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Plasma Performance and Operational Boundaries Without ELMs in DIII-D[1] CARLOS PAZ-SOLDAN, General Atomics - San Diego, THE DIII-D TEAM — A comprehensive database of stationary DIII-D plasmas without ELMs compares all no-ELM regime types found in DIII-D: RMP-ELM suppression, QH-mode (incl. wide-ped), I-mode, EDA H-mode, regular L-mode, and negative triangularity L-mode (neg-D). Absolute plasma performance measured by Lawson product ($< p > \tau_E$) increases in all regimes with IaB and injected power. These abscissa are often limited by the ELM, not hardware. Normalizing $< p > \tau_E$ to IaB, comparable performance is found for QH and RMP plasmas though the pedestal pressure ($p_{ped} \equiv 2p_{e,ped}$) is very different. p_{ped} in RMP plasmas is roughly constant, with the best performance found with a high core $< p >$ fraction alongside high core rotation, suggestive of an ExB shear turbulence suppression mechanism. p_{ped} of QH plasmas is significantly higher than RMP, and QH performance does not correlate with core rotation. However, the best QH p_{ped} are found with high carbon fraction. Performance of neg-D is below RMP and QH, owing to lower achieved elongation, IaB, and resultant confinement. The QH, EDA, L, and neg-D scenarios have approached divertor-friendly high density conditions, though neg-D does so with highest core performance owing to its compatibility with both high power and density.

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