Quantum Turbulence Decay Observations in a Black Body Radiator

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Classical turbulence is one of the most complicated and least understood phenomena in Nature. Detection of the energy released by the decay of classical turbulence [in conventional fluids] is extremely difficult due to the small energy release compared to the thermal energy of the liquid. However in a stationary condensate of pure He^3–B at temperatures much less than the superfluid transition temperature, the energy from the decay of turbulence is easily accessible as this comprises almost the entire free energy of the superfluid He^3 condensate. This energy produces readly detectable quasiparticles enabling us to use vibrating wire resonator techniques to measure the energy released by the decaying quantum turbulence. In this poster we probe the time and power dependencies of turbulence generated by a low frequency oscillating grid in a black body radiator immersed in superfluid He^3–B at several pressures between 2.1 bar and 8.6 bar. We have performed over 700 grid pulses with different grid velocities and pulse lengths while measuring the heat released within the black body radiator. From this, we are able to infer the energy of the turbulence being created by the grid motion and watch its subsequent decay in time.
We present data on transition between Vinen and Kolmogorov like decays as a function of grid velocity.

Section: VT - Vortices and turbulence

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