Abstract Submitted
for the GEC11 Meeting of
The American Physical Society

PIC-MCC simulation of plasma transport across a magnetic filter[1] B. CHAUDHURY, J.P. BOEUF, G. FUBIANI, G.J.M. HAGELAAR, LAPLACE, CNRS and Universite de Toulouse, France, S. KOLEV, University of Sofia, Bulgaria — A magnetic filter is used in the ICP negative ion source for the ITER neutral beam injector to limit the flux of extracted electrons and to prevent negative ion destruction by fast electrons. Plasma transport across the filter from the ICP driver to the extraction grids is however poorly understood and the design of the magnetic filter is empirical. Simulations with a PIC MCC (Particle-In-Cell Monte Carlo Collisions) model have been performed under 1D, 2D periodic, and 2D bounded conditions, with the B field perpendicular to the simulation domain. Results show that : (1) in the 1D simulation only a very small fraction of the electrons can cross the filter, (2) in the 2D periodic simulation the fraction of electrons crossing the filter is still very small in spite of the formation of large amplitude and low frequency drift wave instabilities in the direction perpendicular to the B field, (3) in the 2D bounded simulation the presence of the side walls redirects the electron flow toward the extraction grids, leading to a much larger and non uniform electron flow to the grids that scales as 1/B. These results are consistent with those from a fluid model (G. Hagelaar et al., these proceedings).

[1]Work supported by Federation de Recherche FM, CEA and EFDA.

J.P. Boeuf
LAPLACE, Universite de Toulouse, France

Date submitted: 20 Jul 2011 Electronic form version 1.4