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Steering, entanglement, nonlocality, and the Einstein-Podolsky-Rosen paradox. (English)

Zbl 1228.81078

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Summary: The concept of steering was introduced by Schrödinger in 1935 as a generalization of the Einstein-Podolsky-Rosen paradox for arbitrary pure bipartite entangled states and arbitrary measurements by one party. Until now, it has never been rigorously defined, so it has not been known (for example) what mixed states are steerable (that is, can be used to exhibit steering). We provide an operational definition, from which we prove (by considering Werner states and isotropic states) that steerable states form a strict subset of the entangled states, and a strict superset of the states that can exhibit Bell nonlocality. For arbitrary bipartite Gaussian states we derive a linear matrix inequality that decides the question of steerability via Gaussian measurements, and we relate this to the original Einstein-Podolsky-Rosen paradox.

MSC:

81P15 Quantum measurement theory, state operations, state preparations

81P40 Quantum coherence, entanglement, quantum correlations

Cited in **2** Reviews
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