
HL 8: Invited Talk Ludwig

Time: Monday 14:00–14:45

Location: HSZ 01

Invited Talk HL 8.1 Mon 14:00 HSZ 01
Phonon-mediated non-equilibrium interactions between mesoscopic devices — GEORG SCHINNER and •STEFAN LUDWIG — Center for NanoScience and Fakultät für Physik, Ludwig-Maximilians-Universität, Geschwister-Scholl-Platz 1, 80539 München

With shrinking device dimensions quantum interactions in nanoscale devices become increasingly important for possible applications such as quantum information processing. Here we investigate non-equilibrium interactions between adjacent mesoscopic circuits defined in the plane of a two-dimensional electron system (2DES) of a GaAs/AlGaAs heterostructure.

Charge detection utilizing a biased quantum point contact (QPC) has become an essential probe for studying the electronic properties

of nanoscale devices such as coupled few electron quantum dots. We explore the non-equilibrium back-action of a biased QPC onto nearby nanostructures, tackling the question of possible interaction mechanisms. In a recent experiment ballistic non-equilibrium electrons with a well defined excess energy above the Fermi level are injected into the 2DES. While the injected hot electrons are confined to the emitter circuit, part of their energy is transferred to an unbiased detector. Here, we measure an interaction mediated current across a tunable barrier. Surprisingly, the excess energy of electrons excited in the detector is bounded by about 1.3 meV, corresponding to the maximum energy of interface phonons that can be absorbed by equilibrium electrons. Our results illustrate the importance of interactions mediated by interface acoustic phonons generated by ballistic non-equilibrium electrons.