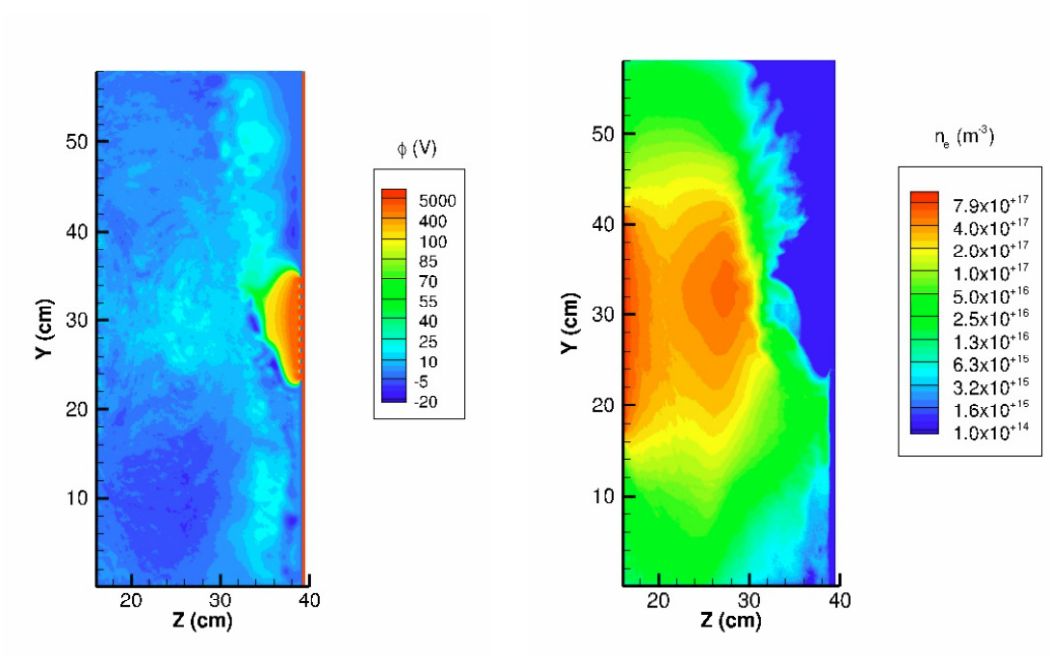
TueA02

Particle model of full scale ITER-relevant negative ion source

Francesco Taccogna, Pierpaolo Minelli, Nicola Ippolito

CNR-NanoTec, Bari, Italy
INFN, Bari, Italy
Corresponding Author: Francesco Taccogna, e-mail address: francesco.taccogna@cnr.it

One of the most important problems in the simulation of negative ion extraction is related to the injection conditions at the source plane (the extracted current strongly depends on the source condition) and to the fact that up to now only a single aperture has been resolved [1-3]. At the same time, full scale source simulations have shown the importance of plasma dis-homogeneity along the extraction grid (y-direction) due to the presence of the magnetic filter but without the possibility of solving the transport and extraction of negative ions through the single aperture (low grid resolution) [4] For this reason, a 2.5D PIC-MCC model of the full scale ITER-relevant negative ion source has been developed keeping the single grid cell small enough to resolve in detail the extraction dynamics till the EG grid. Results (see Figs. 1 where the plasma potential and electron density structures in the expansion and extraction regions have been reported) have shown the complex electron dynamics through the magnetic filter and the strong coupling between expansion and extraction regions determining different boundary conditions at the entrance of every extraction aperture.



(a) (b)

Fig. 1 – (a) Map of (a) electric potential φ(V) and (b) electron density *n*e(m-3) in the {y,z} plane in the expansion and extraction regions. The driver region is on the left, not simulated.

References

[1] F. Taccogna, P. Minelli, S. Longo, *Plasma Sources Sci. Technol.* **22**, 045019, 2013.
[2] S. Mochalskyy, et al., *Plasma Phys. Control. Fusion* **56**, 105001, 2014.
[3] A. Hatayama, et al., *Rev. Sci. Instrum.* **85**, 02A510, 2014.
[4] G. Fubiani, J.-P. Boeuf, *Phys. Plasmas* **21**, 073512, 2014.