Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Experimental Study of Local Anomalous Ion Thermal Transport with A Novel Time Dependent Energy Analyzer[1] VLADIMIR SOKOLOV, AMIYA K. SEN, Columbia University — In the past we have reported measurements of global ion thermal transport due to ion temperature gradient (ITG) modes [1]. It is clearly more desirable to obtain local measurements of the same, which we now report for basic experiments in the Columbia Linear Machine. For local measurement of radial ion thermal transport we used a novel time dependent ion energy analyzer. For compensation of plasma potential fluctuations in energy analyzer measurements, we use floating potential fluctuation of Langmuir probe as a feedback signal with gain +1 and apply this voltage on energy selector grid. The simultaneous measurement of the ion current fluctuations of analyzer $\tilde{I}_{IEA}(t)$ and the fluctuation of ion saturation current of Langmuir probe $\tilde{I}_{SAT}(t)$ allow us to determine local fluctuations of ion temperature $\tilde{T}_i(t)$. The local thermal flux is obtained from cross-correlation of ion temperature fluctuations and potential fluctuations. The radial profiles of the plasma density, ion temperature, and total thermal flux were obtained at different levels of ITG mode. The results indicate that the ion thermal transport is $\Gamma \propto (\partial T_I/\partial r)^\alpha, \alpha > 1$.

[1] B. Song, J. Chen, and A.K. Sen, Phys. Rev. Lett. 70, 2407 (1993).

[1]This research was supported by U.S. Department of Energy Grant No. DE-FG02-98ER-54464.

Vladimir Sokolov
Columbia University

Date submitted: 15 Jul 2009 Electronic form version 1.4