

Quantum Simulation and Computation

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Quantum computers and quantum simulators are computational devices the constituents of which are single atoms, ions, or other physical systems following quantum mechanical laws. The observation that a radically different physical theory compared to classical mechanics is at work might suggest different computational capabilities arising from such an architecture. In fact, such devices could solve some problems that are intractable on conventional supercomputers. Partially stimulated by a new impetus by research effort of US IT companies and the Flagship effort of the European Union, the idea of quantum computing and simulation - anyway only a bit more than two decades old - has gained much momentum recently. While quantum computers are so far still anticipated devices, quantum simulators exist to an extent. This talk will provide a brief introduction to the field, and argues in what way existing quantum simulators may already be seen as machines that (in a mild sense) outperform supercomputers.