Abstract Submitted for the DFD05 Meeting of The American Physical Society

The dispersion of microscopic molecular clouds in turbulence MIRA PASHTRAPANSHKA, Radboud University, P.O. Box 9010, 6500GL Nijmegen, the Netherlands., WILLEM VAN DE WATER, Eindhoven University of Technology, P.O. Box 513 5600MB, Eindhoven, the Netherlands. — We write thin lines (width 60 μ m) and small dots (size 100 μ m) in a strongly turbulent jet flow of air. These patterns are written through photosynthesis of NO molecules using focussed light from a UV excimer laser and are followed in time through laserinduced fluorescence. The size of the written objects is a few times the Kolmogorov length. The Lagrangian trajectories of these clouds can be used for velocimetry, but also to study the dispersion of molecular tracers in turbulence. Our molecular tracers have Schmidt number unity and momentum diffuses at the same rate as mass. Ultraviolet images of the clouds offer a unique view on small- scale mixing. The clouds are dispersed by turbulence and by molecular diffusion, resulting in highly intermittent concentration fluctuations after a few small eddy turnover times. Consequently, large-order structure functions of the fluctuation concentration have strongly anomalous inertial-range scaling exponents.

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Date submitted: 31 Jul 2005

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