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Pedestal particle transport in high opacity regimes on DIII-D and C-Mod[1] SASKIA MORDIJCK, William Mary, JERRY HUGHES, MIT, DIII-D TEAM, C-MOD TEAM — Future fusion reactors will operate at high neutral opacity, which will strongly limit the influence of neutrals to penetrate inside the separatrix, whereas in current day devices part of the pedestal density steep gradient can be attributed to direct ionization of neutrals. We will show experimentally that operation at high neutral opacity is compatible with a steep density pedestal structure. Experiments on DIII-D and C-Mod scanning opacity ($n \times a$, where n is the electron density and a is the minor radius) span a range from 1.5×10^{19} to 7×10^{19} m^{-2}. The highest reached opacity values in C-Mod are only a factor 2 smaller than those expected on ITER and at these opacity values we did not find a degradation of the pedestal density structure. We find that the neutral concentration as measured by the from the filterscopes in DIII-D and modeled with SOLPS-ITER decreases inside the pedestal structure with increasing opacity and increasing pedestal density. Transport in DIII-D based on the ratio of D_i/D_e is dominated by ETG and MTM turbulence in between ELMs, neither of which contribute much to particle transport. In C-Mod edge transport is characterized by a quasi-coherent enhanced D_α mode and no ELMs are present.

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