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Ion Doppler Spectroscopy, Far Infrared Interferometry and Measuring the Lundquist Number on HIT-SI R.G. O'NEILL, R.J. SMITH, A.J. REDD, C. AKCAY, R.A. HOSN, T.R. JARBOE, University of Washington, M. NAGATA, Himeji Institute of Technology — Ion Doppler Spectroscopy (IDS) is used to measure ion velocity and temperature on HIT-SI. The spectrometer uses a 16 channel photo multiplier to track temperature and velocity continuously through the discharge. The spectrometer can view into the HIT-SI injector region as well as into the equilibrium region. Temperature and velocity data will be presented. A tangentially viewing far infrared (FIR) interferometer is now operating routinely to measure chord averaged electron density. The system uses two optically pumped diflouromethane gas lasers to produce a heterodyne signal. The system can achieve a heterodyne beat of up to 2 MHz compared to the older system frequency 250 kHz. The increased frequency is required to track density fluctuations on HIT-SI. Data from the new interferometer will be presented. A key scientific goal in the HIT-SI program is to measure the Lundquist Number,S, in the spheromak equilibrium. The measured value of S is needed to compare HIT-SI experimental results to computational results from the NIMROD code, in which S is a free parameter. This requires measurement of the Density, (which will be measured by FIR), the magnetic field on axis (by internal magnetic probing), and electron temperature (by a Langmuir Probe which is under development.) A discussion of experimental results and corresponding NIMROD calculations will be presented.

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