

The fully entangled fraction as an inclusive measure of entanglement applications

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LANL Quantum Information Workshop
December 9, 2002

Entanglement

Entanglement is related to purely quantum correlations.

- Pure states.

$$|\square\rangle \neq |\square_A\rangle |\square_B\rangle$$

- Mixed states.

$$\square \neq \sum_i w_i (\square_A \square_B)_i$$



Quantum Institute Workshop

Quantum Institute Briefing Center; December 9–10, 2002

Fully Entangled Fraction

The fully entangled fraction is related to a quantum state's ability to dense code, teleport, entanglement swap, etc...

$$FEF = \max_{\hat{U}} \left\{ \langle \Phi | (\hat{U} \otimes \hat{U}) | \Phi \rangle \right\}$$

where $|\Phi\rangle$ is maximally entangled.



Future Research

- A closed form expression for the fully entangled fraction for general 2x2 states and dxd pure states is known, try to extend this to dxd mixed states.
- Explore the relationship between the fully entangled fraction and completely positive maps.
- How does the fidelity of the Shor algorithm relate to the fully entangled fraction?



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