

# Detecting nonlocality in many-body quantum states

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Numerous studies have been carried out regarding entanglement of many-body quantum systems particles, since it proves to be a fundamental key aspect to understanding their properties. However, very little work has been done concerning the nonlocality of these systems, simply because the known Bell inequalities involve correlations among many parties which are out of reach within the current experimental technology. As a consequence, nonlocality of many-body quantum systems cannot be tested experimentally.

In their work, Tura and co-workers designed classes of multipartite Bell inequalities constructed from the easiest-to-measure quantities, the two-body correlators. These inequalities are, nevertheless, capable of revealing the nonlocality properties of many-body quantum states, in particular those relevant for nuclear and atomic physics. In addition, the inequalities proposed by this study, can be verified by measuring the total spin components of the particles, which opens a new window to experimental detection of many-body nonlocality in physical systems in which individual particles cannot be addressed.

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