Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Improved Calibration and Uncertainty Analysis of the MST Thomson Scattering System[1] L.A. MORTON, E. PARKE, D.J. DEN HARTOG, U. W. -Madison, H.D. STEPHENS, Pierce College, M.A. THOMAS, J. GOGLIO, J. ROBINSON, U. W. -Madison — Thomson Scattering on MST is an established and reliable diagnostic of electron temperature profiles and fluctuations with high spatial (2cm) and temporal (40μs) resolution. In order to study small-amplitude fluctuations and correlations at even higher frequencies, the new 'Fast Laser' (4μs pulse period) is being commissioned. Uncorrelated fluctuation studies necessitate a thorough accounting of uncertainties in the measured results to establish the noise floor, since expected temperature fluctuations are only a few percent of the equilibrium values. To this end, an improved calibration procedure has been implemented. Three avalanche photodiode detector modules were absolutely calibrated over a wide range of wavelengths at Canada's Institute of National Measurement Standards. The remaining detectors have been calibrated against these transfer standards at four wavelengths. The nonuniformity of the gain over the detector diode surface has been characterized, as well as the dependence of the gain on operating temperature and signal pulse width. A thorough statistical analysis has been performed to determine the final uncertainties of the derived electron temperature.

[1]Work supported by the US DoE.

Lucas Morton
U. W. -Madison

Date submitted: 24 Jul 2012 Electronic form version 1.4