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Static Quantum Circuits

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Abstract

The circuit model of quantum computation is very similar to the classical model of computation. In the same way that the elementary classical gates like AND, OR and NOT can be joined in various ways to implement any Boolean function on n bits, in quantum circuits, every unitary quantum operator can be implemented by joining a set of unitary gates. However the similarity stops here and indeed a quantum circuit, unlike the classical circuits, is not a static hardware template, it is more or less the same as the quantum algorithm itself and a great deal of external control should be applied in time in order to run this circuit. In this talk, a static quantum circuit, completely analogous to classical circuits, will be introduced. XY Heisenberg spin chains with local interactions will be used to implement universal quantum computation.