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Role of turbulence in determining particle transport in DIII-D[1] SASKIA MORDIJCK, College of William and Mary, LEI ZENG, TERRY RHODES, UCLA, ANTTI SALMI, TUOMAS TALA, VTT — Recent advances in DIII-D identify how changes in turbulence and ExB shear affect particle transport in H-mode plasmas. Using a combination of co- and counter- injected neutral beams to vary applied torque, the ExB shear is systematically scanned at fixed power and fueling. When the ExB shear is reduced below the linear gyro-kinetic growth rates inside the pedestal top (=0.6-0.8), the particle confinement is strongly reduced by an increase in outward diffusion. Furthermore, a slow modulation in ECH power from 1 to 3 MW shows that the density reduction (pump-out) originates in the same region. Time-dependent analysis finds that the pump-out begins with a strong increase in density fluctuations measured by DBS at =0.78, where the initial density reduction is largest, along with an increase in the linear growth rate of the Ion Temperature Gradient (ITG) mode. Turbulence modeling by TGLF shows that the plasma eventually transitions from an ITG mode to a Trapped Electron Mode (TEM) regime during high power ECH, but the TEM is not the initial cause of density pump out. For stationary density profiles, the frequency of the dominant unstable mode (i.e., ITG or TEM) correlates with the local density gradient, as predicated by theoretical simulations.

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