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Thermoelectric transport through an atomic quantum point contact LAURA CORMAN, DOMINIK HUSMANN, MARTIN LEBRAT, SAMUEL HÄUSLER, PHILIPP FABRITIUS, ETH Zurich, JEAN-PHILIPPE BRANTUT, EPFL, TILMAN ESSLINGER, ETH Zurich — Thermoelectricity describes the phenomenon by which a temperature gradient drives transport of energy and particles and vice versa. It is of great technological importance for cooling materials or power generation, but it is also a fundamental probe of the physics of the medium in which the energy and particle currents are created. Experimentally, thermoelectric effects have already been studied with two reservoirs of weakly interacting ultracold fermionic lithium atoms connected by a two-dimensional constriction.
Here, we control these effects in our ultracold atom transport setup by modifying the properties of both the constriction and the reservoirs to explore new conduction regimes, reducing the dimension of the constriction to that of an atomic quantum point contact and setting the interactions in the reservoirs to the unitary regime. The evolution of particle and energy currents to a temperature gradient are strongly modified compared to the weakly interacting case, where a transient particle imbalance builds up before relaxing. In the strongly interacting regime, this imbalance persists for accessible experiment times, realizing an equivalent of the fountain effect for fermions [1].
[1] D. Husmann et al., PNAS 115, 8563 (2018)

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