



## Entanglement-assisted quantum parameter estimation from a noisy qubit pair: A Fisher information analysis

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Mots-clés	Entanglement [2], Quantum estimation [3], Quantum Fisher information [4], Quantum information [5], Quantum noise [6]
Résumé en anglais	<p>Benefit from entanglement in quantum parameter estimation in the presence of noise or decoherence is investigated, with the quantum Fisher information to assess the performance. When an input probe experiences any (noisy) transformation introducing the parameter dependence, the performance is always maximized by a pure probe. As a generic estimation task, for estimating the phase of a unitary transformation on a qubit affected by depolarizing noise, the optimal separable probe and its performance are characterized as a function of the level of noise. By entangling qubits in pairs, enhancements of performance over that of the optimal separable probe are quantified, in various settings of the entangled pair. In particular, in the presence of the noise, enhancement over the performance of the one-qubit optimal probe can always be obtained with a second entangled qubit although never interacting with the process to be estimated. Also, enhancement over the performance of the two-qubit optimal separable probe can always be achieved by a two-qubit entangled probe, either partially or maximally entangled depending on the level of the depolarizing noise.</p>
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- [1] <http://okina.univ-angers.fr/f.chapeau/publications>
- [2] <http://okina.univ-angers.fr/publications?f%5Bkeyword%5D=22605>
- [3] <http://okina.univ-angers.fr/publications?f%5Bkeyword%5D=22603>
- [4] <http://okina.univ-angers.fr/publications?f%5Bkeyword%5D=22604>
- [5] <http://okina.univ-angers.fr/publications?f%5Bkeyword%5D=22606>
- [6] <http://okina.univ-angers.fr/publications?f%5Bkeyword%5D=21130>
- [7] <http://okina.univ-angers.fr/publications/ua15761>
- [8] <http://dx.doi.org/10.1016/j.physleta.2017.02.037>
- [9] <http://www.sciencedirect.com/science/article/pii/S0375960117301858>

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