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Controlling spin and thermoelectric transport in an atomic transport experiment PHILIPP FABRITIUS, SAMUEL HAUSLER, Department of Physics, ETH Zurich, 8093 Zurich, Switzerland, MARTIN LEBRAT, Department of Physics, Harvard University, 17 Oxford St, Cambridge, MA, 02138, USA, JEFFREY MOHAN, MOHSEN TALEBI, LAURA CORMAN, TILMAN ESSLINGER, Department of Physics, ETH Zurich, 8093 Zurich, Switzerland — We report on the control of the thermoelectric transport properties of a strongly interacting Fermi gas flowing through a quasi-two-dimensional contact and second on the control of spin inside a quantum point contact (QPC) and the effects of dissipation on a superfluid. The versatility of cold-atom techniques allows us to precisely define a QPC using light potentials, to directly measure particle, heat and spin currents and to tune interatomic interactions. In a first experiment, we probe the thermoelectric effects induced by a temperature difference across a two-dimensional channel. We use an attractive gate beam as well as an repulsive wall beam to change the relative strength of channel and reservoir contributions to the thermoelectric transport. This allows us to tune the particle transport going from hot to cold to going from cold to hot. In a second experiment, we locally lift the spin degeneracy of atoms inside the QPC usingan optical tweezer tuned very close to atomic resonance. Tuning the laser further away from the atomic resonance we also look at how a superfluid is reacting to dissipation and how its transport properties are effected. These results open the way to the quantum simulation of the coupling between spin, heat and particle currents with cold atoms.

Philipp Fabritius
ETH Zurich

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