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Activation of metrologically useful genuine multipartite entanglement

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In quantum metrology, the usefulness of a quantum state is determined by how much it outperforms separable states. For the maximal metrological usefulness genuine multipartite entanglement (GME) is required. In order to improve the usefulness of a quantum state we consider a scheme of having several of its copies. With this scheme, it is possible to find a large class of practically important entangled states that can achieve maximal metrological performance in the limit of many copies, whereas in the single copy case these states can even be non-useful. Thus, we essentially activate quantum metrologically useful GME. Moreover, this maximal usefulness is attained exponentially fast with the number of copies and it can be achieved by measurements of simple correlation observables. We also give examples of improving the usefulness outside of the above mentioned class.

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