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# P1.1001 Spectral structure and isotopic dependence of NBI ICE in the TUMAN-3M tokamak

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See the full abstract here:
http://ocs.ciemat.es/EPS2019ABS/pdf/P1.1001.pdf

Ion cyclotron emission (ICE) in tokamak plasmas has recently become a subject of enhanced interest due to their potent capability to be used as a diagnostic tool for fast ion and charged fusion product confinement characterization. At the TUMAN-3M tokamak, ICE is observed both in ohmic and NBI heated plasma. In former experiments on the TUMAN-3M with NBI plasma, the heating beam composed of approx. 40% hydrogen and 60% deuterium. The ICE was found to originate in central plasma region, with frequency corresponding to IC resonance for fast minority ion (i.e. deuterium (hydrogen) in hydrogen (deuterium) target plasma). Recently, thank to improvement in beam ion source fueling system, nearly pure hydrogen or deuterium beams are routinely available on the tokamak. The paper report on last observation of spectral characteristics of the ICE made with pure H or D beams injected in plasma with different isotope composition.
In the shots with D-beam injected into D-plasma with negligible hydrogen concentration, the ICE frequency was found to correspond to second harmonic of IC resonance frequency for deuterium, in NBI power (or energy) is bellow some threshold value. If this threshold is overcome, fundamental deuterium IC frequency appears. Thus, the observed ICE frequency matches not a minority IC but the main ion IC frequency. Symmetrical situation (H-beam injection into H-plasma) is currently under investigation.
The spectral lines of ICE were found to have a fine structure, which may be attributed to several effects, such as mixed beam composition or excitation of different spatial modes. Experiments with pure hydrogen and deuterium beams make it possible to discriminate between possible mechanisms of splitting of the spectral line.

References
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