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Dynamical Coulomb Blockade in a temperature-biased quantum channel

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The transport properties of quantum conductors can strongly change when embedded in an on-chip dissipative mesoscopic circuit. At the heart of this phenomenon is the Coulomb energy required to change the charge in small interconnect nodes of the circuit. Handling the dynamics of charge is a huge theoretical challenge beyond perturbative regimes. Yet, the suppression of the electrical conductance (also called dynamical Coulomb blockade) has been intensively investigated and successfully predicted in some mesoscopic circuits since 1990 [1,2].
Moreover, in voltage-bias nanocircuits, Joule power dissipation heats up small nodes, creating an electronic temperature imbalance. In this talk, I will present an experimental investigation of dynamical Coulomb blockade of a quantum channel in series with a resistance under a controlled temperature bias and compare the results to new theoretical developments [3].
[1] G.-L Ingold & Y. Nazarov, Single charge tunneling; Coulomb blockade phenomena in nanostructures (1992), plenum, New York edn. (Chapter 2)
[2] I. Safi and H. Saleur, One-Channel Conductor in an Ohmic Environment: Mapping to a Tomonaga-Luttinger Liquid and Full Counting Statistics, PRL 93, 126602 (2004)
[3] H. Duprez et. al., Dynamical Coulomb Blockade under a temperature bias, PRR 3, 023122 (2021)

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