Invited speaker

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Early FTQC : closing the gap between NISQ and FTQC

Abstract

Quantum computers with tens to hundreds of qubits have been realized on various platforms, including superconducting qubits, ion traps, and cold neutral atoms. These quantum computers, known as Noisy Intermediate-Scale Quantum Computers (NISQ), are already in use for scientific purpose to explore complex quantum dynamics. However, to perform large-scale computations such as factoring or quantum chemistry calculations with guaranteed accuracy, fault-tolerant quantum computation with quantum error correction is necessary. It is estimated that a fault-tolerant quantum computer would require around one million qubits, which is four orders of magnitude more than the current scale of quantum computers. In this research, we introduce the early FTQC approach that partially employs error correction to bridge the gap between NISQ and FTQC. We show the resources required to solve practically important problems.

References

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About the Speaker

Keisuke Fujii received the Ph.D. degree in Engineering at Kyoto University (2011). He concurrently serves as Deputy Director of QIQB at Osaka University and Team Leader of RIKEN Center for Quantum Computing. His research interests focus on quantum computing, quantum error correction, quantum algorithm and quantum computational complexity. He received the Osaka University Award (2020), NISTEP Award (2020), JSPS Prize (2022), and Osaka University Distinguished Professor (2022).