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Two-dimensional quantum turbulence in Bose-Einstein condensates[1]

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One of the most challenging problems in the study of turbulence is the development of a quantitative understanding of the relationships between microscopic attributes of the flows, such as vortex dynamics, and statistical flow characteristics, such as energy spectra. Within the field of two-dimensional quantum turbulence (2DQT), this hurdle may be surmountable using atomic Bose-Einstein condensates. With highly oblate BECs, numerous experimental methods are available to generate the disordered distributions of quantized vortices associated with 2DQT, and new BEC and vortex detection and manipulation techniques are under development. In conjunction with experimental progress, analytical and numerical efforts are rapidly uncovering new aspects of vortices, microscopic flows, and energy spectra of 2DQT. This talk will introduce the study of 2DQT in BECs, mainly focusing on experimental progress and future directions in the investigation, manipulation, and detection of quantized vortices in 2DQT.

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