Experimental investigation of energy transport mechanisms in superfluid turbulence

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Abstract

A recent experimental work on the mechanisms of energy transport in selected turbulent flows of superfluid helium-4 is presented, see J. Fluid Mech. 876, R2, 2019. The obtained results strongly support the view that, in this unique type of turbulence, energy transport occurs in ways appreciably different from those observed in classical turbulent flows of viscous (Newtonian) fluids, at least at sufficiently small scales. Indeed, the flow-induced motions of relatively small particles suspended in the liquid reveal that, at small enough flow scales, the particles do not tend on average to decelerate faster than they accelerate, whereas, at larger scales, a classical-like asymmetry, usually linked to the occurrence of flight-crash events, is recovered. It follows therefore that, in the range of investigated parameters, the energy put into the system is most likely dissipated at scales smaller than the typical size of our flow-probing particles by mechanisms absent in classical turbulent flows. Support from the Czech Science Foundation is acknowledged.

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