Conductance peaks and gaps in single-electron device with the presence of electron-electron interaction - "Nonequilibrium green function approach"

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Abstract

Consider a single-electron transistor (SET) with a small size quantum dot (QD), where confined energy and the Coulomb interaction control the charges adding to QD. In this paper, a theoretical analysis of the relation between source-drain voltage and gate voltage has been done to define quantum-Coulomb blocked (and unblocked) diamonds for QD that has N electrons. An analytical equation for the conductance has been derived using the non-equilibrium Green function technique (NEGFT). Further, the effect of QD size and the tunnelling rate on conductance peaks and gaps have been investigated. Finally, the effect of gate voltage on conductance peaks and gaps with respect the quantum-Coulomb blocked regions has been analysed.

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