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High order statistics of turbulence Lagrangian acceleration HAITAO XU, Max Planck Institute for Dynamics and Self-Organization (MPIDS) and International Collaboration for Turbulence Research (ICTR), ROBERT ZIM-MERMANN, MPIDS and ICTR, EBERHARD BODENSCHATZ, MPIDS and ICTR and LASSP, Cornell University — It is well known that the Lagrangian acceleration of a fluid element in turbulence is highly intermittent. Therefore it has been a challenge to accurately measure higher order statistics of acceleration. We report measurements of the scaling of acceleration moments with Reynolds number and compare our results with several available theories, including the standard K41, K62 with intermittency correction, and a recent theory advocated by Yakhot and coworkers. We achieved these measurements by optically tracking neutrally buoyant polystyrene microspheres at high spatial and temporal resolution in a nearly homogeneous and isotropic water flow driven by 12 independently controlled propellers in a newly constructed turbulence generator.

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