avoid tungsten (W) accumulation and its optimization can lead to longer, more stable plasma operation. In this contribution, the effect of the location of the ICRH resonance layer on the profile shape of the intrinsic W density has been studied in JET-ILW H-mode discharge 85377. With a scan in toroidal magnetic field from 2.5 to 2.85 (T) the resonance layer is moved from the high-field-side (HFS) to the low-field-side (LFS), but still staying within the sawtooth inversion radius. While the main plasma parameters show only slight changes and the sawtooth period remains unaffected, moving the resonance layer towards the LFS leads to a 25% decrease in central W density and in a reduction of the LFS asymmetry close to the resonance layer.

The experimental W density profile has been determined using the soft X-ray (SXR) diagnostic and vacuum-ultra-violet (VUV) spectroscopy coupled together as explained in [1]. This method has been recently upgraded to account for the strong poloidal asymmetries typically present in the SXR emission profiles at JET. Contributions from low-Z impurity and deuterium have been included using the visible Bremmstrahlung Zeff measurement [2] with the assumption that their contributions are poloidally symmetric and that the only other impurity contaminating the plasma (apart from W) is Be. The method has been found to be robust for W concentrations above a few 10^{-5} and in cases where the contributions from medium-Z impurities such as Ni is negligible.

The results are compared with modelling using the code NEO [3, 4] accounting for centrifugal effects as well as temperature anisotropy of the ICRF heated H-minority ions (modelled using TORIC-SSFPQL [5]).

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* See the author list of "X. Litaudon et al 2017 *Nucl. Fusion* 57 10200"