



Co-creation of future society using quantum computers

Division of System Science and Applied Informatics, Graduate School of Engineering Science

Professor Keisuke Fujii



Researchmap <https://researchmap.jp/7000009401/>

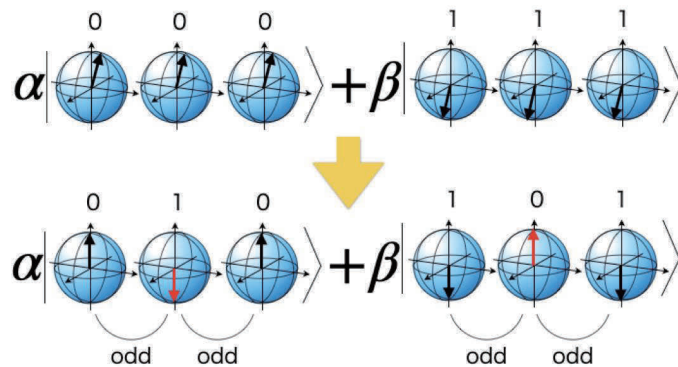
Abstract

Quantum computers are the next generation of computers based on the principles of quantum mechanics, which have been studied for a long time since the principles were first proposed in the 1980s. However, since Google's entry into device development in 2014, research and development has been conducted globally as a unique opportunity to fundamentally rework computers. In the long term, we are working on the realization of large-scale fault-tolerant quantum computers with quantum error correction. In the near future, we are exploring applications of quantum computers of the scale currently realized in the fields of AI and finance, as well as materials and chemistry.

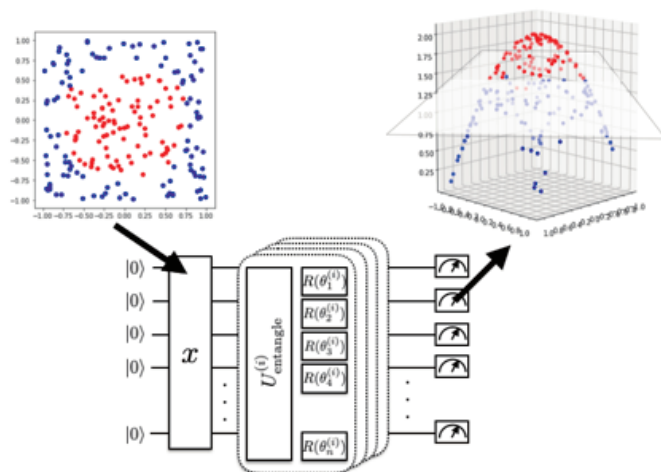
Significance of the research and Future perspective

Our natural world is entirely described by quantum mechanics at the microscopic scale. The realization of a quantum computer based on the principles of quantum mechanics is expected to be a powerful tool for opening up the frontiers of science and technology in the future. In the field of chemistry, which is expected to lead to the solution of global problems such as energy and global warming, quantum computers are expected to play an active role in the development of new catalysts and in the understanding of the mechanisms of photosynthesis and other processes that the natural world has developed over many years.

Quantum error correcting codes



Quantum error correction



Application of quantum computers to machine learning

Telecommunications