

Abstract Submitted  
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**Studies of Inductively Sustained Compact Toroids in MRX S.P.**  
GERHARDT, E.V. BELOVA, M. YAMADA, H. JI, Y. REN, B. MCGEEHAN,  
C. JACOBSON, PPPL, M. INOMOTO, Osaka University — A central solenoid  
has been installed in the Magnetic Reconnection Experiment, in order to study  
the inductive sustainment of compact toroids (FRCs and spheromaks) formed from  
spheromak merging. Inductive sustainment applied to Argon FRCs extends the life-  
time from  $\sim 35\mu s$  to  $350\mu s$ . The sustainment manifests itself as a balance between  
an inward pinch and resistive diffusion of flux and particles. In the configuration for  
these experiments, with neither strong plasma shaping nor nearby stabilizers, FRC  
sustainment in lighter gasses is difficult due the growth of co-interchange instabili-  
ties. The stability in Argon results from limited equilibrium field shaping, resistive  
diffusion, and finite-Larmor radius effects. When induction is applied to sphero-  
maks, terminal tilt (Helium) or  $n=2$  modes (Neon) typically develop. Induction  
applied to an Argon spheromak results in conversion to an FRC: the toroidal flux  
resistively decays while the poloidal flux is sustained by induction. The stability  
throughout the conversion is provided by resistive diffusion. These results will be  
related to the SPIRIT oblate FRC concept. Work supported by DOE.

Stefan Gerhardt  
Princeton Plasma Physics Laboratory

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