Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Magnetic bubbles in unmagnetized plasmas[1] R.L. STENZEL, J.M. URRUTIA, K.D. STROHMAIER, Physics and Astronomy, UCLA — A strong dipole magnetic field is produced with a loop antenna in a large unmagnetized laboratory plasma. The field oscillates well below the electron plasma frequency ($f = 200$ kHz $\ll f_{pe} = 4$ GHz) such that all electromagnetic modes are evanescent. However, the field strength ($B_{\max} \simeq 50$ G) is sufficiently large to locally and temporally magnetize the electrons such that wave propagation in the whistler mode is possible. The space-time behavior of the magnetic field is measured at large and small amplitudes. The field topology forms field-reversed configurations when the antenna field reverses sign while the field from previous cycles is still frozen into the plasma. Magnetic helicity consistent with whistler modes is created. Convection dominates in the center, while diffusion dominates at the boundary of the magnetic bubble. Rapidly varying transient magnetic fields are created near magnetic null points.

[1]Work supported by DOE/NSF.

J. M. Urrutia
Physics and Astronomy, UCLA

Date submitted: 10 Jul 2008 Electronic form version 1.4