Abstract Submitted
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Spectroscopy of cross-correlations of environmental noises with two qubits[1] LUKASZ CYWINSKI, Institute of Physics, Polish Academy of Sciences, PIOTR SZANKOWSKI, MAREK TRIPPENBACH, Faculty of Physics, University of Warsaw, — A single qubit driven by an appropriate sequence of control pulses can serve as a spectrometer of local noise affecting its energy splitting. We show that by driving and observing two spatially separated qubits, it is possible to reconstruct the spectrum of cross-correlations of noises acting at various locations. When the qubits are driven by the same sequence of pulses, real part of cross-correlation spectrum can be reconstructed, while applying two distinct sequence to the two qubits allows for reconstruction of imaginary part of this spectrum [1]. The latter quantity contains information on either causal correlations between environmental dynamics at distinct locations, or on the occurrence of propagation of noisy signals through the environment. While entanglement between the qubits is not necessary, its presence enhances the signal from which the spectroscopic information is reconstructed. [1] P. Szankowski, M. Trippenbach, and L. Cywinski, arXiv:1507.03897.

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