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Understanding the MAST H-Mode Pedestal Through Experiments and Modelling

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The global plasma confinement in H-mode is connected with the pedestal performance making it essential to understand the pedestal dynamics. Recent experiments in MAST combined with modelling have given us insight on the processes governing the pedestal.
A growing mode (n=40, radial extent of 2 cm) rotating in the counter direction is observed using Beam Emission Spectroscopy (BES) in MAST H-mode pedestal top just before an ELM crash. The mode locks the edge rotation shear triggering the filamentary structures to exit plasma as ELMs. Local linear gyro-kinetic modelling finds unstable micro-tearing modes at this region. In the steep pedestal region, where the assumptions of local gyro-kinetic simulations become challenged, we find in a global simulation that the global effects have stabilising kinetic ballooning modes there.
Increasing the global beta_p by 20% at the LH-transition leads to a doubling of the electron pressure pedestal height before the first ELM. The MHD stability modelling shows that increased p_e can be explained by pedestal stability improvement due to the larger Shafranov shift combined with increased concentration of impurities.
In single-null experiments with varying plasma current we find that the pedestal width in flux space scales inversely with the plasma current.

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