Abstract Submitted
for the APR10 Meeting of
The American Physical Society

Experimental Measurement of Whistler Waves at the LAPTAG high school plasma laboratory[1] CHLOE ECHTEBAS, University High School, Los Angeles, ROLAND HWANG, Buckley School, Los Angeles, JANE SHIN, Walnut Grove School, Vancouver, WALTER GEKELMAN, PATRICK PRIBYL, UCLA, JOE WISE, New Roads School, Los Angeles, ROBERT BAKER, University High School, Los Angeles, AMY LEE, New Roads School, Los Angeles — The vector magnetic field of whistler waves above and below half the electron cyclotron frequency is measured in 2 dimensions in a 51×31 plane with $\delta z = 1$cm, $\delta x = 1$cm, $B = B_{0z} \leq 100$ G, and $\delta t = 0.4$ns. The experiments are performed in a high school plasma physics lab featuring a 1.5 meter long, 30 cm diameter pulsed, inductively coupled RF Argon plasma ($F_{rf} = 625$Hz, $P \leq 1$kW, $\tau_{plasma} = 10$ms, $\tau_{rep} = 50$ms, $10^8 \leq n \leq 10^{12}$ cm^{-3}). The three axis $\frac{d\vec{B}}{dt}$ probe, single loop launch antenna and signal detection amplifiers were constructed by the high school students. A phase-locked tone burst is generated at a fixed frequency and launches a whistler wave; each data plane takes six hours to acquire. Data is acquired with a computer controlled 2D drive and a networked 2.5 Gs (440 MHz) digital oscilloscope. The experiment is conducted in the quiescent afterglow 1 to 20 ms after the RF plasma production is terminated. The plasma density is also measured at each position. We present maps of the phase fronts of the wave, and group velocity as a function of frequency together with movies.

[1]This work was done as part of the Basic Plasma Science Facility supported by DOE and NSF.

Walter Gekelman
UCLA

Date submitted: 13 Oct 2009 Electronic form version 1.4