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【516】 Local spin manipulation of quantized atomic currents

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Controlling the internal state of a particle in an ultracold atom experiment is important for studying spinor phases and to simulate spin physics. This control can be implemented using light fields that couples differently to the internal states. This was successfully used in several experiments, although the experiment time is usually constrained by the heating induced by the laser beams.

Here, we create fully spin-polarized currents in an ultracold experiment of fermionic lithium. By shining the spin-dependent, close-to-resonant beam on a small constriction connecting two reservoirs, we demonstrate that the heating is limited: we lift the spin degeneracy for weak interactions while retaining conductance plateaus. This setup can be used to detect small variations of transport thanks to interactions.

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