Abstract Submitted
for the GEC11 Meeting of
The American Physical Society

Drift-induced plasma transport across a magnetic field barrier GERJAN HAGELAAR, GWENAEL FUBIANI, JEAN-PIERRE BOEUF, LAPLACE, CNRS and University of Toulouse, STANIMIR KOLEV, Sofia University — Various low-temperature plasma sources rely on a steady magnetic field for their operation. Most of these sources have an axisymmetric configuration where any magnetic drifts are closed along the azimuthal direction and therefore do not interfere with the overall plasma transport to the chamber walls. However, in non-axisymmetric sources the magnetic drift is bounded by the walls and tends to induce increased transport across the magnetic field. In this paper, we use self-consistent numerical simulations to demonstrate and analyze this bounded-drift effect for the magnetic filter in the negative ion source currently under development for the ITER neutral beam heating system. We show that the plasma in this source develops asymmetry in order to redirect the bounded electron drift across the magnetic filter toward the extraction grids. The resulting cross-field electron current collected by the grids scales as 1/B rather than the classical $1/B^2$ scaling.

Gerjan Hagelaar
LAPLACE, CNRS and University of Toulouse

Date submitted: 15 Jul 2011 Electronic form version 1.4