

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

This year we made progress on several methods to study the effects of noise in quantum computers as well as proposed methods to protect fragile quantum information from noise.

We proposed a new architecture for quantum computing that is highly resilient to noise. In published work, we showed that the scheme is highly robust to noise (1), and allows certain operations to be performed with lower overhead than typical schemes (2).

In a paper that will be published soon, we also demonstrated a numerical method to determine what kind of information about noise can be used to perform error correction more efficiently.

【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“, PRX Quantum 2, 030345, 2021.
- 2) Shraddha Singh, Andrew S. Darmawan, Benjamin J. Brown, and Shruti Puri. “High-fidelity magic-state preparation with a biased-noise architecture“, Phys. Rev. A 105, 052410, 2022.