

P1.1067 A comparison of experimental and theoretical electron energy distribution functions in an argon GyM plasma

Monday, 8 July 2019 14:00 (2 hours)

See the full abstract here:

<http://ocs.ciemat.es/EPS2019ABS/pdf/P1.1067.pdf>

A joint experimental/theoretical investigation on the characteristics of plasmas produced in GyM magnetic linear device [1] has been carried out, comparing the measured electron energy distribution function (EEDF) with the distribution resulting from a self-consistent state-to-state kinetic model coupling the chemistry of inelastic and reactive collisional processes with the Boltzmann equation for free electrons [2]. The simulations are performed feeding the code with discharge parameters (pressure, power, intensity of magnetic field) derived from experimental conditions. The level kinetics includes an extended collisional radiative model with electron excitation (deexcitation) and ionization from the ground and excited states, in order to estimate radiation emission. Three body recombination and radiative recombination have also been included. EEDF has been experimentally determined by Langmuir probe measurements in argon plasmas. A preliminary comparison between the theoretically simulated and experimentally measured ionization degree shows a reasonable agreement. The experimental EEDF presents a peak region around 10 eV, a hint of the presence of non-maxwellian distribution. This peak corresponds to the superelastic collisions of electrons with neutral argon excited in its metastable state. This activity represents the first attempt to model the plasma produced in GyM, and in the future it will be extended to molecular plasmas such as hydrogen and nitrogen.

[1] D. Irají et al. Fusion science and technology (Online) 62 , 428 (2012)

[2] G. Colonna et al. Chemical Physics, Volume 398, 4 April 2012, Pages 37-45

pppo

Presenter: LAGUARDIA, L. (EPS 2019)

Session Classification: Poster P1

Track Classification: MCF