MAGNETICAL CONTROL OF SPIN QUBITS IN QUANTUM WIRE

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Abstract

The problem of control stimulates the analysis of qubit states in two levels system under the control of electromagnetic field. The ability to control the quantum state of a single electron spin in a quantum wire is at the heart of recent developments towards a scalable spin-based quantum computer. We investigated the influence of oscillating electromagnetic radiation field and the frequency of the parabolic confinement on a qubit. We compute the electron energy using supersymetry and, with the aid of Rotating Wave Approximation (RWA) we derived transition probability. For some values of the confinement, the transition probability becomes the Landau-Zener probability. It may also be seen that the high degrees of confinement (or high magnetic field) lead to an enhancement in the transition probability.

Keywords: Qubit transitions, electromagnetic field, quantum wire, transition probability and RWA.