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Effective capacitance of metallic single electron transistor

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We proposed a method to calculate the effective capacitance of a metallic single-electron transistor using the quantum Monte Carlo method to describe the Coulomb blockade effect. The effective capacitance depended on the induced gate charge, temperature, and conductance of the system. Furthermore, the results can be used to calculate the effective charging energy, which can characterize the strength of the Coulomb blockade effect. In the Coulomb blockade regime, the effective charging energy was approximately equal to charging energy. In particular, the effective charging energy decreased with an increase in the conductance and temperature.

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