Kolloquium

physikalisches

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Exploring new Regimes of Transport in Atomic Quantum Simulators

Mo. 28.4.25
16:00 Uhr
Ort: H34

Controlled transport 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 create connectivity. We have explored novel regimes of transport using the highly controlled experimental platform of cold atoms quantum simulators. I will report on i) the directed transport of atoms between two connected traps acting as reservoirs and, ii) the transport in a highly coherent topological pump.

In the first case, 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. In the second case, we demonstrated topological pumping over tens of lattice sites, 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 high-fidelity quantum gates integrated in the topological pumping process.

Experiment on Quantum Simulation of Transport
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