Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Experimental Study of Convective Cells and RF Sheaths Excited by a Fast Wave Antenna in the LAPD MICHAEL MARTIN, WALTER GEKELMAN, PATRICK PRIBYL, BART VAN COMPERNOLLE, TROY CARTER, UCLA, Dept. of Physics and Astronomy, DIRK VAN EESTER, Laboratory for Plasma Physics, ERM-KMS, Belgium, KRISTEL CROMBÉ, Department of Applied Physics, Ghent University, Belgium — Ion cyclotron resonance heating (ICRH) will be essential for ITER where it is planned to couple 20 MW to the plasma. During ICRH, radio frequency (RF) sheaths may form on the antenna or farther away, and convective cells are suspected to form adjacent to ICRH antennas, negatively affecting both machine and plasma performance. The LAPD ($n_e \sim 10^{12-13} cm^{-3}$, $T_e \sim$ 1-10 eV, $B_0 \sim$ 0.4 to 2 kG, diameter $\sim$ 60 cm, length $\sim$ 17m) is an ideal device for performing detailed experiments to fully diagnose these phenomena. A 200 kW RF system capable of pulsing at the 1 Hz. rep. rate of the LAPD and operating from 2 to 2.5 MHz has been constructed to perform such studies. B_0 can be adjusted so that this encompasses the 1^{st} to 7^{th} harmonic of f_{ci} in H plasmas. Emissive, Mach, Langmuir, and B-field probes measured plasma potential, bulk plasma flows, wave patterns, n_e, and T_e in 2D planes at various axial locations from the antenna. Plasma potential enhancements of up to 90 V along magnetic field lines connected to the antenna and induced ExB flows consistent in structure with convective cells were observed. Details of these observations along with power scaling of RF sheath voltage and convective cell flows will be presented.

Michael Martin
UCLA, Dept. of Physics and Astronomy

Date submitted: 15 Jul 2016 Electronic form version 1.4