



Antoine GEORGES

CHAIRE PHYSIQUE DE LA MATIÈRE CONDENSÉE

Fermions froids et simulation quantique

30 avril > 28 mai 2025

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COLLÈGE
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Mercredi 30 avril 2025
Amphithéâtre Guillaume Budé

9h30 : Cours – Antoine Georges
Introduction. Etapes marquantes du domaine. Réseaux optiques.

11h30 : Séminaire
Tilman Esslinger (ETH Zürich)
Quantum gates with cold fermions in topological pumps

Controlled movement of particles and quantum states is essential for advances in quantum simulation, computation and sensing, as it provides a means to prepare initial states and entangled states of high connectivity. We have used the highly controlled experimental platform of fermionic atoms in optical lattices to study Thouless pumping over long distances and in strongly interacting regimes. We showed how strong interactions shift topological boundaries in a Thouless pump and how entangled singlet pairs can be reversibly split over more than a dozen lattice sites. I will furthermore discuss quantum gates integrated into the topological pumping process. Using cold atoms as quantum simulators of devices, we studied the directed transport of atoms between two connected traps acting as reservoirs. We observed an anomalously high current carrying irreversible entropy through a weak link between two traps, each containing superfluids of fermionic lithium in the strongly interacting regime.

Les cours seront enregistrés et diffusés sur le site web de la chaire après la date de la séance. Inscription sur la liste de diffusion : envoyer un message à listes-diffusion.cdf@college-de-france.fr avec comme sujet : subscribe chaire-pmc.ipcdf