# TT 32: Fluctuations and Noise

Time: Thursday 18:00–19:15 Location: H18

TT 32.1 Thu 18:00 H18

**Full Counting Statistics of an Aharonov-Bohm Interferometer with an embedded Quantum Dot** — •Daniel Urban[1,2], Rosario Fazio[2,3], and Jürgen König[1] — [1]Ruhr-Universität Bochum — [2]Scuola Normale Superiore, Pisa — [3]International School for Advanced Studies, Trieste

The visibility of the interference signal in Aharonov-Bohm (AB) interferometers provides information about the coherence of transport channels. For instance, spin-flip processes in embedded quantum dots lead to partial destruction of the coherence [1] and thus reduction of the AB-oscillation amplitude. The occurrence of this effect depends on the dot occupation.

We perform a perturbation expansion of the Cumulant Generating Function [2] of an AB-Interferometer with quantum dots in the regime of weak tunnel coupling. Different statistics are found for vanishing and infinite charging energy: Without interaction the interfering part of the statistics is Poisson-like and all moments are even in the AB-flux. For an interacting quantum dot we find completely different behavior with super-poissonian noise and an odd flux dependence.

[1] J. König and Y. Gefen, PRL **86**, 3855 (2001).
[2] A. Braggio, J. König, and R. Fazio, PRL **96**, 026805 (2006).

TT 32.2 Thu 18:15 H18

**Noise and Full Counting Statistics in Coupled Quantum Dots** — Ramon Aguado[2], •Tobias Brandes[1], Clive Emary[1], Gerold Kiesslich[1], David Marcos[2], Eckehard Schöll[1], and Philipp Zedler[1] — [1]Institut für Theor. Physik, TU Berlin — [2]Departamento de Teoria de la Materia Condensada, CSIC, Madrid

We discuss shot noise and higher current cumulants in quantum dots [1] with internal couplings (such as double quantum dots) by calculating the Full Counting Statistics within a master equation approach in the limit of strong bias and strong Coulomb blockade. We present results for models that include a coupling to internal relaxation processes (dissipation due to phonons) and exhibit interesting limiting cases such as quantum Zeno localization due to strong coupling to the drain reservoir [2].

[1] G. Kießlich, P. Samuelsson, A. Wacker, and E. Schöll, Phys. Rev. B 73, 033312 (2006). [2] T. Brandes, Phys. Stat. Sol. B 243, 2293 (2006).

TT 32.3 Thu 18:30 H18

**Frequency-dependent full counting statistics** — Clive Emary[1], •David Marcos[2], Ramon Aguado[2], and Tobias Brandes[1] — [1]TU Berlin, Sekr. PN 7-1, Institut für Theoretische Physik, Hardenbergstr. 36, D-10623 Berlin, Deutschland — [2]Departamento de Teoría de la Materia Condensada, Instituto de Ciencia de Materiales de Madrid, Consejo Superior de Investigaciones Científicas (CSIC), C/ Sor Juana Inés de la Cruz, 3, Campus de Cantoblanco, Madrid 28049, Spain

Full Counting Statistics (FCS) is fast becoming one of the most powerful theoretical tools for studying electronic transport through mesoscopic devices. The extra information FCS provides over and above average current and shot-noise measurements, yields greater insight into the behaviour of the system, and in particular particle correlations. Most calculations to date have considered FCS in the zero-frequency, or single-time limit. Here, we describe our technique for calculating arbitrary-order multiple-time current correlators, and hence a fully frequency-dependent FCS. Our formalism is derived within the generalised density matrix approach and is therefore of wide applicability.

TT 32.4 Thu 18:45 H18

**Full counting statistics of photon-assisted transport in a quantum point contact** — •Mihajlo Vanevic[1], Yuli V. Nazarov[2], and Wolfgang Belzig[3] — [1]Departement für Physik und Astronomie, Klingelbergstrasse 82, 4056 Basel, Switzerland — [2]Kavli Institute of NanoScience, Delft University of Technology, 2628 CJ Delft, The Netherlands — [3]Fachbereich Physik, Universität Konstanz, D-78457 Konstanz, Germany

We study the charge transport statistics in a coherent quantum point contact driven by a time-dependent voltage. We obtain that the cumulant generating function at zero temperature consists of a dc component which describes the unidirectional charge transfer and the ac component which accounts for the photon-assisted effects in the noise and higher-order even cumulants. We provide a simple interpretation in terms of electron-hole excitations and discuss the relation to the minimal excitation states for optimal Lorentzian voltage pulses. The extended Keldysh-Green's function technique which we use is suitable for the systematic calculation of the higher-order current correlators at finite temperatures in the presence of the driving.

TT 32.5 Thu 19:00 H18

**Bound states in time-dependent quantum transport** — •Elham Khosravi[1], Stefan Kurth[1], Gianluca stefanucci[1], Angel Rubio[2], and Eberhard Gross[1] — [1]Institut fuer Theoretische Physik, Freie Universitaet Berlin,Berlin, Germany — [2]Donostia International Physics Center(DIPC),San Sebastian,Spain

We present a description of transport based on the time evolution of the non-interacting time-dependent Schroedinger equation and develop a numerical algorithm for the time propagation of open systems which is ideally suited for implementation of time-dependent density functional theory. The algorithm is used to study time-dependent transport phenomena. In particular, we investigate the role of bound states and transients in simple model systems. The presence of two or more bound states in the biased electrode-device-electrode system leads to current oscillations that remain undamped even in the long-time limit. Such oscillations might open new conductive channels, an effect which is not accounted for in any steady-state approach.