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Large and powerful RF-driven hydrogen ion sources URSEL FANTZ, PETER FRANZEN, BERND HEINEMANN, Max-Planck-Instiut fuer Plasmaphysik, EURATOM Association, Boltzmannstr. 2, 85748 Garching, Germany, NNBI TEAM — Large area plasma sources are desirable in many applications among them the heating systems of magnetically confined fusion devices such as ITER (www.iter.org). Here, the hydrogen plasma has to illuminate homogeneously an area of 1.9 x 1 m^2 at a pressure of 0.3 Pa maximum. The plasma is generated via inductively coupling in eight cylindrical drivers, each driver powered with up to 90 kW power at 1 MHz frequency. The modular concept allows for size scaling such that large surfaces are homogeneously illuminated. The ELISE test facility, recently commissioned at IPP, is equipped with a source of the same width but half the height of the ITER source, i.e. an area of 1 x 1 m^2. Target parameters in hydrogen and deuterium plasmas are high dissociation degree and high ionization degree: atomic to molecular density ratio of about 0.2 and a ratio of electron to neutral density of about 0.01 – 0.1, respectively. The electron temperature and density are intended to decrease from about 10 eV and 10^{18} m^{-3} in the drivers to 1 eV and 10^{17} m^{-3} close the extraction surface by using a magnetic filter field. The plasma uniformity and the plasma parameters are measured by optical emission spectroscopy using multiple lines of sight allowing also for tomographic studies. The influence of surface bias and the influence of a magnetic filter field on the plasma uniformity is investigated as well.

Ursel Fantz
Max-Planck-Instiut fuer Plasmaphysik, EURATOM Association,
Boltzmannstr. 2, 85748 Garching, Germany

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