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Mathematical constructions for the exhaustive description of multipartite entanglement in pure and mixed quantum states of composed systems

The main aim of the talk is to present a convenient practucal way of multipartite quantum entanglement characterization. I will first discuss technique of nilpotent variables that allows to adequately classify orbits of subgroups of a large Lie group, and for the particular case of the subgroup of local transformstions of a composed quantum system in a pure quantum state, it yields complete clasification of multipartite entanglement. Next, I turn to the case of mixed quantum states and present a linear-programing-type algorithm of polynomial complexity on average, which generalizes the technique of identification of the best separable approximation of the density matrix to the multipartite case. The essentially entangled component - the difference between the density matrix and its best separable approximation - can be further analysed wlth the technique of nilpotent variables.