PPPS 2019



Contribution ID: 691

Type: Oral

Experiment on the propagation of relativistic pulsed electron beam in plasma

Tuesday 25 June 2019 16:30 (15 minutes)

We present an experiment designed to investigate the propagation of a high-current relativistic pulsed electron beam (4MeV, 2kA, 60ns) in plasmas. This experiment takes place on an existing electron source at CEA-CESTA, and uses a plasma cell specially designed to this purpose.

It consists of a $\tilde{1}$ meter long beam line section holding a glass tube in the path of the electron beam. We generate a DC glow discharge a few tens of cm long in the glass tube and we have estimated the electron density to be around $10^9 cm^{-3}$ with 3 different methods, namely electrostatic probes, microwave interferometry and an original diagnostic based on a capacitive coupling with the plasma. A coil for additional inductive heating of the plasma has also been developed to increase the plasma density.

The plasma cell features some critical aspects such as plasma/vacuum windows or return current system, which deserve special care. We have particularly tested the resistance of different plasma/vacuum foils against the energy flux of the electron beam, as well as the mechanical and thermal stress due to the plasma discharge. In addition, the influence of the foils on the beam emittance and focusing has been numerically evaluated by PIC simulations with the LSP (large scale plasma) code. Finally, the preliminary results of the beam propagation in the plasma cell will be presented.

Authors: Dr MAISONNY, R. (CEA, DAM, GRAMAT, F-46500 Gramat, France); DORCHIES, Fabien (Universite de Bordeaux-CNRS-CEA, CELIA, Talence F-33405 France); FOURMENT, claude (CEA); LAHENS, Thomas (CEA-CESTA, Le Barp, F-33116 France)

Presenter: LAHENS, Thomas (CEA-CESTA, Le Barp, F-33116 France)

Session Classification: 1.4 Partially Ionized Plasmas

Track Classification: 1.4 Partially Ionized Plasmas