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Spin transport in a tunable Heisenberg model NIKLAS JEPSEN, JESSE AMATO-GRILL, IVANA DIMITROVA, WEN WEI HO, Massachusetts Institute of Technology MIT, MIKHAIL LUKIN, EUGENE DEMLER, Harvard University, WOLFGANG KETTERLE, Massachusetts Institute of Technology MIT — We report on the first realization of the anisotropic Heisenberg model using ultracold atoms with fully tunable anisotropy. So far, only the isotropic Heisenberg model had been realized. We demonstrate this tunability by measuring the transport properties of the Hamiltonian as function of anisotropy in 1D-chains. We start with an out-of-equilibrium spin pattern and see how this pattern relaxes. As a function of increasing anisotropy, we observe a ballistic and a diffusive regime, which are smoothly connected by a super-diffusive regime and followed by a sub-diffusive regime.

Niklas Jepsen
Massachusetts Institute of Technology MIT

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