A SINGLE-ION STOCHASTIC QUANTUM PROCESSOR

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Abstract

We propose a scheme for implementing a single-ion Stochastic Quantum Processor using a single cold trapped ion. The processor implements an arbitrary rotation around the z axis of the Bloch sphere of a *data qubit*, given two *program qubits*, that is, the operation realized on the data is determined by using different program qubits and not by varying the gate itself. Unfortunately this cannot be done deterministically, and must be necessarily stochastic. In this proposal the operation is applied successfully with probability p = 3/4.