Minicolloque PMQ31 ☒ **Oral** ☐ **Poster**

Spectral functions of ultracold systems : a Localization Landscape approach

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Spectral functions are key quantities in ultracold atoms systems, especially for interpreting the results of experiments aiming at measuring the mobility edge [1]. The behavior of these functions, both in the classical and quantum regimes, have been already the subject of numerous studies, especially for laser speckle potentials [2]. In this talk, we will report on a new approach to computing these functions based on the Localization Landscape (LL) Theory [3].

We will first introduce the Weyl-Wigner transform which transfers the quantum formalism (with operators and eigenvalues) into the phase-space. We will show that the LL captures the structure of Wigner functions corresponding to the eigenstates in phase space, leading to a very simple approximation of the spectral functions. Finally, numerical simulations confirm the predictive power of the LL approach, both in the classical and quantum regime, for a wide class of disordered potentials.

These results opens the perspective for a general LL-based study of localization in cold atoms, in close collaboration with experimental studies, including future predictions and measurements of the mobility edge.

[1] C. A. Müller, D. Delande, and B. Shapiro, Phys. Rev. A **94**, 033615 (2016).

[2] T. Prat, N. Cherroret, and D. Delande, Phys. Rev. A **94**, 022114 (2016).

[3] M. Filoche and S. Mayboroda, PNAS **109**, 14761 (2012).