

Maximizing information flow between coupled qubits under dissipation

Cristian E. Susa,¹ John H. Reina,¹ and Felipe Fanchini²

¹*Departamento de Física, Universidad del Valle, A.A. 25360, Cali, Colombia*

²*Departamento de Física, Faculdade de Ciências, UNESP, Bauru, SP, CEP 17033-360, Brazil*

(Dated: April 7, 2013)

Quantum entanglement and, in general, quantum properties of physical systems have been studied for many years as important resources for quantum processing tasks and quantum information protocols. In this work, we study the information flow (as quantified by discord and entanglement of formation) in an optically-driven bipartite qubit system (quantum emitters) coupled to a common dissipative environment. While the correlations between qubit systems have been widely studied in the literature, our interest is to gain information about how each emitter is correlated to the environment. To this end, we use a monogamic relation which allows us to calculate the emitter-environment correlations without any prior knowledge about the state of the environment at any time. We analyze the behavior of these correlations in terms of the inner properties of the emitters and the control parameters of the laser field. We show that a broader study involving the information flow between the qubits and the environment gives new insights into the dynamics of the interqubit quantum correlations. These aspects increase our knowledge of the usefulness of the dissipative environment, and lead us to identify how to maximize the distribution of correlations between the qubits.

Keywords: Quantum entanglement, discord, information, decoherence.

Modality: Oral

E-mail: cristian.susa.q@correounivalle.edu.co