

Emergence and Characteristics of Turbulence in an atomic trapped superfluid of Rb

Vanderlei S. Bagnato - University of Sao Paulo - IFSC-Brazil

In this work we demonstrate nucleation of vortices in a BEC, where an oscillating field generated by a set of coils is superimposed to the trapping field creating displacement, rotation and deformation of the trap potential. As a function of the amplitude of oscillation we observe several different behaviors of the condensate cloud allowing the construction of a diagram for stable structures. Increasing the amplitude we observe the formation of one, two, three or more vortices in the cloud. Above certain amplitude of oscillation we observe uncountable vortices in every direction, producing a tangled vortices configuration which can be considered as the emergence of a turbulent regime in the cloud. Variations of behavior during TOF for the cloud seem to be a signature of the turbulent regime. In extremes conditions of oscillations, a fragmentation of the cloud is observed and possible theoretical models are offered. We investigated the influence of final size effects, thermodynamics variations of the cloud during the occurrence of Quantum Turbulence.