Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Properties of Whistler Spheromaks[1] REINER STENZEL, J. MANUEL URRUTIA, KYLE STROHMAIER, UCLA — A loop antenna inserted into a large magnetized laboratory plasma is used to induce a field-reversed configuration (FRC) in a large laboratory plasma. Upon reversal of the oscillating antenna current the FRC splits into two emerging spheromaks. The magnetic structures develop helicity of opposite signs, propagates in the whistler mode along the ambient field away from the antenna. The propagation speed of these "whistler spheromaks" or 3D vortices decreases with increasing amplitude. When two counter-propagating spheromaks collide they merge into a stationary FRC whose axis frequently precesses in the direction of the toroidal electron drift. Whistler spheromaks and FRCs are subject to a non-collisional (inertial or stochastic) damping mechanism: Electrons are accelerated along a neutral line by a parallel electric field. Magnetic energy is converted into electron kinetic energy within one cycle. The electron distribution is non-Maxwellian and likely anisotropic since the energized electrons give rise to an instability of whistler modes at different frequencies.

[1]Work supported by DOE/NSF and AFOSR.

Reiner Stenzel
UCLA

Date submitted: 20 Jul 2007 Electronic form version 1.4