Magnetoasymmetric transport in a quantum dot Aharonov-Bohm interferometer

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Away from linear response, screening effects can lead to a breakdown of microreversibility in mesoscopic systems. In nonequilibrium, the internal potential of the conductor is, quite generally, an uneven function of the magnetic field, implying a magnetoasymmetry of the differential conductance.[1] Recent theoretical developments relate the asymmetry of the noise to the asymmetry of the differential conductance in the leading order of a voltage expansion.[2] As a consequence, a higher-order fluctuation relation is established between the two magnetoasymmetries even when fluctuation theorem is not obeyed.

Here we discuss magnetoasymmetries in quantum-dot Aharonov-Bohm interferometers when strong electron-electron interactions are taken into account beyond the mean-field approach.[3] With the aid of the electron occupation at the dot, we demonstrate that its nonequilibrium component is an asymmetric function of the flux even to lowest order in voltage. We also calculate the magnetoasymmetry of the noise and find that it is given, to a good extent, by the magnetoasymmetry of the weakly nonlinear conductance term. Therefore, both magnetoasymmetries (noise and conductance) are related to each other via a higher-order fluctuation relation.

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