Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Measuring anisotropy as a function of scale in turbulence using 3D particle tracking SUSANTHA WIJESINGHE, GREG VOTH, Department of Physics, Wesleyan University, Middletown, CT 06459 — We report the first full 3D experimental measurements of anisotropy as a function of scale in turbulence. From 3D particle tracks obtained with stereoscpic high speed video, we measure the Eulerian structure functions and decompose them into irreducible representation of SO(3) rotation group. This method allows us to quantify the anisotropy in different sectors, specified by j and m of the spherical harmonics $Y_{jm}(\theta, \phi)$, at all scales in the flow. We study a turbulent flow between two oscillating grids in an octagonal tank filled with 1100 l of water with $R_\lambda = 265$. An image compression system processes high-speed video from four cameras in real-time allowing us to acquire huge data sets required for full 3D measurement of anisotropy as a function of scale. Careful selection of a sample of measurements with isotropic orientations is necessary to ensure that anisotropy of the measurement system does not affect the measured anisotropy of the flow. Increasing j sectors show faster decay of anisotropy as scale decreases, consistent with the idea that the small scales should become isotropic at very high Reynolds number. However, conditioning the measured anisotropy on the instantaneous velocity reveals that characterization of anisotropy in an inhom

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Date submitted: 11 Nov 2011 Electronic form version 1.4