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Quantum length scale to distinguish between Kolmogorov and Vinen forms of quantum turbulence KATEPALLI SREENIVASAN, New York University, LADISLAV SKRBEK, Charles University, Prague — Quantum turbulence (QT) is the motion of a tangle of thin vortex filaments spontaneously generated in superfluids. Once created, the self-interaction of vortex lines in the tangle will itself create conditions for the decay of its energy. Two robust asymptotic decay laws appear in past experiments, with the vortex line density decaying either as the -1 or the -3/2 power of time. We define a new quantum length-scale which demarcates these two types of decaying QT, denoted as the Vinen (or ultraquantum) QT and the Kolmogorov (or quasi-classical) QT, respectively. We discuss spectral characteristics of energy for the two decay laws and relate them to the decay exponents. While the Vinen QT has no counterpart in classical turbulence, the Kolmogorov QT does, and we discuss this similarity.

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