

Abstract Submitted
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Observation of the Sling Effect GREGORY BEWLEY, EWE WEI SAW, EBERHARD BODENSCHATZ, Max Planck Institute (DS) Goettingen, INTERNATIONAL COLLABORATION FOR TURBULENCE RESEARCH COLLABORATION — We report the first experimental observations of the sling effect, by which fluid turbulence increases the rate of collisions between suspended droplets. We put liquid water-alcohol droplets in a turbulent air flow, and followed their motions in three dimensions with two cameras. The turbulence was approximately isotropic with a Taylor Reynolds number of about 200. The resulting droplet Stokes numbers were between 0.1 and 0.6, depending on the intensity of the turbulence and the size of the droplets. We used two-droplet statistics to characterize the droplet velocity field and its gradient. The droplet velocity field contained gradients that were large enough relative to the droplet response time for slings to occur, according to the theory. The large negative gradients steepened just as was predicted for slings. During this steepening, the droplet gradients decoupled from the background fluid gradients.

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