

革新的な量子情報処理技術基盤の創出
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Numerical Methods for Studying Real-World Quantum Devices

§ 1. 研究成果の概要

In fiscal year 2020 I continued my research into developing methods to study the effect of noise in quantum computers, along with ways to overcome it. The results produced in the year 2020 are focused on improving quantum error correction.

In one work I proposed a new architecture for quantum error correction in which a new quantum error correcting code, called the XZZX code, is paired with a particular physical qubit, called the Kerr cat qubit. This particular pairing achieves exceptional performance. A preprint of this work has been uploaded to the arXiv.

In another work we found that the power of quantum error correction can be substantially improved by adapting the classical control software, namely the decoding algorithm, to the noise.

【代表的な原著論文情報】

1) Andrew S. Darmawan, Benjamin J. Brown, Arne L. Grimsmo, David K. Tuckett, and Shruti Puri, “Practical quantum error correction with the XZZX code and Kerr-cat qubits”, arXiv:2104.09539