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Turbulent flows of superfluid helium visualized by particle dynamics[1]

MARCO LA MANTIA, Faculty of Mathematics and Physics, Charles University, Prague, Czech Republic

The motions of relatively small particles in quantum flows of superfluid helium (He II) are visualized in order to reveal the underlying flow-induced physics. It is specifically shown how the derived flow properties - such as the particle velocity distribution - depend on the length scale probed by the particles, for both thermally and mechanically driven flows of He II. Quantum features may indeed appear at small enough length scales, smaller than the quantum scale of the flow, the average distance between quantized vortices, while, at larger length scales, a classical (viscous-like) picture emerges, reinforcing the idea that quantum turbulence is not only interesting in its own right but may also lead to the deeper understanding of fluid turbulence in general, an open problem of classical physics relevant to many research fields, ranging from fluid dynamics to cosmology.

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