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Spectroscopic measurements for hydrogen dissociation degree in an helicon plasma C. MARINI, P. DEMOLON, B. DUVAL, I. FURNO, EPFL, CRPP, CH-1015 Lausanne, Switzerland, PH. GUITIENNE, Helyssen, Route de la Louche 31 CH-1092 Belmont sur Lausanne, Switzerland, A. HOWLING, R. JACQUIER, A. KARPUSHOV, EPFL, CRPP, CH-1015 Lausanne, Switzerland, A. SIMONIN, CEA, IRFM, F-13108 St Paul lez Durance, France, K. VERHAEGH, EPFL, CRPP, CH-1015 Lausanne, Switzerland — Future fusion reactors, such as DEMO, will need a new generation of Neutral Beam (NB) systems to produce high power (up to 120 MW) and high energy (1 MeV) neutral beams. To achieve these requirements, the use of negative ion beams produced by a surface or volumetric plasma source is presently exploited by the fusion community. A new helicon plasma source based on a resonant birdcage network antenna is under development at the CRPP in collaboration with CEA-IRFM, and is installed on the linear Resonant Antenna Ion Device (RAID). One of the most important parameters for the negative ion production, other than electron temperature T_e and density n_e, is the dissociation degree α, that can be determined by using the passive spectroscopic method conceived by Lavrov et al. [2006 Plasma Sources Sci. Technol. 15 135]. The method exploits the dependence of the H_α, H_β and Fulcher (2,2)Q1 line intensity ratios on T_e, α and the gas temperature T_{gas}. A strong point of the method is that it employs only passive spectroscopic measurements that are non-perturbing and relatively easy to implement. The experimental setup is described and results are compared with actinometric estimations and 0D model predictions.

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