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Status of the QPS Experiment[1] J.F. LYON, Oak Ridge National Laboratory, QPS TEAM — The Quasi-Poloidal Stellarator (QPS) is a very-low-aspect-ratio compact stellarator with $R/a \sim 2.7$, 1/4–1/2 that of existing stellarators. The dominant magnetic field components are poloidally symmetric in flux coordinates, which allows large E x B poloidal flows for direct suppression of anomalous transport. Nine independent coil currents allow varying neoclassical transport by ∼25, degree of poloidal symmetry by ∼10, and poloidal viscosity by ∼20 for study of anomalous and neoclassical transport, stability limits at beta ∼5%, and equilibrium robustness. Physics studies focus on evaluations of viscosities and neoclassical transport coefficients, momentum transport and flow damping, impact of bootstrap current on equilibrium and stability, global ballooning stability, minimization of magnetic islands, measures of poloidal symmetry deviation, and control of the plasma and neutral densities. The experiment has $R = 0.95$ m, $a = 0.3$–0.4 m, $B = 1$ T for a 1.5-s pulse, and P(heating) = 3–5 MW. An R&D program is underway that includes conductor testing, an improved cooling concept, potting with cyanate ester resin, vacuum canning, and fabrication of a full-scale prototype modular coil. The most complex of the modular coil winding forms has been cast and is undergoing machining prior to coil winding. Recent progress, relationship to other stellarator concepts, project schedule, and proposed experimental program are presented.

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