A quasi-2D gas in a flat box: A new tool for studying Kibble-Zurek physics

Jean Dalibard*[1,2]

[1]Collège de France (CDF) – Collège de France – 11 place Marcelin Berthelot F-75231 Paris Cedex 05, France

[2]Laboratoire Kastler Brossel (LKB (Lhomond)) – Université Pierre et Marie Curie (UPMC) - Paris VI, CNRS : UMR8552, École normale supérieure [ENS] - Paris, Université Pierre et Marie Curie [UPMC] - Paris VI – 24 rue Lhomond, F-75231 Paris CEDEX 05, France

Abstract

Cold atomic assemblies are usually prepared in harmonic potentials, which are well suited for investigating some aspects of equilibrium properties of the gas as well as specific collective modes. However the non-homogeneity of these gases changes the nature of the critical dynamics occurring when the BEC transition point is crossed at a finite rate (Kibble Zurek mechanism).
In this talk I will describe our recent implementation of a flat box confinement for a quasi-2D Rb Bose gas, with various in-plane geometries such as rings or disks. In particular I will present results obtained in a quench cooling of the gas, with the emergence of topological defects, such as permanent current and/or vortices. I will relate the transition at the origin of this critical behaviour with the transverse condensation of the gas along the strongly confined dimension, and I will connect our results with predictions from the Kibble-Zurek mechanism.

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*Speaker