Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

**Overview of MST Results and Plans** J.A. GOETZ, UW - Madison and the Center for Magnetic Self Organization, MST TEAM — MST progress in basic and fusion plasma physics investigations and the development of the RFP fusion configuration is reported. Pellet injection into high current, improved confinement plasmas allows the empirical density limit to be surpassed. The reduction in magnetic fluctuations and enhancement in energy confinement is not quite as large as for low-density plasmas. A heavy ion beam probe is providing measurements in the plasma interior to assess electrostatic turbulence when magnetic fluctuation-induced transport is reduced. A multi-pulse Thomson scattering diagnostic allows electron temperature dynamics to be investigated at up to 25 kHz. This new capability has been used for measurement of electron thermal transport through the sawtooth cycle. In addition, temperature fluctuations correlated with magnetic islands have been identified. The ion mass dependence and anisotropy (parallel vs. perpendicular) in non-collisional ion heating have been measured and are useful in testing proposed heating mechanisms. A new 1 MW, 20 ms, 25 keV neutral beam injector will be used to investigate energy and momentum deposition, MHD stability and the beta limit, and super-Alfvenic ion effects on tearing and kinetic instabilities. Progress on lower hybrid and electron Bernstein wave injection for current drive and heating, and on oscillating field current drive for current sustainment will be described. Work supported by USDoE and NSF.

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Date submitted: 22 Jul 2009 Electronic form version 1.4