Abstract Submitted
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The present HSX program and path to a new mid-sized stellarator[1] D.T. ANDERSON, University of Wisconsin-Madison — HSX has experimentally shown improved neoclassical confinement with quasisymmetry in low-collisionality hot-electron plasmas. The present program focuses on open issues in stellarator physics including the neoclassical radial electric field, impurity transport, edge magnetic field structure, turbulent transport and energetic ion confinement. GENE simulations are being used to identify configurations with varied turbulent transport levels. Doppler reflectometry, and new CECE and microwave scattering systems will provide data for comparison to the GENE calculations, with the ultimate goal of identifying means to optimize for turbulent transport reduction. Monitoring neutron production rates from a deuterium neutral beam (20 keV 25 A) into a deuterium plasma will provide data on energetic ion confinement as the magnetic configuration is varied. A pre-conceptual design of a new mid-sized stellarator to investigate quasisymmetry with higher ion temperatures and densities will be presented. The design will emphasize physics studies not attainable in W7-X including role of high effective transform and residual zonal flows, low flow damping, and good energetic particle confinement over a broad region of phase space. Inclusion of flexibility for divertor solutions is a requirement for good performance.

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