Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Overview of MST Research B.E. CHAPMAN, UW-Madison — MST progress in advancing the RFP for (1) fusion plasma confinement with ohmic heating and minimal external magnetization, (2) predictive capability in toroidal confinement physics, and (3) basic plasma physics is summarized. Validation of key plasma models is a program priority, which is enhanced by programmable power supplies (PPS) to maximize inductive capability. The existing PPS enables access to very low plasma current, down to Ip=0.02 MA. This greatly expands the Lundquist number range S=10ˆ4-10ˆ8 and allows nonlinear, 3D MHD computation using NIMROD and DEBS with dimensionless parameters that overlap those of MST plasmas. A new, second PPS will allow simultaneous PPS control of the Bp and Bt circuits. The PPS also enables MST tokamak operation, thus far focused on disruptions and RMP suppression of runaway electrons. Gyrokinetic modeling with GENE predicts unstable TEM in improved-confinement RFP plasmas. Measured fluctuations have TEM properties including a density-gradient threshold larger than for tokamak plasmas. Turbulent energization of an electron tail occurs during sawtooth reconnection. Probe measurements hint that drift waves are also excited via the turbulent cascade in standard RFP plasmas. Exploration of basic plasma science frontiers in MST RFP and tokamak plasmas is proposed as part of WiPPL, a basic science user facility. Work supported by USDoE.

Brett Chapman
UW-Madison

Date submitted: 14 Jul 2017 Electronic form version 1.4