Experimental test of the dynamical Coulomb blockade theory for coherent conductors

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In mesoscopic circuits, the impedances composition laws differ from their classical counterparts. For instance, the impedance of a well defined coherent conductor is modified by the circuit in which it is embedded. This quantum phenomenon, known as dynamical Coulomb blockade, results from the granularity of charge transfers together with Coulomb interaction. Dynamical Coulomb blockade is well understood theoretically and has been checked experimentally on the simplest coherent conductors realized by tunnel junctions since the early 90s. However, it is only recently that the theoretical predictions have been generalized to coherent conductors [1,2]. These predictions state that the dynamical Coulomb blockade corrections to the conductance are reduced in amplitude by the same Fano factor as quantum shot noise. We could perform a quantitative experimental test of this strong prediction by measuring the conductance of a quantum point contact inserted in an adjustable on-chip resistive circuit [3].

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