Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Progress Toward a New Technique for Measuring Local Electric Field Fluctuations in High Temperature Plasmas[1] M.R. BAKKEN, M.G. BURKE, R.J. FONCK, B.T. LEWICKI, M.M. LIBEN, D.S. THOMPSON, G.R. WINZ, University of Wisconsin - Madison, Madison, WI — A new diagnostic measuring local $E_z(r,t)$ fluctuations is being developed at the Pegasus Toroidal Experiment. A novel multiple volume phase holographic grating spectrometer, designed to have high resolution (0.25Å) and high étendue (U = 0.01cm^2-ster), measures the line separation of the π components of the H_α motional Stark spectrum of emitted beam light. The spectra are recorded at high frequency ($f_{\mathrm{Ny}} \approx 500$kHz) by a high speed CMOS imaging detector. The groove density of the objective grating is varied linearly along its surface to counter geometric Doppler broadening. A low divergence ($\Omega \approx 0.5^o$), 80kV, 2.5A H^0 diagnostic neutral beam is being deployed on Pegasus. The beam uses a washer-stack arc ion source to maximize full energy species fraction in the injected neutral beam. Laboratory tests of the ion source demonstrate stable, repeatable plasmas with $T_e \leq 20$eV and $n_e \approx 5\text{x}10^{17}\text{m}^{-3}$, sufficient to sustain a 6mA/cm^2 current density at the focal plane for up to 20ms. A three phase resonant converter power supply, with low amplitude (δV/80kV $\approx 0.05\%$), high frequency ($f_{\mathrm{rip}} \approx 280$kHz) ripple, is in development to provide the 80kV accelerator power.

[1]This research supported by US D.O.E. Grant DE-FG02-89ER53296

Mindy Bakken
University of Wisconsin - Madison, Madison, WI

Date submitted: 23 Jul 2015 Electronic form version 1.4