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Negative Hydrogen Ion Production in a Helicon Powered Magnetized Plasma Column[1] GWENAEL FUBIANI, LAURENT GARRIGUES, GERJAN HAGELAAR, BERNARD REMAN, LAPLACE, University of Toulouse, CNRS, Toulouse, France, RICCARDO AGNELLO, MICHELE FADONE, IVO FURNO, ALAN HOWLING, REMY JACQUIER, EPFL, Swiss Plasma Center (SPC), CH-1015 Lausanne, Switzerland, ALAIN SIMONIN, CEA, IRFM, F-13108 St Paul lez Durance, France — A new generation of neutral beam systems will be required in future fusion reactors, such as DEMO, able to deliver high power (up to 50 MW) with high neutral energy (>1 MeV). Negative ions have a higher neutralization fraction (compared to positive ions) in a gas cell at energies greater than 50 keV. They are generated mostly on cesiated metal surfaces inside a magnetized high brightness plasma source but cesium consumption must be limited to a minimum in a fusion power plant to reduce the maintenance of the source. There is hence a strong research focus to optimize the production of negative ions via dissociative attachment of the gas molecule inside the source volume. To achieve this, one must generate a plasma with a hot (˜10 eV) and cold (˜1 eV) electron temperature regions and confine the electrons magnetically. In this work, we will analyse the properties of a hydrogen plasma produced in a thin (20 cm radius and 1.8 m length) magnetized (˜150G) plasma column powered by a helicon discharge [I. Furno et al., EPJ Web of Conferences **157**, 03014 (2017)]. The numerical simulations are performed with a 2.5D Particle-in-Cell algorithm with Monte-Carlo Collisions (PIC-MCC) [G. Fubiani et al., New J. Phys. **19**, 015002 (2017)]. The model will be compared to experiments.

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