



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

SÉMINAIRE

Mercredi 2 mai 2018 à 11h15

Orme des Merisiers SPEC, Salle Itzykson, Bât.774

Leticia TARRUELL

ICFO-The Institute of Photonic Sciences, Castelldefels (Barcelona), Spain

Quantum liquid droplets in a mixture of Bose-Einstein condensates

Self-bound states are ubiquitous in nature and appear in contexts as diverse as solitary waves in channels, optical solitons in non-linear media and liquid droplets. Their binding results from a balance between attractive forces, which tend to make the system collapse, and repulsive ones, which stabilize it to a finite size. In this talk, I will present our recent experiments on dilute quantum liquid droplets: macroscopic clusters of ultra-cold atoms that are eight orders of magnitude more dilute than liquid Helium but, despite not falling in the standard van der Waals paradigm of liquids, have similar properties. We have experimentally observed the self-bound character of these droplets in a mixture of Bose-Einstein condensates with effective attractive interactions, and mapped out the associated liquid-to-gas transition [C. R. Cabrera et al., *Science* 359, 301 (2018)]. In a second series of experiments, we have placed such droplets in an optical waveguide and explored their connection to more conventional bright solitons [P. Cheiney et al., *Phys. Rev. Lett.* 120, 135301 (2018)]. Interestingly, the existence of dilute quantum liquid droplets is a direct result of quantum fluctuations. Thus, their properties constitute a sensitive test of quantum many-body theories.

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