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Information entropy of many atoms with nanoresonators

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In this communication, we discuss different aspects of information entropy and its application as an indicator of the quantum entanglement. We focus on the dynamics of multi-atom systems coupled to a nanomechanical resonator under influence of both a phonon bath in contact with the resonator and irreversible decay of the qubits. Even in the presence of environment, the inherent entanglement is found to be rather robust. Due to this fact, together with control of system parameters, the system may therefore be especially suited for quantum computer. Our findings also shed light on the evolution of open quantum many-body systems.

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Analysis of self-healing mechanism in asymmetric beams

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Recent studies have shown that an asymmetric Bessel beam, similar to conventional Bessel beam, recover their original intensity profile after encountering an obstruction. Here, we investigate the ability of an asymmetric Bessel beam mode to recover their original intensity profile when it is perturbed by an obstruction and additionally drastically perturbed by a pattern of light generated by an appropriate annular obstruction, regardless the asymmetry degree of the mode neither the orientation of optical crescent. An obstruction placed in the path of asymmetric Bessel beam introduces an optical loss, then a series of plane waves with different amplitude that bypass the obstruction will again interfere to form an asymmetric Bessel beam. However, an optic field induced by the annular obstruction entangle the asymmetric optic field. The analysis of this effect not had even been analyzed. The purpose of the present paper is to study the mechanical properties of asymmetric Bessel beams within the general formalism of quantum optics. These results may be useful for quantum key distribution.

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