"Possibilities for further optimizing the H^-/D^- RF source"

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The RF source, consisting of a cylindrical driver and a racetrack shaped expansion volume with 0.17 m^2 cross section area has shown high extracted current densities for H^- and D^- ions of 330 and 250 A/m^2. Surface production on a cesiated surface is the dominant production mechanism for negative ions. That means that the control of cesium distribution and cesium re-deposition during and between plasma pulses is dominating the source performance. The RF source having low power deposition on the expansion volume and plasma grid allows to influence the cesium distribution by optimising the wall and plasma grid temperature.

The cesium content in the plasma can be stabilized with a cesium dispenser which can be switched on and off during the plasma pulse. The effect of this will be tested shortly by using electrically heated SAS cesium dispensers which react within a short time constant.

Only H^- ions produced near the extraction hole have a chance to get extracted. The quantity of extractable ions could be influenced by the geometry of the plasma grid at the plasma side. This is being varied by inserting plates mounted onto the plasma grid from the plasma side. These plates can be easily exchanged and also allow to test various materials.

Another possibility to enhance the available current density is by optimising the diameter of the holes in the plasma electrode finding the best compromise between production surface near the hole and electric extraction field.

Stripping losses can be measured spatially resolved by H_α beam emission spectroscopy giving access to further optimisation studies. Finally the source efficiency can be optimised by improving the strength and the shape of the filter field and by reducing the effective wall area of the expansion volume by inserting confinement magnets. The paper will be present first results and outline planned further experiments.