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Spin manipulation inside an atomic quantum point contact

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We report on a few remarkable transport properties of lithium-6 atoms through a quantum point contact (QPC) precisely defined by a set of optical potentials. The versatility of cold-atom techniques allows us to directly measure and control spin currents and to tune interatomic interactions.
We locally lift the spin degeneracy of atoms inside the QPC using an optical tweezer tuned very close to atomic resonance. We observe quantized, spin-polarized transport that is robust to dissipation and sensitive to interaction effects. The effective magnetic field created by the optical tweezer can be twice larger than the Fermi energy whilst having the spatial extend of a Fermi wavelength.
These results open the way to the quantum simulation of spin caloritronics and spintronic devices with cold atoms.

Choix de session parallèle

4.3 Simulateurs quantiques

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