Abstract Submitted
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The Physics Program for the QUASAR facility[1] D.A. GATES, S.A. LAZERSON, G.H. NEILSON, M. ZARNSTORFF, Princeton Plasma Physics Laboratory, O. SCHMITZ, H. FRERICHS, University of Wisconsin-Madison — The QUASi-Axisymmetric Research (QUASAR) stellarator is a new facility which can solve two critical problems for fusion, disruptions and steady-state, and which provides new insights into the role of symmetry in plasma confinement. The principle of quasi-axisymmetry will be used in QUASAR to study how tokamak-like systems can be made disruption-free and steady-state with low recirculating power, while also improving upon features of tokamaks, such as; stable at high pressure with high confinement, and scalable to a compact reactor. The two large stellarator experiments - LHD and W7-X - are pioneering facilities capable of developing 3D physics understanding at large scale and for very long pulses. The QUASAR design is unique in being QA and optimized for confinement, stability, and moderate aspect ratio (4.5). Important elements of the physics program for QUASAR are: establishing the physics basis of the design by demonstrating stable operation at high-β simultaneous with good neoclassical confinement, understanding the concomitant turbulent transport, and understanding the dependence of the underlying transport on magnetic geometry. An additional important element of the program will be understanding the physics characteristics of a QA stellarator with an high flux expansion ergodic edge.

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