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Internal Field Measurements of the Spheromak Equilibria in the HIT-SI Experiment R.J. SMITH, T.R. JARBOE, B.A. NELSON, A.J. REDD, W.T. HAMP, G.J. MARKLIN, R.G. O'NEILL, P.E. SIECK, J.S. WROBEL, University of Washington — The formation of Spheromak equilibria with plasma currents as high as 30kA are now routinely achieved in the HIT-SI device with 4MW of input power. The axisymmetric equilibrium is formed using steady inductive helicity injection (SIHI). Helicity injection is maintained at a constant rate by means of two AC driven RFP sources phased in quadrature and connected to the main chamber so as to drive a rotating n=1 mode at 6kHz frequency. A magnetic probe consisting of three spatially separated radial arrays of 3d pickup coils has been designed to allow the direct measurement of the plasma current using finite differences of the magnetic field components. The probe is insertable at the mid-plane to a depth of 15cm. Measurements of the internal magnetic field structure, plasma current, poloidal and toroidal flux distributions are presented for operations varying the injector voltage, injector flux and fill density. Comparisons of the experimental data to numerical computations of the injector and Spheromak magnetic fields using the 3D Taylor state are also presented.

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