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

SÉMINAIRE

Mercredi 19 Mars 2014 à 11h15

Orme des Merisiers SPEC, Salle Itzykson, Bât.774

Disordered Bose Superfluids

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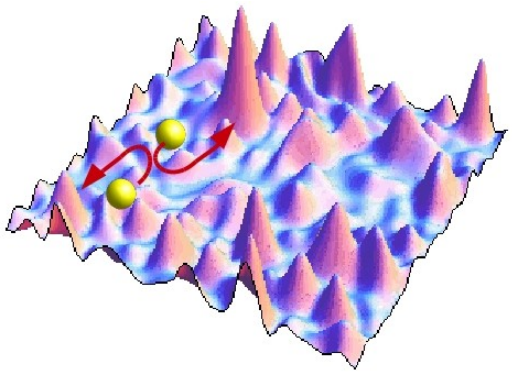

The dynamics of many-body quantum systems is attracting a growing attention, motivated by the development of novel devices where physical parameters can be controlled. In a disordered environment, the interplay of interactions and disorder poses challenging questions. For instance, does Anderson localization survives interactions? Does superfluidity survives disorder? Does disorder favor or prevent ergodicity and thermalization processes? Ultracold atoms offer a unique tool to address these questions [1], taking advantage of an accurate control of both interactions and disorder, which can be made time-dependent.

Here we report two theoretical studies of disordered Bose superfluids. First, we discuss the phase diagram of the 2D disordered Bose fluid based on large-scale quantum Monte Carlo simulations [2]. We discuss the nature of the normal fluid to superfluid transition and conductivity calculations. Second, we discuss collective localization effects and show how they affect the transport of correlations in interacting superfluids [2,3]. We show in particular that the 3D case features a rich localization diagram that strongly depends on the model of disorder [3].

References

[1] L. Sanchez-Palencia and M. Lewenstein, Nat. Phys. 6, 87 (2010).
[2] G. Carleo, G. Boéris, M. Holzmann, and L. Sanchez-Palencia, Phys. Rev. Lett. 111, 050406 (2013)
[3] P. Lugan et al., Phys. Rev. Lett. 99, 180402 (2007).
[4] S. Lellouch, L.-K. Lim, and L. Sanchez-Palencia, in preparation (2014).

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