Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Experimental studies of vorticity in externally driven flows using electron plasmas N.C. HURST, J.R. DANIELSON, C.M. SURKO, University of California - San Diego — Pure electron plasmas confined in Penning-Malmberg traps offer unique opportunities to study vortex dynamics. The Drift-Poisson equations governing the plasma are isomorphic to the two-dimensional Euler equations for ideal fluid flow, where the electron density is the analog of fluid vorticity[1]. In this work, boundary conditions are imposed by biasing segmented electrodes so as to create externally applied flows that advect the vorticity. In this way, for example, one can study the response of a stable, coherent vortex to irrotational shear or strain flows. Advantages of this technique over traditional methods[2,3] include precise control of the externally applied flow and the ability to directly measure the vorticity field. Results to be discussed include studies of vortex stripping, destruction, and fission, and breaking of adiabatic invariance in time-dependent external flows.

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Date submitted: 30 Jul 2015 Electronic form version 1.4