

Abstract Submitted
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Towards steady state high performance ECRH plasmas at W7-X HEINRICH LAQUA, HARALD BRAUNE, JAKOB BRUNNER, STEFAN MARSEN, DMITRY MOSEEV, TORSTEN STANGE, ROBERT WOLF, Max Planck Institute of Plasma Physics, W7-X TEAM — The operation phase OP1.2 in 2018/19 demonstrated that high performance plasma could be achieved with ECRH only. The excellent confinement and heat exhaust properties could not be sustained for steady state since W7-X was neither equipped with a steady state pellets system nor with cooled plasma facing components. Both are in preparation for the next campaign in 2021, where steady state operation is envisaged. The ECRH system, which consists of 10 gyrotrons, successfully operated with the O2-mode polarisation at densities of $1.5 \cdot 10^{20} \text{ m}^{-3}$ and a power up to 7.5 MW. Here the electron ion coupling is strong enough that T_i was approaching T_e reaching values of up to 3.5 keV. High density ECRH operation also enabled stationary detachment at the divertor for up to 30 s. The long pulse high power operation exhibits the limits of the actual ECRH installation. In particular the atmospheric power transmission suffered from high humidity levels in the experimental hall. In addition high density operation requires more ECRH power. Therefore extensive up-grades will be performed in the next 3 years, including the development of an 1.5 MW gyrotron, preparing 2 additional gyrotron positions, improving the O2 launch geometry and a strong reduction of the humidity in the transmission line.

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