Experiments on Quantum Turbulence in Superfluid 3He-B at Very Low Temperatures

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We describe experiments on quantum turbulence in superfluid ^{3}He-B in the low temperature limit where the normal fluid fraction becomes vanishingly small. Quantum turbulence, a tangle of quantized vortex lines, is easily generated by mechanical resonators such as vibrating wires and vibrating grids. At low temperatures the kinetic energy contained in the turbulent flow greatly exceeds the thermal energy carried by ballistic quasiparticles. This allows us to directly measure the energy released by the decaying turbulence using black-body radiator techniques. We find that the decay is remarkably similar to that expected for the decay of turbulence in a classical fluid. In ^{3}He-B, vortices also have a large cross-section for Andreev scattering thermal quasiparticle excitations. We have utilized this property to directly measure Andreev scattering from quantum turbulence and to investigate the turbulent dynamics. More recently we have studied quasiparticle transmission through quantum turbulence. We discuss recent results.

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