

Abstract Submitted
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HIT-SI Progress and Plans D.A. ENNIS, C. AKCAY, M.A. CHILENSKI, C.J. HANSEN, A.C. HOSSACK, T.R. JARBOE, G.J. MARKLIN, B.A. NELSON, B.S. VICTOR, J.S. WROBEL, University of Washington — Experiments in the Helicity Injected Torus-Steady Inductive (HIT-SI) spheromak have yielded improved current amplification and a new understanding of the injector-spheromak interaction. The HIT-SI experiment investigates steady inductive helicity injection with the aim of forming and sustaining a high-beta equilibrium in a spheromak geometry using two semi-toroidal injectors. In each injector, the toroidal flux and induced loop voltage are sinusoidally oscillated in phase at a frequency of 5.8 kHz, generating a DC spheromak. Operations with unequal helicity injection rates between the two injectors produced the highest spheromak current (38 kA), and current amplification ($I_{\text{tor}}/I_{\text{inj}} \approx 2$) to date. Single-injector operations establish a preferred direction of generated spheromak current for each injector depending on the sign of the injected helicity and its orientation relative to the confinement volume. Since the HIT-SI injectors are mounted on opposite sides of the confinement volume, they prefer to drive opposing spheromak currents. A new experimental configuration with three high-frequency injectors on the same side of the confinement volume is being developed to take advantage of this new understanding. Higher frequency operations (14.7 kHz) have been tested using the present injector configuration with encouraging results. Work supported by USDoE.

David Ennis
University of Washington

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