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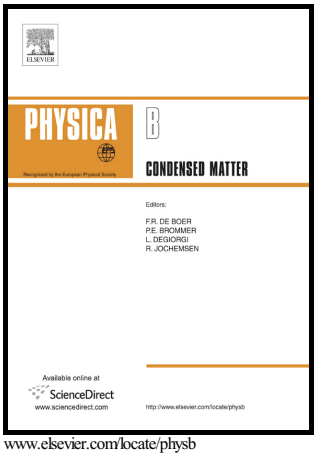

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Decoherence and tripartite entanglement dynamics in the presence of Gaussian and non-Gaussian classical noise

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Abstract

We address the entanglement dynamics of a three-qubit system interacting with a classical fluctuating environment described either by a Gaussian or non-Gaussian noise in three different configurations namely: common, independent and mixed environments. Specifically, we focus on the Ornstein-Uhlenbeck (OU) noise and the random telegraph noise (RTN). The qubits are prepared in a state composed of a Greenberger-Horne-Zeilinger (GHZ) and a W state. With the help of the tripartite negativity, we show that the entanglement evolution is not only affected by the type of system-environment coupling but also by the kind and the memory properties of the considered noise. We also compared the dynamics induced by the two kinds of noise and we find that even if both noises have a Lorentzian spectrum, the effects of the OU noise cannot be in a simple way deduced from those of the RTN and vice-versa. In addition, we show that the entanglement can be indefinitely preserved when the qubits are coupled to the environmental noise in a common environment (CE). Finally, the presence or absence of peculiar phenomena such as entanglement revivals (ER) and entanglement sudden death (ESD) is observed.

Key words: Environmental noise, Entanglement, Qubit.

1. Introduction

Quantum entanglement, as one of the most fascinating fundamental property of quantum systems [1], has been found as a basic resource for many potential applications in quantum information processing (QIP)[2, 3, 4] and technology

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