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Overview of MST results and plans J.S. SARFF, Physics Dept and CMSO, University of Wisconsin-Madison — Advances in RFP performance and basic physics studies on MST are summarized. Pellet injection increases the density of improved confinement plasmas well above the empirical limit (up to n/n_G=1.5), and the beta value is likewise increased, without evidence for a hard limit. A 1 MW tangential neutral beam injector is operational, sparking several new topics for RFP research. The observed good confinement of fast ions bodes well for increasing beta and assessing energetic ion effects. The NBI's directed momentum affects the plasma flow, and altered tearing mode dynamics suggest localized current drive in the core. Energy confinement with oscillating field current drive is measured about the same as for steady induction, a promising result for this efficient form of current sustainment. Magnetic self-organization studies reveal that ion heating during magnetic reconnection events is increasingly anisotropic at lower density. Detailed measurements of the flow and magnetic structure of the reconnection region around the q=0 surface emphasize the importance of nonlinear mode coupling and two-fluid physics. Several new diagnostics are being implemented, including fast Thomson scattering, neutral particle analyzers, and fast ion CHERS. Continuing investigation of lower hybrid and electron Bernstein waves will be summarized. Work supported by USDoE and NSF.

John Sarff
University of Wisconsin-Madison

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