

Charge fluctuations in chaotic cavities

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June 03, 2005

Chaotic cavities provide an important example to test theories of electrical transport. In this talk I emphasize a number of electrical properties of mesoscopic chaotic cavities for which one needs to discuss the potential and charge inside the cavity [1]. Interestingly these quantities are related to a matrix similar to the Wigner-Smith delay-time matrix, except that the energy derivative is replaced by a derivative with regard to the potential. A prime example is the dynamic conductance of a cavity connected to reservoirs via quantum point contacts which are subject to oscillating potentials [2]. I introduce the electrochemical capacitance and the charge relaxation resistance [1, 2, 3]. In the presence of an applied voltage the current through the cavity exhibits shot noise. We discuss the resulting fluctuations of charge and potential in the cavity [3]. The theory has been applied to photon-assisted transport through chaotic cavities [4], the physics of quantum detectors [5], and the investigation of departures from the Onsager relations in the non-linear I-V-characteristics of chaotic cavities [6].

References

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