Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

An Upgraded Soft X-ray Pinhole Camera for Current Profile Measurements on the Pegasus Toroidal Experiment[1] M.B. MCGARRY, M.J. FROST, G.R. WINZ, A.C. SONTAG, University of Wisconsin-Madison — An improved soft X-ray pinhole camera for current profile measurement has been installed on Pegasus. With an optical CCD camera and P43 phosphor scintillator that responds to X-ray energies in the range of 100 eV-5 keV, it provides a 240-fold throughput improvement over the prototype (Tritz et al, Rev. Sci. Instrum., **74**, 2003, 2161). The 4k x 4k back-illuminated CCD has a 200 mm diameter active area, giving a spatial resolution of $\sim$3 cm at 1 m and a temporal window of 2 ms. The current profile is obtained iteratively. Abel inversion of the measured intensity is used to obtain an emissivity profile across the plasma midplane. This profile is then used as constraint on an equilibrium reconstruction program, which generates a set of potential current profiles and associated intensity contours. χ^2 minimization during the equilibrium fitting identifies the best intensity map. This non-invasive current profile measurement technique offers improved understanding of MHD mode evolution and has potential applications for large scale fusion experiments.

[1]Work supported by U.S. DOE Grant DE-FG02-96ER54375

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Date submitted: 20 Jul 2007 Electronic form version 1.4