Review of: "Correlated noise enhances coherence and fidelity in coupled qubits"

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Potential competing interests: No potential competing interests to declare.

Moving from theory of quantum information and communication to its applications, serious limitations are encountered in terms of efficiency. One of main obstacle is got by the phenomena of information degrading due to interaction with the environment. This phenomenon can be counteracted through targeted engineering of the materials used to transmit information.

In the present article the authors face with this problem by examining the role of noise correlation, with particular reference to the efficiency of super-dense coding protocols. They consider a system of two spatially separated qubits coupled together by a static dipole-dipole interaction and coupled to environment. Each of the qubits is driven by locally correlated fields, and authors show that this allows tuning the local noise correlation by suitably manipulating the local environment around them. Authors examine the effect of cross-correlation by computing the linear absorption spectrum of the system for a suitable choice of parameters, and show how the dynamics and spectroscopy of the system can be profoundly affected by environmental correlations by studying the behavior of purity and fidelity. On the basis of this analysis, they suggest that, by knowing whether the state is subject to correlated or anticorrelated noise, sender A and receiver B can make sure that their shared resource state can maintain its purity long enough for the information to be communicated.

The article is very appreciable and is very well written. Its results are original and can provide very useful tools for the efficient realizations of quantum information protocols.

Therefore, I recommend it for publication.