
Generalized spin-squeezing inequalities for particle number with quantum fluctuations

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Résumé

Particle number fluctuations, no matter how small, are present in experimental setups. One should rigorously take these fluctuations into account, especially for entanglement detection. In this context, we generalize the spin-squeezing inequalities introduced by G. Tóth et al. [Phys. Rev. Lett. 99, 250405 (2007)]. These new inequalities are fulfilled by all separable states even when the number of particles is not constant and may present quantum fluctuations. These inequalities are useful for detecting entanglement in many-body systems when the superselection rule does not apply or when only a subspace of the total system Hilbert space is considered. We also define general dichotomic observables for which we obtain a coordinate-independent form of the generalized spin-squeezing inequalities. We give an example where our generalized coordinate-independent spin-squeezing inequalities present a clear advantage over the original ones.

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