

Your Quantum Computing Innovation Partner

Quantum Innovation Update

 April 2025

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NERSC / LBNL Collaboration

The screenshot shows the NERSC website header with the logo and tagline "Powering Scientific Discovery for 50 Years". The navigation menu includes HOME, ABOUT, SCIENCE, SYSTEMS, FOR USERS, NEWS (highlighted), R & D, EVENTS, and LIVE STATUS. A search bar is located in the top right. The article title is "COLLABORATION EXPLORING NEUTRAL ATOM TECHNOLOGY EXPANDED FOR SECOND YEAR" in large green letters. The date is "SEPTEMBER 4, 2024" and the author is "By Elizabeth Ball". The contact information is "Contact: cscomms@lbl.gov". The main text reads: "In the past year, the National Energy Research Scientific Computing Center (NERSC) has teamed up with the Boston-based quantum computing company **QuEra Computing**, exploring one up-and-coming approach to quantum computing known as neutral-atom technology. After a successful first year punctuated with strong scientific results, the partnership has been extended, with plans to offer neutral-atom quantum computing access to some users in the coming year." Below the text is a photograph of a quantum computing setup. A caption below the photo states: "NERSC's partnership with QuEra Computing has afforded the NERSC quantum team access to Aquilla, QuEra's neutral atom quantum".

“We thought it was a space where we could innovate and learn more about this up-and-coming technology, and that proved to be a good decision given what's happened over the last year,” said NERSC quantum computing engineer Katie Klymko. “Our collaboration with them has been very successful.”

Pawsey Supercomputer Centre Collaboration

Active projects:

1. Quantum walks over blockaded subspaces
2. Biomarker-driven analysis of lung function with a quantum machine learning
3. High-performance emulator on Setonix
4. Direct access



Moody's Collaboration – Weather Forecasting

“Comprehensive models of climate systems are very costly to run....On the other hand, [quantum] reservoir computing possesses a set of unique characteristics that are appealing for building climate surrogate models.”

Ricardo Garcia, quantum computer engineer, Moody's Analytics.



Los Alamos National Lab Collaboration

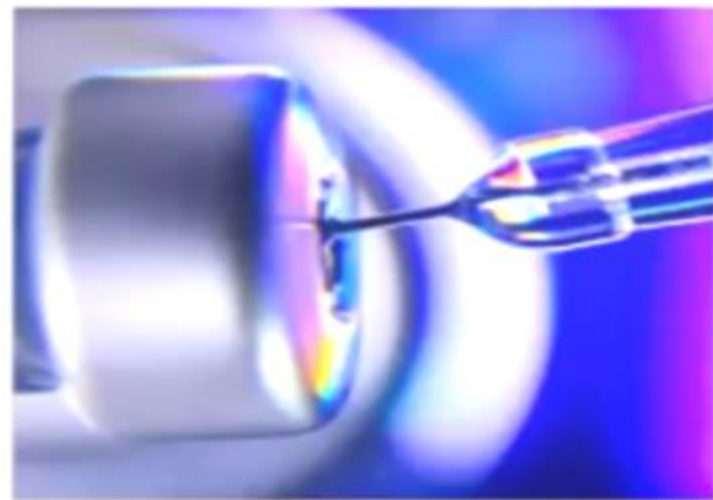
“Los Alamos National Lab's NNSA-funded Advanced Simulation and Computing (ASC) program has worked to push forward the state-of-the-art in quantum computing for many years,” says Andrew Sornborger, a staff scientist and project lead of the LANL ASC quantum portfolio. “**Today, we are at a tipping point**, where qubit fidelities make first-generation fault-tolerant quantum simulations feasible. Our co-design work with QuEra to use their neutral atom quantum computer to study problems in nuclear dynamics is a significant investment that we have made to bring the field of quantum computing through this tipping point.”

Merck, Amgen, Deloitte Collaboration – Drug Discovery

Drug Discovery Prediction with Quantum Reservoir Computing

Objective

Regression Prediction



Predict regression scores for drug characteristics across multiple runs of data using the Merck activity challenge data.

