# Production and characterization of a far from equilibrium BEC: turbulence and universality

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In this presentation we will combine many of the experiments performed in Brazil relating to the production and characterization of a Bose Condensate of Rb atoms, driven far from equilibrium. Excitation of the trapped BEC can be done through a combination of fields that promote time distortion of the trapping potential. These excitations can evolve over time, promoting energy migration from the largest to the smallest scales in a process called cascade. We perform temporal excitations that consist of deformation and slight rotation of the potential, causing the system to evolve to a turbulent regime. Simulations demonstrated generation of solitons, vortices and waves in the sample. Using time of flight techniques, we measure the moment distribution, n(k, t) and from it we obtain the energy spectrum E (k, t). This makes it possible to identify the inertial regions, where E (k, t) is clearly dependent on the power law (inertial region) characteristic of turbulent regime, and to measure the energy flow migrating between the scales and their preservation from the absence of dissipation. Finally, the temporal evolution of the moment distribution allows to verify the presence of a space-time scalability, which indicate the presence of a class of universality in the phenomenon. The problem is investigated on the basis of the theory of the existence of non-thermal fixed points in the system and a discussion around these aspects is offered. This work received support from FAPESP- program CEPID, CNPq and CAPES, all Brazilian agencies and had the participation of L. Madeira, A. Garcia-Orosco, P. Castilho, M. Moreno, L. Machado, G. Telles, H A. J. Middleton-Spencer (visiting student) and P.E.S. Tavares.