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Achievement of high atomic hydrogen densities in cylindrical rf plasmas with magnetic field URSEL FANTZ, STEFAN BRIEFI, Max-Planck-Institut fuer Plasmaphysik — Cylindrical rf plasmas in hydrogen with and without an axial magnetic field of up to 120 G are investigated in the pressure range of 0.3 to 10 Pa. The atomic hydrogen density is determined with optical emission spectroscopy, analyzing the Balmer lines and the molecular radiation (Fulcher band). The results obtained by using different coil geometries (4 to 6 turn windings and Nagoya type antenna) as well as different diameters (10 cm and 25 cm) of a quartz, aluminum oxide or aluminum nitride cylinder are compared. RF powers of up to 600 W at a frequency of 13.56 MHz are available for the 10 cm configuration, whereas up to 70 kW power at 1 MHz are used for the 25 cm cylinder. Density ratios of atoms to molecules of up to 0.3 are achieved in both configurations, whereby the achievement in the high power setup is limited by neutral depletion. The influence of the wall material on the atomic densities, and thus the recombination coefficient, will be pointed out.

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