Stochastic antiresonance in qubit phase estimation with quantum thermal noise

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Résumé en anglais	We consider the fundamental quantum information processing task consisting in estimating the phase of a qubit. Following quantum measurement, the estimation performance is evaluated by the classical Fisher information which determines the best performance limiting any estimator and achievable by the maximum likelihood estimator. Estimation is analyzed in the presence of decoherence represented by a quantum thermal noise at arbitrary temperature. As the noise temperature is increased, we show the possibility of nontrivial behaviors of decoherence, with an estimation performance which does not necessarily degrade uniformly, but can experience nonmonotonic evolutions. Regimes are found where higher noise temperatures turn more favorable to estimation. Such behaviors are related to stochastic resonance or antiresonance effects, where noise reveals beneficial to information processing.
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[9] http://okina.univ-angers.fr/publications/ua16049
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