Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Progress and opportunities in direct numerical simulations at the next higher resolution[1] P.K. YEUNG, Georgia Institute of Technology, K.R. SREENIVASAN, New York University — In recent years, many researchers in the turbulence community have been able to exploit the steady advancement of computing power to advance our understanding of turbulence, including new parameter ranges and the effects of coupling with other physical processes. However it is remarkable that, the "record" grid resolution of 4096^3, first achieved just over 10 years ago (Kaneda *et al.*, *Phys. Fluids* 2003) still stands in the literature of the field. In this talk, we will present preliminary results from an 8192^3 simulation of turbulence on a periodic domain, carried out using 262144 CPU cores on the *Blue Waters* supercomputer under the NSF Track 1 Petascale Resource Allocations program. Since a simulation at this magnitude is still extremely expensive, and the resources required are not easily secured, very careful planning and very aggressive efforts at algorithmic enhancement are necessary (which we will also briefly discuss). This new simulation isexpected to allow us to probe deeply into fundamental questions such as intermittency at the highest Reynolds numbers and the best possible resolution of the small scales at the current limit of computing power available.

[1]Supported by NSF Grant ACI-1036170.

Pui-kuen Yeung
Georgia Institute of Technology

Date submitted: 01 Aug 2013 Electronic form version 1.4