SEMPARIS – Séminaires en région parisienne

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Cours

Mercredi 30 Avril 2025, 11 :30
CDF, Amphitheatre Guillaume Budé
Domaines : cond-mat.str-el

Titre : *Quantum gates with cold fermions in topological pumps*

Orateur : **Tilman Esslinger (ETH Zürich)**

Résumé : *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.*