Criterion for detection of genuine multipartite entanglement in continuous-variable systems

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Abstract

In the multipartite systems there exist different types of entanglement where genuine entanglement is an important one. Due to its importance in quantum information tasks, various criteria have been presented for the detection of genuine entanglement. One of them is the criterion introduced by Shchukin group [4.] First, they obtained an inequality such that if any multipartite continuous-variable quantum state violates this inequality for all bipartitions, then the state is genuine multipartite entangled. Since the application of this inequality required numerical optimization and became more difficult by increasing the number of parties, then they presented a single analytical condition for genuine entanglement using the inequality which, although was not the best possible one, did not have these difficulties. In this paper, using the original inequality, we present a single analytical condition for genuine entanglement whose lower bound is greater than the lower bound of the analytical condition obtained by Shchukin group; therefore, it is able to detect more genuine entangled states. Moreover, it has the same detection ability as the original inequality without having its difficulties. We illustrate this through an example.

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