Quinta Escuela de Física Matemática
The Mathematics of Entanglement
Universidad de los Andes
Mayo 27 al 31 de 2013

Homothety of entanglement in Grover's quantum algorithm

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Abstract

Entanglement represents an important factor in the speed-up of quantum computational processes [1-4]. Recently, it is of interest to analyze the function of multipartite entanglement in quantum algorithms. On the other hand, it was shown that multipartite entangled states are used in the first phase of the Grover's quantum search algorithm[5]. In this work, we show the behavior of entanglement in this algorithm, computing it through GME (Geometric Measure of Entanglement). Then, we demonstrate that behavior of any type of entanglement is independient of the quantity q of qubits for large q, thus showing a homothetic transformation. Finally, we compare this outcome with the one obtained by a fixed-point quantum algorithm and we propose some guidelines for efficient simulation in the context of this quantum algorithm.

References

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