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Quantum entanglement between ballistic electrons and quantum-dot spins in carbon nanotubes DIDIER OMAR GAMBOA-ANGULO, MARITZA DE COSS, Facultad de Ingeniera, Universidad Autnoma de Yucatn, GUILLERMO CORDOURIER-MARURI, ROMEO DE COSS, Departamento de Fsica Aplicada, Cinvestav- Mrida — In this work we analyze the quantum entanglement between ballistic electrons and quantum-dot spins in semiconductor and metallic carbon nanotubes. The quantum-dot is modeled as a confined electron in a potential well. The interaction between the confined and the ballistic electrons is obtained through an effective interaction given by Coulombic and the quantum well potential. This interaction generates quantum correlation between the static and mobile electron spins. The electron dynamics is model by the Schrdinger equation for semiconductor carbon nanotubes and by the Dirac equation for metallic carbon nanotubes. The addition of mass term in the system in order to create a band gap and confinement of the electrons in metallic carbon nanotubes is discussed. Concurrence and quantum correlation parameter calculations are performed to obtain the level of spin quantum entanglement. We found that the resonance effect has an important impact on the quantum entanglement in the proposal systems.

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