Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

**Electron Density Fluctuations within the HIT-SI Experiment**
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— This research traces the origins of electron density fluctuations in the HIT-SI experiment. HIT-SI is a magnetic confinement experiment that uses two helicity injectors to initialize and sustain current in the confinement region. Densities of 1-10e19 $m^{-3}$ with density fluctuations related to the injector frequency are measured with an FIR interferometer. After spheromak formation, injector currents flow in the direction of toroidal current in the confinement volume. Peaks in the density fluctuations are seen when the injector current passes through the beam path of the interferometer. These observations are consistent with particle motion in the direction of injector current as expected by anti-dynamo action in this region. Furthermore, we have observed fluctuations that indicate that the injector current displaces the confined current. Calculating the toroidal current centroid from surface magnetic probe measurements as a function of time provides further testing of this model. Understanding density fluctuations allows a more complete description of the physics of current drive in HIT-SI.

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Date submitted: 12 Jul 2013 Electronic form version 1.4