Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

**Measuring the effects of large scale intermittency on the small scales of turbulent flows** CHEN-CHI CHIEN, DANIEL BLUM, GREG VOTH, Department of Physics, Wesleyan University — In standard cascade picture of 3D turbulent flows, energy is injected at a constant rate at large scales. It then is transferred to smaller scales by triad interactions that result from the non-linearity of the Navier-Stokes equation. The down-scale transfer is intermittent, and a vast literature has explored the signatures of this internal intermittency on statistics of the small scales. However, the energy injection at large scales is not constant in most real turbulent flows. We explore the signatures of this large scale intermittency on small scale turbulence statistics. Measurements were made in a flow between oscillating grids. By modulating grid frequency we introduce temporal variations in the injected energy which allows us to control the level of large scale intermittency. We find that the non-dimensional ratio of second to third order structure function depends on the degree of large scale intermittency, and we can quantitatively predict this ratio from the measured time dependence of the energy at large scales. Large scale intermittency can also be observed by conditioning Eulerian structure functions on the large scale velocity. Quantifying this dependence provides an alternative measurement of large scale intermittency which agrees with the structure function ratio.

Chen-Chi Chien
Department of Physics, Wesleyan University

Date submitted: 09 Nov 2012 Electronic form version 1.4