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Isotope dependence of H-mode threshold and confinement in ASDEX Upgrade MATTHIAS REICH, RAINER FISCHER, NATHANIEL HICKS, BERND KURZAN, THOMAS PUETTERICH, FRANCOIS RYTER, ELISABETH WOLFRUM, IPP Garching, ASDEX UPGRADE TEAM — In view of the ITER low activation phase (H and He), it is important to predict the confinement properties and especially the L-to-H power threshold (P_{thresh}) for all working gases. Due to extensive studies in deuterium plasmas and fairly good documentation of hydrogen plasmas (in particular for ASDEX Upgrade), it is known that P_{thresh} (H) $\sim 2\ P_{thresh}$ (D). Dedicated experiments to improve upon the existing database, especially upon the scarce helium data, have recently been conducted at ASDEX Upgrade. Now the database provides good coverage for all three gases (H, He and D). The data extend over a range from 1.5 T to 3 T in toroidal magnetic field and 3 10^{19} to 8 10^{19} m^{-3} in density. An almost linear dependence of threshold on the magnetic field is consistently found across all three gases. P_{thresh} and its density dependence in helium are very similar to that in deuterium. In both gases P_{thresh} exhibits a minimum at about 4 10^{19} m^{-3}. The new results from hydrogen beams into helium plasmas (as is the currently favored ITER first plasma scenario) and ECRH in helium and deuterium are compared to the previous results from deuterium and hydrogen plasmas. The influence of rotation on the power threshold is estimated from L-to-H transitions obtained with ECRH and NBI.

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