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Does a good quantum tomography bring a good quantum metrology?

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This study is concerned with the investigation of the continuity of Quantum Fisher Information (QFI) between two states, one experimentally generated , σ=(σ,∂_x σ), and one theoretically derived, ρ=(ρ,∂_x ρ), in different systems such as qubits, exponential density matrices and noise-free quantum dynamics [1, 2, 3, 4].
In quantum parameter estimation, the QFI exhibits universal continuity, where neighboring states with similar derivatives have nearly equal QFIs [1, 5, 6]. This property, independent of the dynamics or the form of parameter detection, extends the classical Fisher information concept to density matrices [7, 8, 9].
The investigation aims at determining the minimum error and defining the lower bound for ΔF^Q=|F^Q (ρ)-F^Q (σ)|. Calculations of the relative error are discussed, ranging from Δ_min to Δ_max indicating that if the ΔF^Q values are close to each other, the relative error has been adequately accounted for in the experimental calculations; otherwise, recalibration may be required [1, 10].
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Abstract category

Quantum Simulations

Primary author: Dr EBRAHIMI ASLMAMAGHANI, Samira (university of palermo)

Co-authors: Prof. REZAKHANI, Ali (Sharif University of Technology); Dr ALIPOUR, Sahar (QTF Center of Excellence,Department of Applied Physics, Aalto University, FI-00076 Aalto, Finland); Prof. LIVRERI, Patrizia (university of palermo)

Presenter: Dr EBRAHIMI ASLMAMAGHANI, Samira (university of palermo)

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