

MERIT Internship Report

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Outline of Internship

- Period
January 11th, 2022 – February 18th, 2022
- Place
Applied Materials Technology Center, Technology Division, Panasonic Corporation
- Theme
Enhancement of Quantum Computing Program for Electronic State Calculation

Contents

Quantum computers are expected to be able to solve problems that are difficult to handle with conventional classical computers through quantum mechanical superposition. Quantum computation algorithms are classified into two types: "long-term algorithms," which require a quantum computer with fault tolerance, and "NISQ algorithms," which perform calculations on a quantum computer without fault tolerance and are expected to be put to practical use shortly.

In this internship, to apply quantum computers to materials simulation, we studied the reduction of the number of required qubits and the improvement of calculation accuracy for both the long-term algorithm and the NISQ algorithm.

Impression

I had learned about quantum computation in university lectures, but this internship not only allowed me to take a fresh look at quantum computation from the perspective of materials development but also to experience corporate research firsthand. I had a valuable opportunity to explain my research in front of non-researchers such as human resources staff at the final debriefing session, which was very informative.

In addition to quantum computation, I was able to hear about the front lines of various fields, such as materials informatics, which broadened my perspective.

Acknowledgement

I would like to express my sincere appreciation to the internship host, Panasonic Corporation. Especially, I would like to thank the quantum computing team for accepting me.

I would also like to thank Prof. Shiomi, Prof. Arita, the MERIT office, and MP-CoMS for agreeing to this internship.