Quantum Algorithms

We design novel quantum algorithms for quantum computation, quantum simulation and quantum annealing. These new algorithms are specifically aimed for small-sized quantum processors that do not require error correcting protocols.

Summary

New small size quantum computers are coming to age. A relevant example is the IBM Quantum Experience which is accessible on the cloud. The use of such a machine brings the possibility of exploring new quantum algorithms.

There are two main lines of research in quantum algorithmia. A first possibility is to use pure quantum logic based on gates that build circuits. The fact that the readout of a quantum machine is non-deterministic brings an element of difficulty to the construction of quantum algorithms and its application to real problems. A second possibility consists in dropping the quantum circuit philosophy in favor of a quantum annealing strategy. This second solution makes feasible attacking optimization problems, which are relevant for different industries.

Objectives

The focus of Quantic on quantum algorithms can be summarized as follows:

1) Develop strategies to exploit small and medium size quantum computers
2) Adapt realistic problems to quantum annealing
3) Develop a quantum operating system to run a small quantum device

For more information, visit our group website http://quantic.bsc.es

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