Advancing Synthetic Diagnostics for Plasma Control and Pulse Planning in SPARC

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The SPARC tokamak is poised to be the World's first net energy-producing magnetic confinement fusion device. A critical component of SPARC's success lies in the development of diagnostic systems which can survive SPARC's operation and support plasma control and campaign planning.

Currently efforts are focused on the development of synthetic diagnostic models tailored to the plasma control system requirements and pulse planning workflows for SPARC. These models leverage open source tools for synthetic signal generation, as well as in-house developed frameworks which meet the stringent demands of plasma control. This work highlights the integration of these synthetic diagnostic developments into SPARC's operational workflow, showcasing their role in ensuring precise plasma control and effective pulse execution.