TT 73: Fluctuations and Noise

Time: Friday 11:45–12:30 Location: H20

TT 73.1 Fri 11:45 H20

Noise-induced Phase Transition in an Electronic Mach-Zehnder Interferometer: a Manifestation of Non-Gaussian Noise — Andreas Helzel[1], Leonid V. Litvin[1], Ivan P. Levkivskyi[2,3], Eugene V. Sukhorukov[2], Werner Wegscheider[4], and •Christoph Strunk[1] — [1]Institut für experimentelle und angewandte Physik, Universität Regensburg, 93040 Regensburg, Germany — [2]Département de Physique Théorique, Université de Genève, CH-1211 Genève 4, Switzerland — [3]Bogolyubov Institute for Theoretical Physics, 03680 Kiev, Ukraine — [4]Laboratorium für Festkörperphysik, HPF E 7, ETH Zürich, 8093 Zürich, Switzerland

An electronic Mach-Zehnder interferometer is employed as a detector for the non-Gaussian current noise emitted from a quantum point contact (QPC). The visibility of Aharonov-Bohm interference in the interferometer constitutes a direct probe of the generator of the full counting statistics (FCS) of the current fluctuations. The visibility shows a lobe and node structure vs. the applied dc bias, which depends on the transmission $\mathcal{T}_0$ of the QPC, and changes qualitatively at $\mathcal{T}_0 = 1/2$. The analysis of the data provides direct experimental evidence for a singularity in the FCS. The noise is highly non-Gaussian and leads to an abrupt disappearance of the multiple side lobes for $\mathcal{T}_0 < 1/2$. Together with a singularity of the dephasing rate these observations constitute an experimental evidence of a recently predicted noise-induced phase transition occurring at $\mathcal{T}_0 = 1/2$.

TT 73.2 Fri 12:00 H20

Finite-frequency noise properties of the nonequilibrium Anderson impurity model — •Christoph P. Orth[1], Andreas Komnik[2], and Daniel F. Urban[3] — [1]University of Basel, Switzerland — [2]University of Heidelberg, Germany — [3]University of Freiburg, Germany

We analyze the spectrum of the electric-current autocorrelation function (noise power) in the Anderson impurity model biased by a finite transport voltage. Special emphasis is placed on the interplay of nonequilibrium effects and electron-electron interactions. Analytic results are presented for a perturbation expansion in the interaction strength U . Compared to the noninteracting setup we find a suppression of noise for finite frequencies in equilibrium and an amplification in nonequilibrium. Furthermore, we use a diagrammatic resummation scheme to obtain nonperturbative results in the regime of intermediate U. At finite voltage, the noise spectrum shows sharp peaks at positions related to the Kondo temperature instead of the voltage.

TT 73.3 Fri 12:15 H20

Detection of single-electron heat transfer statistics — •Rafael Sánchez[1] and Markus Büttiker[2] — [1]Instituto de Ciencia de Materiales de Madrid (ICMM-CSIC), Madrid, Spain — [2]Université de Genève, Genève, Switzerland

Capacitively coupled conductors permit separate directions of the heat and current flux. Energy is transferred between two conductors by means of electron-electron interaction. When one of systems is at a higher temperature, the transferred heat can be converted to electrical power. In quantum dot systems, the energy transfer is discrete, allowing for high conversion efficiencies[1]. Charge fluctuations of such a system can be monitored by quantum point contact. It allows us to extract the transferred heat statistics from the detection of state-resolved charge fluctuations. We investigate gate dependent deviations away from a charge fluctuation theorem in the presence of local temperature gradients (hot spots). Non universal relations are found for state dependent charge counting. A fluctuation theorem holds for coupled dot configurations with heat exchange and no net particle flow[2].

[1] R. Sánchez, and M. Büttiker, Phys. Rev. B 83, 085428 (2011)
[2] R. Sánchez, and M. Büttiker, Europhys. Lett. (in press); arXiv:1207.2587