

P5.1055 Generation of suprathermal ions in ECR heated plasmas in the stellarator TJ-II

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

See full abstract here <http://ocs.ciemat.es/EPS2019ABS/pdf/P5.1055.pdf>

The majority ions present in Electron Cyclotron Resonance (ECR) heated plasmas in the stellarator TJ-II are heated through collisions with electrons. Since there is no direct heating of plasma ions in this device their thermal distribution is expected to be Maxwellian. However, during recent experiments in TJ-II a population of suprathermal ions, with energies in the range 600 - 1000 eV and with a non-Maxwellian distribution, was observed during the ECR only heating phase [1]. A possible explanation to this phenomenon is a reduction of the power that triggers the parametric decay instability (PDI) when certain conditions of the density profile, magnetic field and turbulence are fulfilled, as explained in [2]. It is considered that one of the daughter waves from this PDI may heat resonant ions and give rise to the non-Maxwellian distribution. ECR plasmas in TJ-II are created and maintained by two gyrotron systems that deliver microwaves at two symmetric positions in the plasma that are separated 56° toroidally. This work presents a series of experiments in which one gyrotron is modulated while the second is operated continuously during the whole discharge. This produces two clearly separated phases: one with full power, the other with half power. It is observed that suprathermal ions are generated when full power is applied. In addition, when a cryogenic pellet is injected during a full power phase, in order to modify the plasma density profile, it is found that suprathermal ions are absent from the ion flux, measured with a neutral particle analyser (NPA), immediately after the pellet injection. Finally, the radial extent of the suprathermal ion population is investigated by changing the NPA line-of-sight.

References

- [1] J.M. Fontdecaba et al. ECA Vol. 42A 45th EPS Conference on Plasma Physics 2 6 July 2018
- [2] E.Z. Gusakov and A.Yu. Popov Physical Review Letters 105 115003 (2010)

pppo

Presenter: FONTDECABA, J. (EPS 2019)

Session Classification: Poster P5