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EXCITATION OF A TRAPPED BEC: GENERATION OF TURBULENCE AND ITS CHARACTERIZATION

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Turbulence is characterized by chaotic spinning flow regimes which appear in many important processes in nature. Vorticity, in superfluid systems, may present the simplest form of turbulence, and be a gateway to the study of this phenomenon in quantum gases. A 87Rb Bose condensate is used to observe and investigate quantum turbulence, by means of a weak, off-axis, magnetic field gradient, which perturbs the BEC and pushes kinetic energy onto it. This creates vortices on the condensed-thermal interface of the BEC and set up experimental conditions to the emergence of turbulence.
Once the turbulent regime is set, the condensate is then released and expands under free fall. The atomic density profile is acquired using resonant absorption imaging, after 15 ms of time-of-flight. The calibrated images were used to determine the in situ momentum distribution of the BEC. We have observed that, the perturbed density profiles differ from the nonperturbed BEC. We have seen strong evidences of power law in the measured momentum and energy distributions. Additional characteristics of the system, such as the condensate's finite number, size and temperature, may play a role on the energy injection mechanism and will be discussed.

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