



# Rotation Rate of Rods in Turbulent Fluid Flow

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The rotational dynamics of anisotropic particles advected in a turbulent fluid flow are important in many industrial and natural setting. Particle rotations are controlled by small scale properties of turbulence that are nearly universal, and so provide a rich system where experiments can be directly compared with theory and simulations. Here we report the first three-dimensional experimental measurements of the orientation dynamics of rod-like particles as they are advected in a turbulent fluid flow. We also present numerical simulations that show good agreement with the experiments and allow extension to a wide range of particle shapes. Anisotropic tracer particles preferentially sample the flow since their orientations become correlated with the velocity gradient tensor. The rotation rate is heavily influenced by this preferential alignment, and the alignment depends strongly on particle shape.

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