

QuEra On-Premises Quantum Computers

Overview

QuEra's on-premise quantum computers cater to diverse customers, including national quantum programs, hybrid classical/quantum High-Performance Computing (HPC) centers, and corporations with high-sensitivity HPC computing requirements. This solution delivers best-in-class quantum computers within your infrastructure.

QuEra's computers are based on **neutral atom technology** developed in collaboration Harvard and MIT. Neutral atoms are considered a most promising quantum computing technology because of their inherent purity, scalability, long coherence time and all-to-all connectivity.

QuEra's **Gemini-class systems** are state-of-the-art dual-mode quantum computers, integrating both analog quantum mode and digital gate-based mode. Featuring 256 qubits, the computer offers efficient encoding and high-level entanglement in the analog mode, complemented by the programming universality of the gate-based mode. This system is the next-generation upgrade of the Aquila-class system that is publicly accessible on the Amazon quantum cloud since November 2022.

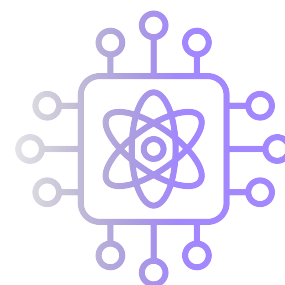


Key Specifications

- **Qubits:** 256 neutral-atom qubits made of ^{87}Rb Rubidium atoms.
- **Dual-Mode Operation:** Analog quantum and digital gate-based operations provide the ultimate combination of power, flexibility and control.
- **Field-Programmable Quantum Array (FPQA™) Architecture** allows for changing the location of the qubits, thus allowing efficient encoding of many optimization and machine learning problems.
- **75 μm x 75 μm** field and minimum spacing of 4 μm
- **2-Qubit Gates:** Commercial state-of-the-art gate fidelity at the time of shipment, and at least 99%.
- **Single Qubit Gates:** At least 99% fidelity at the time of shipment
- **SPAM Errors:** Below 1.5%
- **Gate Speed:** 4MHz for globally addressed Rydberg transitions
- **Repetition:** At least 3 shots/second
- **Global Detuning Range:** 40 MHz
- **Transport:** 150 μs over the whole array (16 atom sites)
- **Software Support:** Bloqade™, a powerful open-source development environment for analog computing. Qiskit-compatible interface for digital gate-based mode.

Technology Readiness Level

- **Analog Component:** TRL-9, deployed on Amazon Braket since November 2022
- **Gate-Based Component:** TRL-7, tested and validated at QuEra in 2023, available for customer delivery starting 2025.



Deployment

- **On-Premises Deployment:** Physical installation at the customer's facility
- **Remote Access:** Participants can enjoy remote access to a similar system at QuEra's site. This is both while the system is prepared for shipping, as well – if desired – after the fact.

Hosting Requirements

- **Physical Dimensions:** < 4'x12'x9' WxLxH, < 1200 lbs (1.2x3.6x2.7 in m < 545 kg), additional 1-meter clearance
- **Power:** 7kW, 208V/three-phase, tolerant to 10-minute power outages
- **Cooling:** >10kW chilled water capacity @<55F
- **Ambient Temperature:** 70°F ± 2°F (21°C ± 1°C) On-site
- **Cleanliness:** Class 100,000 (ISO 8) or better, humidity < 60%
- **Compressed Air:** >100 psi, 0.1 cfm



Additional Services



On-site support and application development



Continuous software upgrades and scheduled hardware upgrade

Optional Enhancements

- **SLURM Interface:** For integration with HPC infrastructure, quantum and classical/quantum job submission, monitoring, and security
- **Integrated Quantum Machine's OPX Control Platform:** Optimize performance and develop novel error correction schemes
- **Integrated NVIDIA DGX Quantum:** Run complex classical algorithms alongside quantum algorithms using state-of-the-art Grace Hopper processors with an ultra low-latency connection

Contact Information



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Contact our experts now

This comprehensive data sheet encapsulates the cutting-edge features, specifications, enhancements, and deployment details of QuEra's on-premise quantum computer. It represents a significant leap in quantum computing, offering unparalleled power, flexibility, and control, ready to tackle complex computational challenges.