Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

The Edge Pedestal on the SPARC Tokamak[1] J.W. HUGHES, N.T. HOWARD, M. GREENWALD, A.E. HUBBARD, A. MATHEWS, A.Q. KUANG, P. RODRIGUEZ-FERNANDEZ, T.M. WILKS, MIT PSFC, S. MORDIJCK, R. REKSOATMODJO, William and Mary, P.B. SNYDER, GA — The SPARC tokamak is designed to operate in a high confinement regime with an edge transport barrier in order to meet its $Q > 2$ objective. The highest pedestal pressure previously achieved is $\sim$ 80kPa; the anticipated H-mode pedestal on SPARC will exceed this value by > 3 and do so at reactor relevant collisionality. Because the pedestal is in a regime limited by current-driven kink/peeling modes, there is minimal degradation of the achievable temperature pedestal with increasing density. Possible relaxation mechanisms for the pedestal include both periodic edge localized modes (ELMs) and continuous fluctuations. We estimate the impact of ELM-suppressed operation on the pedestal height using documented results from existing devices. Experimental results from Alcator C-Mod are particularly informative, since it routinely operated at high field ($\leq$8T vs. 12T for SPARC v0) and density ($\leq 6\text{x}10^{20}\text{m}^{-3}$, comparable to SPARC v0). C-Mod pushed into a reactor-relevant regime of neutral opaqueness, in which the capability of recycling neutrals to refuel the core plasma is strongly diminished. This regime of high neutral screening was compatible on C-Mod with edge pedestal formation, a very positive result when looking forward to SPARC.

[1]Research Supported by Commonwealth Fusion Systems

Jerry Hughes
Massachusetts Institute of Technology

Date submitted: 01 Jul 2019 Electronic form version 1.4