Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Maximizing fusion power in an ARC-class tokamak with a heat exhaust solution[1] D.G. WHYTE, MIT, A. CREELY, CFS, P. RODRIGUEZ-FERNANDEZ, M. GREENWALD, MIT — Maximizing power is a key goal for fusion as an economic energy source. Fusion power fundamentally has two limits: core plasma pressure must reside within tokamak operation limits and plasma heat exhaust must be within technology limits. A compact high-field ARC-sized tokamak operating in L-mode with a radiative mantle offers a self-consistent solution to achieving over 2 GW of fusion power within heat exhaust limits with an ignited plasma. This performance trajectory requires low but acceptable safety factor, inductive current drive, high Greenwald fraction and seeded high-Z impurities. A 1-D power balance model shows pathways to achieving robust ignition and fusion power control with minimal external heating under 10 MW through the Cordey pass. The divertor is highly dissipative and used for particle/ash removal, but is not the principal heat exhaust location. The physics and technology implications of this approach are discussed.

[1]Supported by MIT and CFS.

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Date submitted: 29 Jun 2020 Electronic form version 1.4