Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Entanglement and dissipation in a 2x2 quantum-dot cell LESBIA DEBORA CONTRERAS, Centro de Investigación Cientifica y de Educación Superior de Ensenada(CICESE), FERNANDO ROJAS, Centro de Ciencias de la Materia Condensada(UNAM) — Quantum dot arrays or quantum-dot cellular automata (QCA) have been proposed as elements capable to encode, process and transmit logical information based on quantum effects in terms of charge distributions in specific geometries. and the basis for the charge qubits. Quantum Entanglement is a resource to encode information in a completely new way making possible quantum teleportation, quantum error correction, quantum dense coding. In this work, we explore the dynamical formation of entangled states including dissipative effects, of two parallel double dots (four dots, 2x2 cell), with one extra electron each, coupled by the Coulomb interaction and controlled by a time dependent potential difference applied to one of the double dots, causing the electron to switch. We include dissipative effects via electron-phonon interaction in the Markovian approximation for the reduced density matrix. Dynamical properties of the cell such as charge polarization, measure the entanglement (Wootters concurrence) and the probabilities for each Bell state, are discussed as a function of relevant parameters (tunneling, potential difference, temperature). We find that it is possible to obtain entangled states in the cell based on the electronic charge distribution and produce a specific Bell state from an initially non entangled state through the control of the time dependent potential. The work is supported by DGAPA project IN114403 and CONACyT project 43673-F

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Date submitted: 03 Dec 2004 Electronic form version 1.4