

多“原子-腔场”系统中的纠缠交换与纠缠保持

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收稿日期 修回日期 网络版发布日期 2007-9-29 接受日期

摘要 利用量子信息学的观点, 将单个原子与单模光场相互作用的J-C模型推广到由M(M为任意正整数)对二能级原子与M个单模腔场分别独立相互作用的组合物理系统模型. 通过求解该系统态矢量的演化矩阵分析原子与腔场相互作用的过程, 并讨论系统中量子纠缠信息的交换与保持的机理. 结果发现: 无论原子纠缠态还是光场纠缠态, 在一定条件下均可实现纠缠交换或纠缠保持; 同时, 利用原子与腔场的相互作用可制备不同形式的纠缠态.

关键词 [量子信息学](#) [腔量子电动力学](#) [纠缠交换](#) [纠缠保持](#) [纠缠制备](#)

分类号 [0431](#)

Entanglement states exchange and preservation in the system of the multi-atom-cavity-field

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Abstract

From the viewpoint of the quantum information theory, the J-C Model of an atom interacting with a single-model light-field is expanded to a union physical system model which consists of M(where M is any positive integer) pairs of two-level atoms and the M cavity-field with interaction respectively. By solving the evolution matrix of the system state vector, the process of the atoms interacting with the light-field is studied and the principle of exchange and preservation of quantum entanglement information in this system is discussed. It is found that not only the atom entanglement but also the light-field entanglement can be transferred and preserved under different time conditions. At the same time, the different form entanglement states can be prepared by using the interaction of the atoms with the cavity-field.

Key words [quantum informatics](#) [cavity quantum electrodynamics](#) [entanglement exchange](#) [entanglement preservation](#) [entanglement preparation](#)

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