

P2.1051 Ion temperature profiles in NBI and ECRH heated W7-X plasmas

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see full abstract here

<http://ocs.ciemat.es/EPS2019ABS/pdf/P2.1051.pdf>

In a survey of ion temperature (Ti) profiles in ECRH dominated W7-X plasmas during the most recent W7-X campaign, it is found that no strong dependence of the central ion temperature on either electron temperature or plasma density exists. This indicates that the ion heating, which occurs through transfer of heat from electrons, has little influence on the ion temperature profile and suggests a critical ion temperature gradient which can not be exceeded under typical conditions. The addition of NBI heating to medium or high power ECRH discharges shows no significant rise of Ti despite significant direct ion heating, supporting the conclusion of a maximum Ti gradient. However, in some low ECRH power discharges, NBI heating induces a rapid Ti rise, transiently achieving a central Ti well above that typically seen at higher ECRH power and showing that the apparent limit on Ti gradient can be exceeded.

Ion temperature profiles are taken from the recently installed Charge Exchange Recombination Spectroscopy diagnostic which gives high resolution localised measurements over 3/4 of the full plasma diameter. The survey includes all discharges with significant NBI power as well as many ECRH discharges with short diagnostic NBI blips. The high resolution CXRS profile information is supported by a broader database of Ti information from X-ray Imaging Crystal Spectrometer (XICS)[1] measurements covering almost all discharges of the campaign as well as electron temperature and density profiles from the Thomson Scattering diagnostic[2].

References

[1] A. Langenberg, N.A. Pablant, Th. Wegner et al. Rev. Sci. Instrum. 89 10G101 (2018)

[2] E. Pasch et al. Rev. Sci. Instrum. 87 11E729 (2016)

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