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量子光学

Stark位移对混态J-C模型中熵和纠缠的影响

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摘要：

考虑一个二能级原子与单模热光场经由双光子过程耦合，采用量子约化熵研究了原子和场的约化熵变化规律，用共生纠缠度(Concurrence)研究了原子与场之间的纠缠演化。借助于数值计算方法，详细分析了在混态J-C模型中，Stark位移和平均光子数对约化熵变和纠缠的影响。结果表明在Stark位移影响下，原子和光场的约化熵变化量均减小。选择适当的原子初态，可以使得原子的约化熵和光场的约化熵发生交换。此外，考虑Stark位移时，原子与光场之间纠缠的最小值增大，原子与光场不再出现退纠缠态。

关键词： 量子光学 纠缠 共生纠缠度 量子约化熵 Stark位移 Jaynes-Cummings模型

Influence of Stark shift on entropy and entanglement in J-C model with mixed states

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Abstract:

A two-level atom coupling with a single-mode thermal ?eld through two-photon processes is considered. It is studied that the reduced entropy change of the atom and the ?eld by using quantum reduced entropy, and entanglement between the atom and field measured by using Concurrence. By mean of numerical computation method, The e?ect of the Stark shift and the mean photon number in the J-C model with mixed states on the reduced entropy change and entanglement is investigated. The results show that reduced entropy changes of the atom and the ?eld decrease under the influence of the Stark shift. When the initial parameters are suitable, the complete exchange between the atomic and field reduced entropy occurs. In addition, the minimum values of the entanglement raise in the presence of the Stark shift, which means that the atom is no longer disentangled from the field.

Keywords: quantum optics entanglement concurrence reduced entropy Stark shift Jaynes-Cummings model

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