Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Measurements of the Spatial Structure of Geodesic Acoustic Modes in DIII-D[1] J.C. HILLESHEIM, W.A. PEEBLES, L. SCHMITZ, T.L. RHODES, T.A. CARTER, UCLA — Geodesic acoustic modes (GAMs) are linearly stable, turbulence driven modes exhibiting oscillating axisymmetric ($m = 0$, $n = 0$) $E \times B$ flows. They potentially play an important role in establishing the saturated level of turbulence in fusion plasmas. Two Doppler backscattering (DBS) systems at locations separated toroidally by 180° are aligned to make simultaneous measurements at the same radial location ($\rho \approx 0.8$) and wavenumber ($k_\perp \sim 4\,\mathrm{cm}^{-1}$, $k_\perp \rho_s \sim 1$) in a beam-heated L-mode DIII-D plasma. Flow oscillations, which agree with the predicted GAM frequency scaling, correlate toroidally between the two DBS systems with an ensemble averaged cross-coherency of $\gamma \approx 0.6$ over 600 ms. The cross-phase between pairs of the DBS signals is consistent with the expected GAM structure. The radial variation in cross-phase agrees with descriptions of the GAM eigenmode as having an Airy function character with outward radial propagation; the measured radial wavelength is $\lambda_r \approx 2.8\,\mathrm{cm}$ and the calculated GAM characteristic length scale is $L_{GAM} = \rho_i^{2/3} L_T^{1/3} \approx 1.2\,\mathrm{cm}$.

[1]Supported by US DOE under DE-FG02-08ER54984. JCH's work performed through a DOE-ORISE FES Fellowship Program.

Jon Hillesheim
UCLA

Date submitted: 22 Jul 2009 Electronic form version 1.4