

Abstract Submitted
for the GEC12 Meeting of
The American Physical Society

STUDENT AWARD FINALIST: Measurements of Positive and Negative Energy Distribution Function obtained from a Langmuir probe in an ion-ion plasma¹ JEROME BREDIN, PASCAL CHABERT, ANE AANESLAND, Laboratoire de Physique des Plasmas (LPP), Ecole Polytechnique/CNRS, Route de Saclay, 91128 Palaiseau, France — An ion-ion plasma, created downstream of a magnetic barrier, has been studied with a Langmuir probe. In classical electron-ion plasmas the second derivative of the I-V characteristic below the plasma potential can be used to deduce the electron energy distribution function (EEDF). In nearly electron-free ion-ion plasmas, we propose to use the second derivative to deduce both the electrons and the ion (positive and negative) EDFs. Below the plasma potential, the second derivative involves two distributions; the negative ions at low energy and the electrons, which are in very small quantity, at high energy. Above the plasma potential, the second derivative analysis leads to the positive ion distribution. The exact procedure to analyze the data will be detailed during the presentation. We found that downstream of the magnetic barrier, where the ion-ion plasma forms, ion temperatures are fairly high, from 0.5 eV to 0.1 eV. The temperature of the positive ions is slightly higher than that of the negative ions. The ion densities can also be deduced from the I-V characteristic and they are in the order of 10^{17} m^{-3} , that is almost three order of magnitude higher than the electron density in this region of the plasma.

¹We are grateful for the expert technical assistance by J. Guillon and M. Baudier. This work is part of the PEGASES project funded by EADS Astrium and the EPIC-ANR blanc project ANR-11-BS09-040.

Jerome Bredin
Laboratoire de Physique des Plasmas (LPP),
Ecole Polytechnique/CNRS,
Route de Saclay, 91128 Palaiseau, France

Date submitted: 10 Jul 2012

Electronic form version 1.4