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Duality quantum computing and its application

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Duality quantum computing is a new mode of a quantum computer that admits linear combinations of unitaries. Duality quantum computing can realize an arbitrary sum of unitaries and therefore a general quantum operator, which is called a generalized quantum gate. All linear bounded operators can be realized by the generalized quantum gates, and unitary operators are just the extreme points of the set of generalized quantum gates. Duality quantum computing provides flexibility and a clear physical picture in designing quantum algorithms, and serves as a powerful bridge between quantum and classical algorithms. Thus there are many applications in duality quantum computing, such as solving linear equations, simulating open quantum system, simulating quantum channels and so on. Recently, we present a quantum algorithm to probabilistically perform the creation and annihilation operators via duality quantum computing.

Biography

Xiangyu Kong is a PhD candidate at Tsinghua University from Guilu Long group. His research area is duality quantum computing and NMR quantum information processing.

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