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Overview of HIT-SI Results and Plans D.A. ENNIS, C. AKCAY, C.J. HANSEN, N.K. HICKS, A.C. HOSSACK, T.R. JARBOE, G.J. MARKLIN, B.A. NELSON, B.S. VICTOR, University of Washington — Experiments in the Helicity Injected Torus-Steady Inductive (HIT-SI) device have achieved record spheromak current amplification during operations in deuterium plasmas. HIT-SI 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. Recent operations in deuterium plasmas have produced toroidal plasma currents greater than 50 kA, with current amplifications (I_{tor}/I_{inj_quad}) > 3, and poloidal flux amplifications ($\psi_{pol}/\psi_{inj\_quad}$) > 10. High performance deuterium discharges are achieved by initially conditioning the plasma-facing alumina surface of the HIT-SI confinement volume with helium plasmas. During subsequent deuterium operation the alumina surface strongly pumps deuterium, thereby limiting the density in the confinement volume. Additional measurements during high current deuterium discharges demonstrate reduced current and electron density fluctuations, impurity O III ion temperatures up to 50 eV and a toroidal current persistence for 0.6 ms after the injectors are shut off. Progress and plans for the HIT-SI3 configuration, with three injectors mounted on the same side of the confinement volume, will also be presented. Work supported by USDoE and ARRA.

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