

Introducing upper and lower bounds for Rényi entanglement measure

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Abstract

Determining the amount of entanglement is one of the important subjects in the quantum information theory. In this field, different measures have been introduced to determine the degree of entanglement of bipartite systems. Concurrence and tangle measures are two samples of these measures, which are generally difficult to calculate analytically for arbitrary mixed states. Hence, in order to have an approximation of entanglement, besides the numerical methods, a series of upper and lower bounds that can be easily calculated have been introduced. On the other hand, concurrence and tangle measures have a relationship, in certain range with Rényi entanglement measure. In this paper, using the upper and lower bounds of tangle and concurrence measures and with regard to the relationship between these measures and the Rényi entanglement measure, upper and lower bounds are introduced for the Rényi entanglement measure. Then, in a spin system, the efficiency of these bounds is examined.

Keywords: Concurrence measure, tangle measure, Rényi entanglement measure, upper and lower bounds of entanglement, spin system

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