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Lagrangian Velocity Statistics in High Reynolds Number Turbulence NICHOLAS OUELLETTE, HAITAO XU, Cornell University, MICKAEL BOURGOIN, LEGI-CNRS, EBERHARD BODENSCHATZ, Cornell University/Max Planck Institute for Dynamics and Self-Organization — We report measurements of the second order Lagrangian velocity structure functions and the Lagrangian velocity spectrum in a high Reynolds number (up to a Taylor microscale Reynolds number of $R_\lambda = 815$) turbulence experiment. The motion of tracer particles is followed optically and in three dimensions using multiple high speed cameras. Values of the Lagrangian structure function scaling constant C_0, which is of central importance to stochastic turbulence models as well as to understanding particle pair dispersion and scalar mixing, are obtained both from the structure functions and from the spectra, and these two measurements are shown to agree. Additionally, the Reynolds number dependence of C_0 is investigated, and is found to be in agreement with an existing model. This work is supported by the NSF and the Max Planck Society.

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