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Non-Markovian entanglement dynamics of open quantum system with continuous measurement feedback

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In the past two decades, entanglement has attracted much attention continuously for its potential use as the key resource of quantum computation and quantum information. Due to decoherence of a system coupling to its environment or bath, entanglement degradation is unavoidable. In this work we investigate the entanglement dynamics of two identical two-state quantum systems coupling to a bosonic mode and a common structured bath. Here the bosonic mode, which is resonantly driven by a classical filed and heavily damped broadband reservoir, acts as a probe resonator for the use of continuous quantum measurement feedback, and the bath composes of continuous harmonic oscillators that has one of three different structures characterized by the Ohmic types of spectral densities. We proceed by using hierarchical equations of motion (HEOM) approach. We present the master equation of the reduced density matrix for the system interested and, accordingly, the HEOM for auxiliary operators. We illustrate the equivalence between the H-order HEOM approach and the 2H-order perturbation theory. The HEOM calculation shows that the quantum measurement feedback plays a positive role in the entanglement generation, and the non-Markovian effect of the bath could greatly enhances this action, increasing the entanglement by 33% in the case of, the Ohmic bath. We reveal in detail the dependence of the scheme performance on the spectral density parameters, the temperature of the bath, and the measurement feedback. The numerical results are obtained with the HEOM truncated at the 3rd order, which are equal to those obtained with the 6th order perturbation theory.

Biography

Guo Jian Yang pursued his graduation from Central South University, P R China; Bachelor's Degree in Electronic Information Engineering. He is currently a PhD student in the Department of Physics at the Beijing Normal University, P R China. His research field of interest lies in non-Markovian effects in quantum optical systems.

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