Ion Temperature Measurements in the Pegasus Toroidal Experiment\textsuperscript{1} M.G. BURKE, M.W. BONGARD, R.J. FONCK, D.J. SCHLOSSBERG, University of Wisconsin-Madison — Ion temperature measurements are being made on the PEGASUS Toroidal Experiment in OH and helicity-injection driven plasmas using thermal Doppler broadening of emission spectra. The system consists of a 0.75 meter monochromator with UV sensitive optics, an image intensifier, and a high speed imaging system that can achieve a 5 kHz frame rate. Presently the system achieves a spectral resolution of 0.21 Å, and collects light over a single radial chord. Of particular interest is the ion temperature evolution during non-solenoidal startup using point source helicity injection. Turbulent magnetic reconnection during helicity injection is expected to provide strong ion heating, as seen in lab and astrophysical plasmas. Indeed, $\langle T_i \rangle$ is measured to be $\sim 0.5$ keV while $\langle T_e \rangle$ is estimated to be $\leq 0.1$ keV from passive impurity spectroscopy. Presently the system is used to compare the $T_i$ evolution of plasmas produced through helicity injection, OH drive, and hybrid current drive scenarios. Future upgrades will provide plasma rotation measurements using multiple tangential views in PEGASUS.

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