



CEA - Saclay 91191 Gif-sur-yvette Cedex
Service de Physique de l'Etat Condensé - UMR 3680

SÉMINAIRE

Mercredi 24 mai 2017 à 11h15

Orme des Merisiers SPEC, Salle Itzykson, Bât.774

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Turbulence in a Quantum Gas

For the past two decades harmonically trapped ultracold atomic gases have been used with great success to study fundamental many-body physics in a flexible experimental setting. Recently, we achieved the first atomic Bose-Einstein condensate (BEC) in an essentially uniform potential of an optical-box trap [1], which has opened new possibilities for closer connections with condensed-matter systems, and theories of the many-body problem that generally rely on the translational symmetry of the system.

In this talk, I will present a study where we drive our uniform BEC out of equilibrium with an oscillating force that pumps energy into the system at the largest length scale [2]. In the limit of weak drives, the BEC's response is linear, well captured by its lowest-lying excitations. For stronger drives, a nonlinear response is apparent and we observe a gradual development of a turbulent cascade characterized by an isotropic power-law distribution in momentum space. Our conclusions are well supported by comparison with numerical simulations of the Gross-Pitaevskii equation.

[1] A. L. Gaunt *et al.*, Phys. Rev. Lett. 110, 200406 (2013)

[2] N. Navon *et al.*, Nature 539, 72 (2016)

A coffee break will be served at 11h00. The seminar will be given in English.