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Coarse-grained velocity gradients in turbulence NICHOLAS OUELLETTE, HAITAO XU, EBERHARD BODENSCHATZ, Max Planck Institute for Dynamics and Self-Organization — In a turbulent flow, energy cascades from large length and time scales, where it is injected into the flow, to small scales, where it is dissipated by the action of molecular viscosity. At small scales, this energy dissipation is characterized by the velocity gradient tensor. At larger scales, however, different dynamics must apply. We therefore present measurements of a velocity gradient tensor coarse-grained over inertial-range scales in an intensely turbulent laboratory water flow. We discuss the potential of these coarse-grained gradients as a probe of the scale-to-scale energy transfer in the turbulent cascade and their relation to Large Eddy Simulation. This work was supported both by the National Science Foundation and by the Max Planck Society.

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