

Abstract Submitted
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Evidence for Separatrix Formation and Sustainment with Steady Inductive Helicity Injection¹ B.S. VICTOR, T.R. JARBOE, A.C. HOSSACK, D.A. ENNIS, B.A. NELSON, R.J. SMITH, C. AKCAY, C.J. HANSEN, G.J. MARKLIN, N.K. HICKS, University of Washington — The Helicity Injected Torus with Steady Inductive Helicity Injection (HIT-SI) has achieved a breakthrough in the development of a new, more efficient current drive method for magnetic confinement fusion. Results include the first sustainment of toroidal plasma current of over 50 kA at 3 times the injected currents added in quadrature, the ratio of current density to electron density exceeding 10^{-14} A-m, and toroidal current persistence of 0.6 ms after injector shut off. Separatrix toroidal currents—currents not linking the helicity injectors—are sustained at up to 40 kA. Results are achieved in HIT-SI during deuterium operations immediately after helium operations. Toroidal mode measurements for these high performance deuterium shots have a three stage evolution: initial growth of an n=1 eigenstate, rapid transition to a weak toroidal current and toroidal current growth coupled to a decrease in the n=1 activity with near constant helicity injection.

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