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Dissipative quantum phase transition in a single electron transistor ALFRED ZAWADOWSKI, LASZLO BORDA, GERGELY ZARAND, Institute of Physics, TU Budapest, DAVID GOLDHABER-GORDON, Stanford University — We study the transport properties of a single electron transistor (SET) with highly resistive gate electrodes, and show that the SET displays a quantum phase transition analogous to the famous dissipative phase transition studied by Leggett. At temperature $T = 0$, the charge on the central island of a conventional SET changes smoothly as a function of gate voltage, dueto quantum fluctuations. However, sufficiently-strong dissipation, $R_g > R_C$, can freeze out charge fluctuations on the island even at the degeneracy point, causing the charge on the island to change in sharp steps as a function of gate voltage. For $R_g < R_C$ the steps remain smeared out by quantum fluctuations. The Coulomb blockade peaks in conductance display anomalous scaling at intermediate temperatures.

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