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QUANTUM COMPUTING FOR DEEP SPACE PHYSICS APPLICATIONS

Abstract

Quantum computers can be realized by three different architectures, namely the gate model, the adiabatic, and the one-way quantum computing architectures, respectively. Each one can be exploited, instead of running a quantum algorithm, as a powerful simulator of some physical processes. We review all the possible existing and potential use of a quantum computer to simulate relevant physical processes, from nuclear reactions, to materials, to quantum gravity models, in the perspective of applying to deep space physics applications. We highlight the potential quantum advantage in the different cases and we explain how each quantum computing architecture may act as quantum simulator.