Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Observation of improved and degraded confinement through driven flow on the Large Plasma Device D.A. SCHAFFNER, T.A. CARTER, G.D. ROSSI, D.S. GUICE, UCLA, J. MAGGS, S. VINCENA, B. FRIEDMAN, UCLA — Density confinement improvement and degradation is observed in the edge plasma of the Large Plasma Device (LAPD) at UCLA through conditions of spontaneous, biased-driven and minimal azimuthal flow states. A floating, biasable, annulus-like limiter plate is placed between the cathode and the plasma chamber to provide a known edge boundary potential and a means of inducing a radial electric field to drive azimuthal flow in the direction opposite the natural flow state. With this configuration, a range of flow states can be achieved from the clockwise spontaneous flow to a minimal flow state to a large counter-clockwise driven flow. In both the clockwise and counter-clockwise flow states a steepened density gradient is observed at the cathode edge while in the low flow state, a "confinement degradation" or broad density gradient is seen. A plot of shearing rate versus gradient scale length for each flow state lies on a single curve suggesting that only shearing is correlated to confinement and not flow direction. The relationship between particle flux, Reynolds Stress, and flow/confinement state are also explored as well as the instabilities observed—i.e. drift-wave, Kelvin-Helmholtz and rotational interchange modes.

David Schaffner
UCLA

Date submitted: 14 Jul 2011 Electronic form version 1.4