

Chen, Libing; Lu, Hong

A simplified quantum logic network for unambiguous discrimination of two nonlocal and unknown pure qubit states. (English) [Zbl 1209.81055](#)

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Summary: Two nonlocal and unknown pure qubit states can, with a certain probability of success, be discriminated unambiguously with the aid of local operations, classical communication, and shared entanglements (LOCCSE). We present a scheme for such kind of nonlocal unambiguous quantum state discrimination. This scheme consists of a nonlocal positive operator valued measurement (POVM). This nonlocal POVM can be realized by performing nonlocal unitary operations on initial system and ancillary qubits, and local von Neumann projective measurements on the ancilla plus initial system. By utilizing the degrees of freedom of the original system Hilbert space, we need far more simpler operations than those required by the original Neumark approach. We construct a quantum logic network to implement the required nonlocal POVM.

MSC:

- 81P50 Quantum state estimation, approximate cloning
- 81P40 Quantum coherence, entanglement, quantum correlations
- 81P15 Quantum measurement theory, state operations, state preparations
- 28B05 Vector-valued set functions, measures and integrals
- 46G10 Vector-valued measures and integration
- 47H07 Monotone and positive operators on ordered Banach spaces or other ordered topological vector spaces

Keywords:

entanglement; nonlocal and unknown pure quantum states; unambiguous quantum state discrimination; positive operator valued measure

Full Text: [DOI](#)

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