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Orientation statistics of non-spherical particles sedimenting in turbulence STEFAN KRAMEL, LYDIA TIERNEY, WYATT REES, GREG A. VOTH, Wesleyan University, UDAYSHANKAR MENON, ANUBHAB ROY, DONALD L. KOCH, Cornell University — We study the sedimentation of non-spherical particles in turbulence. The particle orientation is determined by a competition between inertial torques causing a preferential alignment and turbulence randomizing the orientation. The relative importance is quantified by a settling number S_F defined as the ratio of the tumbling-rate from inertial torques and from turbulence. The experiments focus on the orientation statistics of particles formed from several slender arms, including fibers and particles with three arms in planar symmetry (triads), which allows us to study alignment of both fibers and disk-like particles. We measure the time-resolved 3D orientations of the particles along with the fluid velocity field around them in a vertical water tunnel. An active jet array with 40 individually controllable jets enables us to adjust the turbulence intensity and observe the transition from strongly aligned particles to randomized orientations as S_F is decreased. Results are compared to simulations and theory based on slender body theory.

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