Double Occupancy Errors in Quantum Computing Operations: Corrections to Adiabaticity

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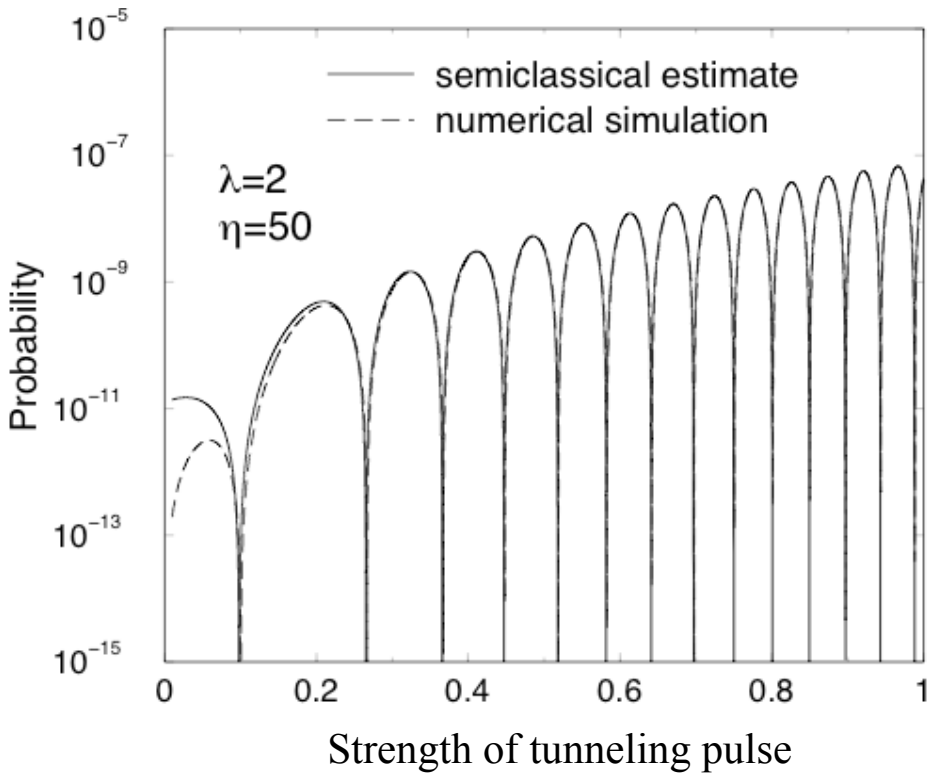
Two-qubit operations are necessary for quantum computations. In the one of solid state implementations two-qubit operations can be realized by changing the tunneling barrier between two quantum dots (qubits). Except for a desirable effect of swapping spin states of qubits, this process may lead to a double occupancy of the qubit at the end of the operation. Such double occupancy destroys the qubit and constitutes a processing error. In this work in collaboration with R. Requist, J. Schliemann, and D. Loss we calculate the probability of double occupancy errors by computing the probability of non-adiabatic transitions in an effective two-level system. arXiv:cond-mat/0409096