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The density dependence of H-mode access at high magnetic fields[1]
J.W. HUGHES, D. BRUNNER, A.E. HUBBARD, B. LABOMBARD, J. RICE, J. TERRY, E. TOLMAN, MIT PSFC, I. CZIEGLER, U. York, E. EDLUND, PPPL
— Experimental investigations on Alcator C-Mod explore the power requirements, and local edge threshold conditions, for H-mode transitions, while accessing reactor-relevant plasma densities and toroidal magnetic fields from 2.5T to 8T. As on many tokamaks, the power threshold for H-mode P_{th} does not increase monotonically with density, but actually rises significantly below a particular value of $\bar{n}_e$ (the so-called 'low-density limit' for H-mode). Such behavior can not be reproduced by current scaling laws used to project the power threshold for H-mode on future devices, which tend to assume a power law form, *e.g.* $P_{th} \sim B_T^x n_e^y$. Considerably more complicated dependencies are suggested by experiments, which indicate that the low-density branch moves to higher values of density as B_T is increased. We extend this examination to magnetic fields that meet and surpass the ITER design field, and interpret the results in the context of candidate models to explain the upturn in P_{th} at low density.

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Jerry Hughes
MIT PSFC

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