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# How quantum correlations help us improve the precision and efficiency of quantum metrology protocols?

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In the last decade, quantum signals and detectors carved out a place for themselves in mainstream technology. Characterization of those devices at the quantum level is thus a crucial ingredient for the development of quantum technologies. Quantum metrology, on the other hand, is the art of estimating the value of one or more parameters of interest. Recently, it has been shown that the quantum Fisher information via local observables and via local measurements (i.e., local quantum Fisher information (LQFI)) is a central concept in quantum estimation and quantum metrology and captures the quantumness of correlations in the multi-component quantum system. This new discord-like measure is very similar to the quantum correlations measure called local quantum uncertainty (LQU). In the present study, we have revealed that LQU is bounded by LQFI in the phase estimation protocol. Also, a comparative study between these two quantum correlations quantifiers is addressed for the quantum Heisenberg XY model. Two distinct situations are considered. The first one concerns the anisotropic XY model and the second situation concerns isotropic XY model submitted to an external magnetic field. Our results confirm that LQFI reveals more quantum correlations than LQU.

Ref: A. Slaoui,L. Bakmou,M. Daoud and R.A. Laamara, A comparative study of local quantum Fisher information and local quantum uncertainty in Heisenberg XY model. Physics Letters A, 383 (2019) 2241-2247.

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