

## Charge Fluctuations and Dephasing in Interferometers

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Expressions which describe the conductance and the noise of mesoscopic conductors in terms of scattering matrices have become well known. In contrast, it is less appreciated that also local quantities like the fluctuations of the charge in the interior of a mesoscopic conductor can be related via functional derivatives to the scattering matrix [1]. An electrically self-consistent discussion of charge fluctuations requires a discussion of screening. At low frequency this approach leads to electro-chemical capacitances, emittances (inductances) and equilibrium and non-equilibrium charge relaxation resistances in term of interaction constants and in terms of the scattering matrix. We use the approach to explain a recent experiment by Kobayashi et al. who have found different dephasing rates for Aharonov-Bohm oscillations measured in local and non-local four-terminal resistance measurements [2].

[1] M. Buttiker, in "Quantum Mesoscopic Phenomena and Mesoscopic Devices", edited by I. O. Kulik and R. Ellialtioglu, (Kluwer, Academic Publishers, Dordrecht, 2000). Vol. 559, p. 211 cond-mat/9911188

[2] G. Seelig, S. Pilgram, A. N. Jordan, M. Buttiker, cond-mat/0304022; G. Seelig and M. Buttiker, Phys. Rev. B **64**, 245313 (2001).