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Impact of Magnetic Island - Turbulence Multi-Scale Interaction on Plasma Confinement and Magnetic Island Stability[1] L. BARDOCZI, ORAU, T.A. CARTER, UCLA, R.J. LA HAYE, General Atomics, T.L. RHODES, UCLA, G.R. MCKEE, U. Wisconsin — Recent measurements[1] and gyrokinetic simulations[2] reported the reduction of turbulent density fluctuations () inside magnetic islands, and increase outside magnetic islands, when the island width (W) exceeds a threshold (W_T). As the cross-field transport is dominantly driven by , this calls into question the conventional understanding of confinement (τ_e) degradation and Neoclassical Tearing Mode (NTM) stability physics. We report that the increase in ion-scale outside the island correlates with higher heat and particle fluxes, i.e., increases temporarily when τ_e is decreasing, while in the following stationary state is comparable to before NTM onset. This indicates that the decrease of the plasma stored energy results from -NTM interaction. On the other hand, simultaneous reduction at the O-point has a destabilizing effect on NTMs. These observations suggest that driving at the O-point could prevent small islands from growing large, allowing better plasma confinement and safer tokamak operation. [1] Bardczi, L. et al. Phys. Plasmas 24, 056106 (2017) [2] Navarro, A. B. et al. Plasma Phys. Control. Fusion 59, 034004 (2017)

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