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Revival of Bell nonlocality across a quantum spin chain

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Abstract

The transmission of pure and mixed states along a quantum spin chain is investigated. Non-locality between two qubits will evolve as it is transmitted through the quantum channel in a way that may violate or not the Clauser-Horne-Shimony-Holt (CHSH) Bell inequality at different times. This violation of local realism is analogue to the so-called sudden death and sudden birth features of entanglement. In the quantum channel, which will turn to be a damping one, some (mixed) states will be preferred according to the nature of the quantum correlations that are preserved during the evolution along the spin chain.

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