Abstract Submitted
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Investigation of Core Physics in the SPARC Tokamak[1] N.T. HOWARD, P. RODRIGUEZ-FERNANDEZ, MIT-PSFC, C. HOLLAND, UCSD, M. GREENWALD, J.W. HUGHES, MIT-PSFC, A.J. CREELY, CFS, J.C. WRIGHT, S. WUKITCH, MIT-PSFC, SPARC TEAM — Initial 1.5D modeling of the SPARC tokamak has enabled a first look at the physics regimes accessible during SPARC operation. This integrated modeling has begun to shed light on open scientific questions related to reactor-relevant, high field tokamak operation and reveals some of the unique scientific opportunities presented by the SPARC device. This talk will present a survey of results obtained from modeling of core and pedestal physics for the SPARC v0 design parameters. Physics-based transport models reveal stiff core transport, particularly in the ion channel, due to the existence of unstable long wavelength turbulence over a large part of the profile with well coupled electrons and ions existing in the outer half of the plasma. The observed stiff core transport implies that the modeling and assumptions made in the pedestal play a dominant role in determining the overall fusion performance. In this talk, we will discuss the balance of ion and electron energy, observations of the dominant turbulence as calculated by TGLF and CGYRO, the alpha particle physics accessed in SPARC including its relevance to the study burning plasma regimes, and the implications of these observations on the model fidelity required for accurate modeling of high field tokamak plasma conditions.

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