

Multi-particle entanglement in graph states

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Graph states are multi-particle entangled states that correspond to graphs, where the vertices of the graph take the role of quantum spin systems and edges represent interactions. They play a significant role in quantum error correction, multi-party quantum communication and quantum computation within the framework of the one-way quantum computer. We characterise and quantify the genuine multi-particle entanglement of such graph states in terms of the Schmidt measure, to which we provide upper and lower bounds for the Schmidt measure in graph theoretical terms. Several examples and classes of graphs will be discussed, where these bounds coincide. For graphs up to 7 vertices we provide a complete characterisation modulo local unitary transformations and graph isomorphies.