SCATTERING IN NETWORKS AND DESIGN OF THE RESONANCE TRIADIC QUANTUM SWITCH

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Based on connection between the Dirichlet-to-Neumann Map and the scattering matrix for scattering problem on the networks the resonance transmission through the splitting is considered.

The mathematical design of a realistic three-position quantum switch controlled by the constant electric field is suggested in form of a circular quantum well - a unit disc on a plane- with four straight channels attached to it. The magnitude of the constant electric field directed parallel to the disc may be defined such that rotation of this field in the plane of the device permits manipulation of the electron current through the triple splitting. Explicit expression for transmission coefficient from one channel to another is obtained via reduction of the analysis of the corresponding infinitely-dimensional spectral problem to the analysis of a relevant finite-dimensional analytic matrix function. Our techiques is based on methods developed in [7, 6, 8] and the results are published in other papers quoted below.

Our main practical result is the calculation of the working point of the switch in the multi-dimensional space of the numerical parameters of the switch , to enable the resonance manipulation of the current across the quantum well from one wire to another.

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