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Expansion of a plasma across a transverse magnetic field in a negative hydrogen ion source for fusion URSEL FANTZ, LOIC SCHIESKO, DIRK WÜNDERLICH, Max-Planck-Institut für Plasmaphysik, NNBI TEAM — Negative ion sources are a key component of the neutral beam injection systems for the international fusion experiment ITER. To achieve the required ion current of 40 A at a tolerable amount of co-extracted electrons (electron to ion ratio below one) the source is separated into a plasma generation region and an expansion chamber equipped with a magnetic filter field (up to 10 mT). The field is needed for: (1) cooling the electrons down and thus minimize the H^- destruction by collisions, (2) to reduce the co-extracted electron current, and (3) to enhance the extraction probability for the surface produced negative ions. The area of the ITER source will be approximately 1m width and 2 m height, the IPP prototype source is a 1/8-size source. The recently installed flexible magnetic filter frame allows for systematic filter field studies (strength, position, polarity). Two Langmuir probes have been used to measure the plasma parameters simultaneously in axial direction. The profiles in the upper and lower part of the expansion chamber show beside the expected electron temperature and density decrease a drop in the plasma potential and a drift depending on the polarity, which vanishes when removing the filter field. The data interpretation is supported by modeling activities.

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