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Overview of the HIT-SI3 Experiment and Ion Doppler Spectroscopy Results from HIT-SI A.C. HOSSACK, K.D. MORGAN, C.J. HANSEN, C.J. EVERSON, D.A. SUTHERLAND, A.W. SUMMERS, R.N. CHANDRA, N.H. NGUYEN, B.A. NELSON, T.R. JARBOE, University of Washington, D.B. ELLIOTT, West Virginia University, B.S. VICTOR, Lawrence Livermore National Laboratory — HIT-SI3 is a one-meter diameter spheromak current drive experiment. The plasma is formed and sustained by three inductive helicity injectors. The loop voltage and magnetic flux in each injector are oscillated in phase. The three injectors can be phased 120 or 60 degrees apart giving constant helicity injection. Operating frequencies include 14.5 kHz, 47.5 kHz, and higher. Toroidal current 3 times greater than the quadrature sum of injector currents has been achieved. Results are presented from a new, internal magnetic probe which spans the entire major radius of the flux conserver. Initial results will also be presented from the multi-point Thomson scattering diagnostic, ion Doppler spectrometer (IDS), and laser-induced fluorescence neutral density diagnostic. IDS results from the previous experiment, HIT-SI, are also presented. The spheromak plasma exhibits coherent motion driven by the injector currents and higher injector driving frequencies yielded higher betas than low frequency. Measurements are also compared with NIMROD and PSI-TET simulations and show qualitative agreement with temperature and velocity profiles. Work supported by USDoE.

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