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Entangled state teleportation through a couple of quantum channels composed of XXZ dimers in an Ising-XXZ diamond chain

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The quantum teleportation plays an important role in quantum information process, in this sense, the quantum entanglement
properties involving an infinite chain structure is quite remarkable because real materials could be well represented by an infinite
chain. We study the teleportation of an entangled state through a couple of quantum channels, composed by Heisenberg dimers
in an infinite Ising-Heisenberg diamond chain, the couple of chains are considered sufiicciently far away from each other to
be ignored the any interaction between them. To teleporting a couple of qubits through the quantum channel, we need to
find the average density operator for Heisenberg spin dimers, which will be used as quantum channels. Assuming the input
state as a pure state, we can apply the concept of fidelity as a useful measurement of teleportation performance of a quantum
channel. Using the standard teleportation protocol, we have derived an analytical expression for the output concurrence,
fidelity, and average fidelity. We study in detail the effects of coupling parameters, external magnetic field and temperature
dependence of quantum teleportation. Finally, we explore the relations between entanglement of the quantum channel, the
output entanglement and the average fidelity of the system. Through a kind of phase diagram as a function of Ising-Heisenberg
diamond chain model parameters, we illustrate where the quantum teleportation will succeed and a region where the quantum
teleportation could fail.

Tipo de Apresentação

Poster

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