Approach

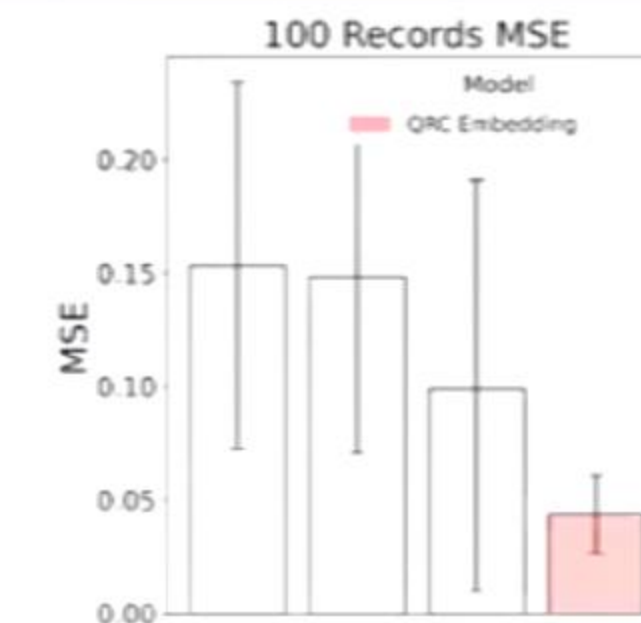
Quantum Reservoir Computing Regression



We analyzed molecular features and transformed them by mapping them into the Rydberg atoms, thus changing the data structure into higher dimensions with distinctive structures.

