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Hyper-Thermal Hydrogen Atoms Produced by Surface Neutralisation[1] TATIANA BABKINA, TIMO GANS, UWE CZARNETZKI, Institute for Plasma and Atomic Physics, Ruhr-University Bochum, Germany — Hyper-thermal neutrals have significant potential for technological applications and can also play an important role in the power balance of plasmas. We present experimental investigations of the energy distribution function of the flux of hyper-thermal hydrogen atoms and compare results with data obtained using a computer simulation (TRIM). Hydrogen ions are produced in a magnetically confined inductively coupled RF plasma. They are accelerated from the plasma bulk towards a biased electrode by the plasma boundary sheath potential in front of the surface. Neutralisation and reflection of impinging ions at the surface result in hyper-thermal atoms. These atoms are investigated by optical emission spectroscopy; and a quantitative analysis of the energy distribution function is carried out using a mass resolved energy analyser. The obtained energy spectra can be explained as a superposition of individual spectra of the various ion species (H^+, $H_2{}^+$, $H_3{}^+$). Negative ions created at the electrode surface produce hyper-thermal neutrals with energies exceeding the sheath potential.

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