

Construction of GHZ-Like States for a Three-Particle (Spin 1/2) System

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Abstract: As the simultaneous eigenstates of a complete set of commuting observables (CSCO) consisting of three-body operators of the form $\sigma_{1\alpha}\sigma_{2\beta}\sigma_{3\gamma}$, the construction of entangled states for a three-particle system is investigated. It is shown that there exist 54 different sets of operators (each containing four commuting three-body operators with their product being -1) and any three members of each set constitute a CSCO. It is found that 54 different sets of maximally entangled states can be constructed, including the usual GHZ (Greenberg-Horne-Zeilinger) state as a special case. Once a preferential representation is adopted, all of them can be expressed as a GHZ-like form. Moreover, there also exist 18 sets of partially entangled states, where only two particles are entangled.

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Key words: entangled state, complete set of commuting observables, GHZ-like states

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