Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

**Observation of Fast-Ion Doppler-Shifted Resonance with Shear Alfven Waves**[1] S. ZHOU, Y. ZHANG, H. BOEHMER, W. HEIDBRINK, R. MCWILLIAMS, UC Irvine, S. VINCENA, T. CARTER, W. GEKELMAN, D. LENEMAN, P. PRIBYL, UCLA — The Doppler-shifted cyclotron resonance ($\omega_{Alfven} - k_z v_z = \omega_{fast-ion}$) between fast ions and shear Alfvén waves (SAW) is experimentally investigated. A test particle beam of fast ions is launched by a $Li^+$ source [1] in the helium plasma of the Large Plasma Device (LAPD), with ion energy around 600eV. Both single loop antenna and dual polarization antenna are used to launch linear or circular polarized SAW (amplitude $\delta B/B$ up to 1%). A collimated fast-ion energy analyzer measures the non-classical spreading of the beam, which is proportional to the resonance with the wave. Theoretically, when launched in (out of) phase with perpendicular wave electric field, fast ions gain (lose) energy from (to) the wave. The energy change of fast ions in presence of the wave is measured by changing the grid potential of the energy analyzer. A resonance spectrum is observed by launching SAWs at 0.3-0.8$\omega_{ci}$. A Monte Carlo code simulates the fast-ion particle orbit, wave-particle interaction, and energy-analyzer properties. Both the magnitude and frequency dependence of the beam-spreading agree with the simulation. [1] Y. Zhang *et al.*, Rev. Sci. Instrum. **78** (2007) 013302.

[1]Supported by the DOE and NSF.

William Heidbrink
UC Irvine

Date submitted: 21 Jul 2008 Electronic form version 1.4