Results

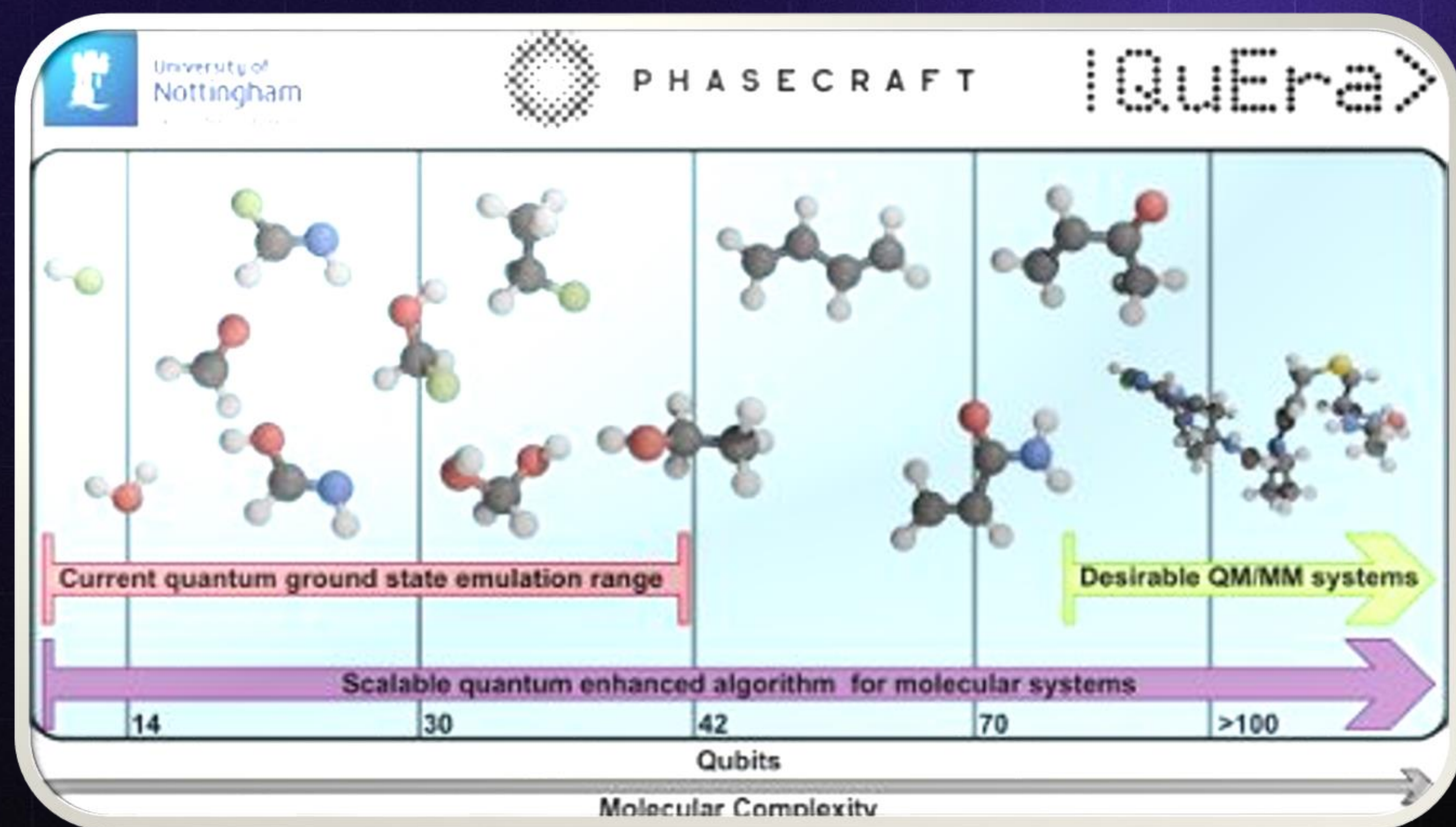
Better results at small sample size



For record sizes of 100 and 200, QRC regression prediction performed better than classical models across multiple subsamples of data. QRC embedded data outperformed classical and classical kernel embedded data.

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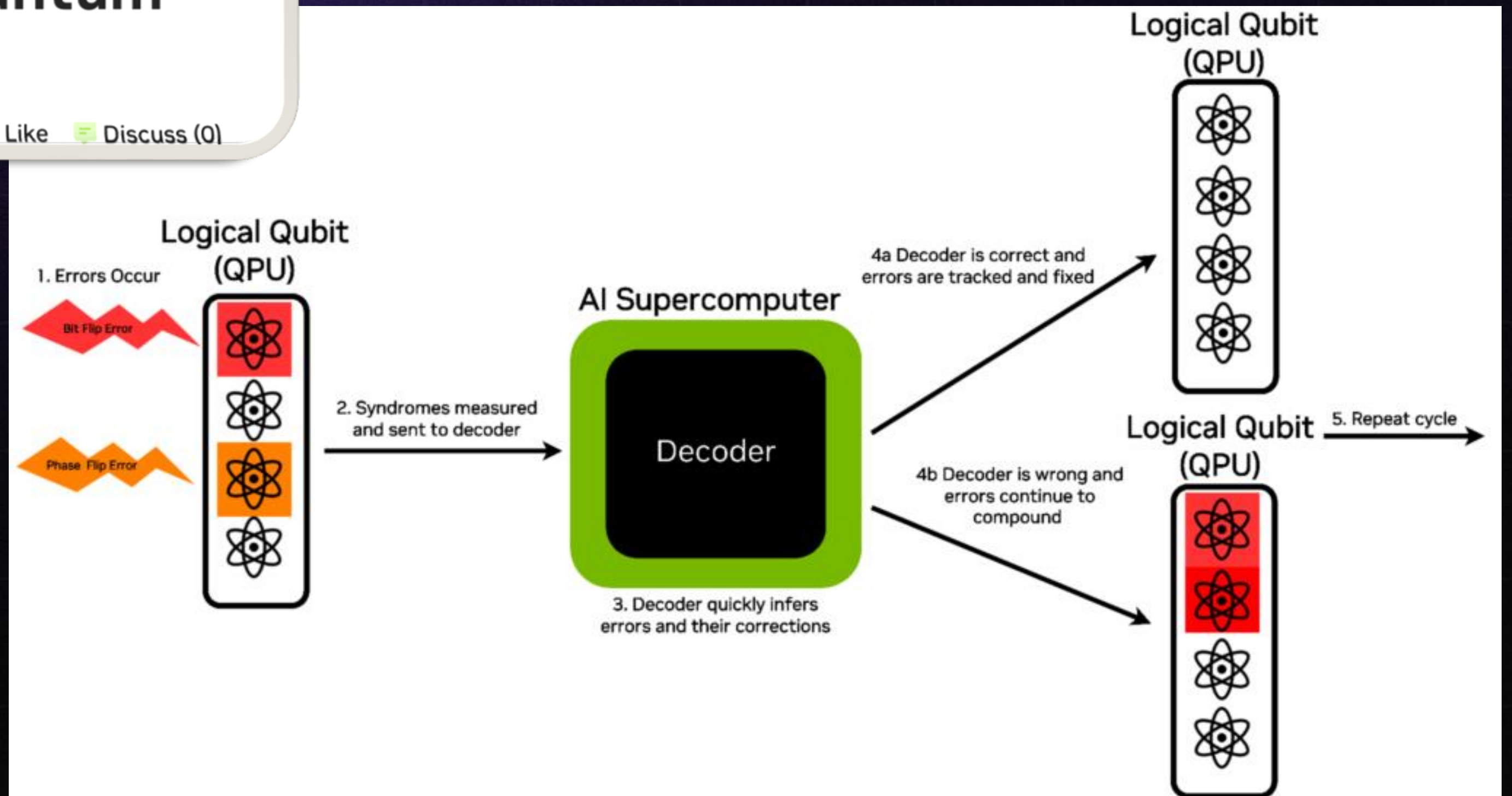
Wellcome Foundation – Drug Discovery



