

Vortex shedding and turbulence relaxation in highly oblate Bose-Einstein condensates

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In this talk, I will describe our recent experiments on various vortex dynamics in highly oblate Bose-Einstein condensates. 1) Vortex shedding dynamics was investigated with a moving optical obstacle formed by focusing a repulsive Gaussian laser beam. We measured the critical velocity for vortex shedding and examined shedding patterns in various obstacle conditions. We observed periodic vortex-dipole shedding from a penetrable obstacle and von Karman vortex streets of charge-2 vortex clusters from an impenetrable obstacle. 2) Thermal relaxation of highly oblate, turbulent BECs was investigated. We observed nonexponential decay behavior of the vortex number and measured the temperature dependence of the vortex decay rate. We found that the vortex decay rate is almost linearly proportional to mutual friction coefficient which was separately measured from long-time dynamics of a corotating vortex pairs in trapped BECs. I will discuss the possibility of experimental observation of Onsager condensation in decaying two-dimensional quantum turbulence.