CB

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Lecture I, II: Tangled Quantum Vortices.

In ordinary fluids, such as air or water, vortices assume any shape and strength, from tiny swirls produced by the wings of butterflies to powerful tornadoes. In quantum fluids, such as superfluid helium or atomic Bose-Einstein condensates, quantum mechanics constrains the rotational motion and simplifies the nature of vortices. In these systems near absolute zero, the phase of the quantum mechanical wave function changes by 2 \pi going around the axis of the vortex. Quantum vortices are thus thin, long filaments of fixed core and circulation.

Despite this simplicity and the lack of viscous dissipation, the turbulent state of quantum fluids has many similarities with ordinary turbulence, for example the same turbulent Kolmogorov energy spectrum. This talk will review the most recent experimental and theoretical work on the quantum turbulent