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# P1.1103 Channeling of neutral beam injection power into radio frequency waves

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The concept of alpha power channeling has been proposed by N. Fisch and collaborators as an efficient tool to improve the performance of fusion reactors, delivering the fusion alpha power into radio frequency waves, which are absorbed by ion species [1]. Alpha channeling by Doppler-shifted inverse nonlinear Landau damping at half-integer cyclotron resonance has been recently discussed [2], suggesting that Deuterium neutral beam (NB) injection power can be also channeled into ion Bernstein wave (IBW) power. NB channeling into IBW has been indeed recently observed [3]. We discuss here a possible effect of channeling into radiofrequency waves of Deuterium NB power injected in D-T tokamak plasma of ITER with 7Li or 9Be minority. We consider fast magnetosonic waves (FW) launched from the low field side at operating frequency suitable to locate the fundamental cyclotron resonant layer of minority species near the magnetic axis. Depending on the concentrations of the ion species and the launched spectra vs. the parallel refractive index, the three-ion heating scheme by FW proposed by E. Kazakov [4], or the IBW ion heating in mode conversion regime [5] occur, both providing efficient ion heating. Inverse Landau damping at the Doppler shifted fundamental ion cyclotron resonance of Deuterium ions might then provide NB power channeling into radiofrequency waves, due to the inversion of the D+ population in the velocity space perpendicular to the static magnetic field. Numerical and analytical solutions of the relevant Fokker-Planck equation, here discussed, indicate that such inversion can occur in steady state conditions if the space diffusion rate of the deuterons produced by the NB ionization is sufficient large compared with the slowing down rate. Similar condition for channeling has been suggested in previous theoretical [2] and experimental works [3].

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[3] R.M. Magee, et al., Nature Physics (2019) 1-6
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