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NTU Q

UPCOMING EVENTS

Road to Quantum Utility Workshop 2025: Using quantum devices with more than 100 qubits

Date: January 21–22, 2025 (Tuesday and Wednesday)

Location: Yang Jin-Bao Lecture Hall (Room 104), Center for Condensed Matter Sciences and New Physics Building, National Taiwan University

Register date: 4:00 PM on January 13, 2025 (Monday) (Registration link)

Event Link(English)

Event Link(中文)

HIGHLIGHTING NEWS

QUANTUM COMPUTING, INC. HAD CONTRACT WITH NASA TO SUPPORT PHASE UNWRAPPING USING DIRAC-3 PHOTONIC OPTIMIZATION SOLVER

Quantum Computing Company (QCi) recently announced they are going to cooperate with the National Aeronautics and Space Administration's (NASA) Goddard Space Flight Center by applying its entropy quantum optimization machine, Dirac-3, to support NASA's advanced imaging and data processing demands.

They planed to apply Dirac-3 to address the phase unwrapping problem for reconstructing images and extracting information from interferometric data generated by the radars. QCi believes this project will highlight Dirac-3's capabilities in providing superior solutions to non-deterministic polynomial time hard (NP-hard) problems.

This cooperation shows the advance of next-generation quantum and photonic technologies to tackle complex optimization and computational challenges.

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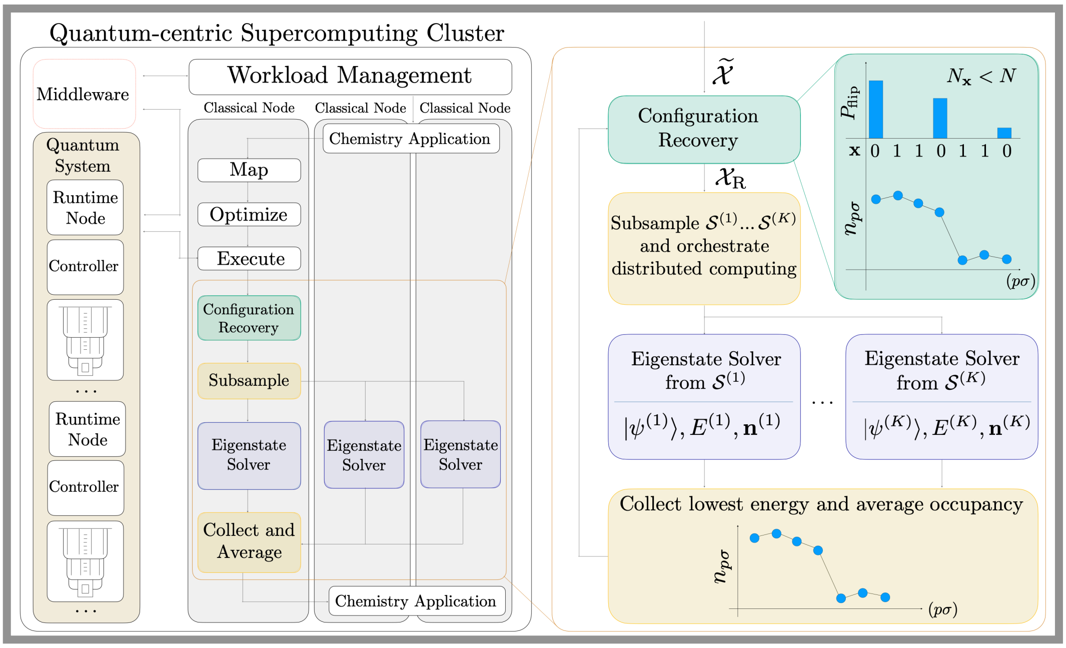
SAMPLE-BASED QUANTUM DIAGONALIZATION

This paper demonstrates how to approximate problems that their sizes are beyond the ability of state-of-art computer to exactly diagonalize it. This paper features by the bellowing methods: quantum core computation structure, Local Unitary Cluster Jastrow (LUCJ) ansatz, and Sample-Based Quantum Diagonalization (SQD). We will focus on intruding SQD in this article.



SQD is a hybrid quantum-classical workflow designed to approximate molecular eigenstates and ground-state energies for quantum chemistry problems. It addresses the limitations of pre-fault-tolerant quantum processors, particularly noise and circuit depth constraints, by leveraging classical distributed computing to enhance quantum measurement outcomes.

In SQD, noisy quantum samples are processed through a **configuration recovery routine**, which corrects errors in particle number and improves signal quality. The recovered configurations are used to construct subspaces for projecting and diagonalizing the Hamiltonian, yielding approximate eigenstates. The process iteratively refines the results until convergence, ensuring robust performance even under noisy conditions.

READMORE (Paper)
READMORE (Tool)

計畫補助單位： NSTC 國家科學及技術委員會 National Science and Technology Council

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