Residual entanglement of accelerated fermions is useful

The non-vanishing residual entanglement, between the fermionic modes in the infinite acceleration limit, does not violate CHSH inequality, therefore it is not non-local. In this paper, we study the usefulness of the residual fermionic entanglement in single mode approximation and beyond single mode approximation. It is shown that there are some cases where the CHSH inequality is not violated by the residual entanglement, but the state is useful for quantum teleportation. Conditions for the violation of the CHSH inequality in terms of the ‘‘presence probability’’ of the particle in different Rindler regions are given for the state to be useful for teleportation and superdense coding