Abstract Submitted
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SPARC and the High-field Path to Fusion Energy[1] MARTIN GREENWALD, J. IRBY, E. MARMAR, D. WHYTE, MIT - PSFC, D. BRUNNER, A. CREELY, R. MUMGAARD, B. SORBOM, Commonwealth Fusion Systems, THE SPARC TEAM — The SPARC tokamak is under design as a mid-sized, DT burning experiment. By employing novel high-temperature superconducting magnets, it will achieve 12.2 T, 8.7 MA in a device with R = 1.85 m and a = 0.57 m. The SPARC physics mission is to create and confine a plasma that produces net fusion power and retire risks on the high-field path to commercial fusion energy. The performance to satisfy that mission has been defined as $Q > 2$ and $P_{Fusion} >$ 50 MW which would be comfortably more than the 25 MW of ICRF input power. Achieving this goal, we believe, would be a sufficient demonstration to place fusion firmly into the worlds energy plans. Significant margin against uncertainties in performance assumptions has been built into the design such that well-established physics predicts that SPARC could produce more than 140 MW of fusion power with $Q > 10$. Successful operation of SPARC would inform and enable the construction of an ARC-class fusion pilot plant a device with a major radius on the order of 3 m, producing over 500 MW of fusion power. In this development path, a parallel program to develop required fusion technologies is envisioned as a broadly based collaboration.

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