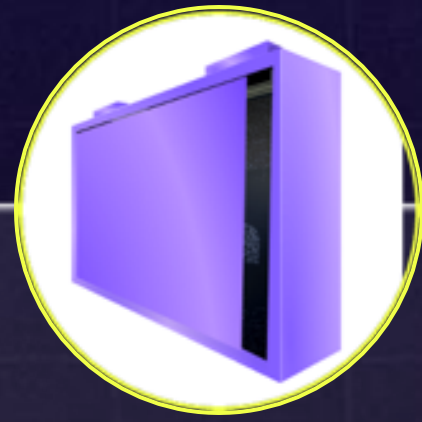
The Nottingham-Phasecraft-QuEra collaboration is pioneering a quantum-enhanced approach to drug development, focusing on covalent inhibitors. Researchers at the University of Nottingham have identified these inhibitors as a potential treatment for myotonic dystrophy—a debilitating genetic disorder that leads to progressive muscle weakness and wasting. With an estimated 6,500 people affected in the UK alone, this research could have profound implications.

NVIDIA AI Collaboration

The screenshot shows the NVIDIA Developer website interface. At the top, there are navigation links for Home, Blog, Forums, Docs, Downloads, and Training. Below that is the 'Technical Blog' header with a search bar and a filter icon. The main content area displays the article title 'NVIDIA and QuEra Decode Quantum Errors with AI' in a large, bold font. Below the title, it shows the date 'Mar 18, 2025' and engagement metrics: '+5 Like' and 'Discuss (0)'. The article is categorized under 'Simulation / Modeling / Design' and the language is set to 'English'.



Working with QuEra



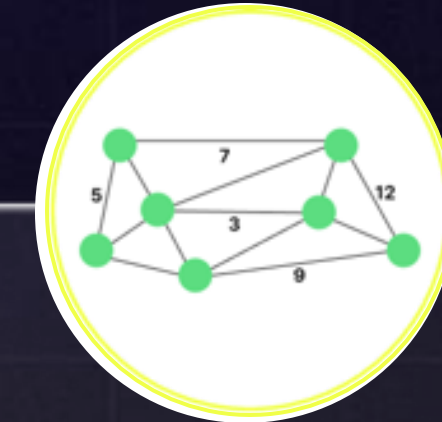
Machine Sales

- Purchase a QuEra computer.
- On-site installation, support, and community development.



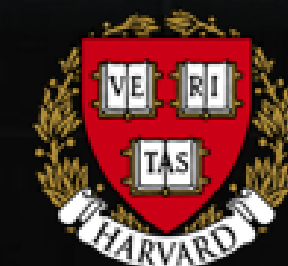
Cloud Access

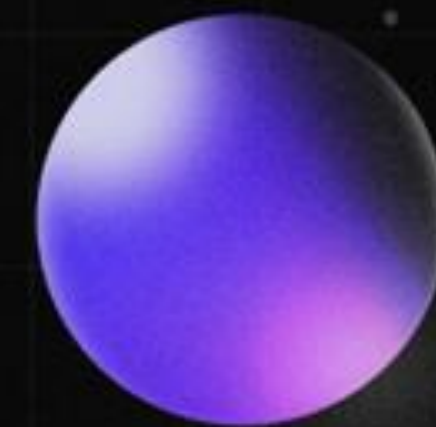
- Secure remote access.
- Mentoring and support by QuEra scientists.



Algorithm Co-Design

- Long-term partnership with develop “killer applications”





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