Quantum Turbulence by Quantized Vortices

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There is a growing interest in the relation between classical turbulence and quantum turbulence. Classical turbulence arises from complicated dynamics of eddies in a classical fluid. In contrast, quantum turbulence consists of a tangle of stable topological defects called quantized vortices (FIG. 1), and thus quantum turbulence provides a simpler prototype of turbulence than classical turbulence. In this talk, we review our works about the dynamics and statistics of quantized vortices in quantum turbulence by numerically solving a modified Gross-Pitaevskii equation [1,2]. We obtained the Kolmogorov energy spectrum in both decaying and steady turbulence. Consequently, this is the first study that confirms the inertial range of quantum turbulence.

[1] M. Kobayashi and M. Tsubota, Phys. Rev. Lett. **94**, 065302 (2005).

[2] M. Kobayashi and M. Tsubota, J. Phys. Soc. Jpn. **74**, 3248 (2005).

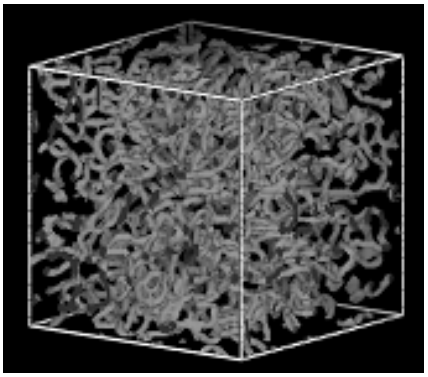

FIG.1: Example of quantum vortices in quantum turbulence.