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Overview of HIT-SI Results and Plans D.A. ENNIS, C. AKCAY, M.A. CHILENSKI, W.T. HAMP, A.C. HOSSACK, T.R. JARBOE, G.J. MARKLIN, B.A. NELSON, R.J. SMITH, B.S. VICTOR, J.S. WROBEL, University of Washington — Recent experiments in the Helicity Injected Torus-Steady Inductive (HIT-SI) have yielded improved current amplification, a new understanding of the injector–spheromak interaction, and a clear direction for future campaigns. HIT-SI investigates steady inductive helicity injection in a high-beta spheromak geometry using two semi-toroidal injectors. The HIT-SI diagnostic suite includes: FIR interferometry, IDS, bolometry, internal and surface magnetic probes. Results of operations with unequal injector helicity (differing voltage and flux demands) produced the highest spheromak current (34 kA) and current amplification ($I_{tor}/I_{inj} \approx 2$) to date. Single injector operations established opposing directions of preferred spheromak current for each injector determined by the sign of the helicity and its orientation relative to the confinement volume. Observation of decaying spheromak current is thought to result from equilibrium field loss into the flux conserver eventually leading to spheromak current flipping. Future HIT-SI plans include installation of equilibrium flux control to reduce spheromak degradation and provide favorable boundary conditions. Additionally, mounting the injectors on the same side of the confinement volume will allow all injectors to operate more efficiently in their preferred direction. Work supported by USDoE.

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