Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Optical Emission Spectroscopy in an Unmagnetized Hot Plasma
BLAIR SEIDLITZ, CHRIS COOPER, DAVE WEISBERG, MARK NORNBERG, JOHN WALLACE, CARY FOREST, University of Wisconsin - Madison — Recently, a new technique has been developed to create in the laboratory, a large (1.5m), weakly magnetized, fast flowing ($0.1 < V/C_s < 1$), and hot (10-20eV) plasma. These unique conditions make it possible to study a wide variety of phenomena in plasma astrophysics which is the goal of the Madison plasma dynamo experiment. Accurate measurements of plasma properties such as density and temperature can be challenging with Langmuir probes due to contamination, their perturbative nature, plasma flow, and probe overheating due to large T_e. To achieve a non-invasive measurement of relevant parameters, optical emission spectroscopy techniques have been implemented using a 1.5nm resolution fiber-coupled broad wavelength spectrograph. Measurements of HeI and HeII emission are utilized to predict relative density ratio using the coronal model. This has yielded HeII ground state measurements which is particularly important in MPDX's plasma regime containing HeI, HeII, and HeIII. Radially resolved measurements are also made with a periscope like device. Finally, full collisional radiative modeling is being explored to characterize T_e via HeI emission.

Blair Seidlitz
University of Wisconsin - Madison

Date submitted: 11 Jul 2014 Electronic form version 1.4