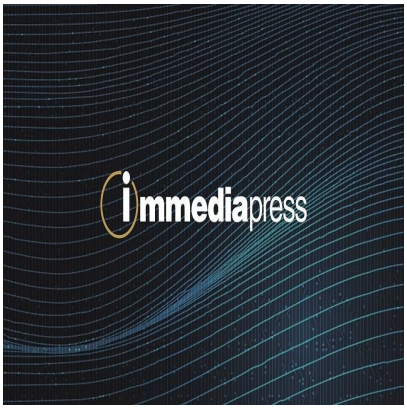

Quantinuum Breaks Error-Correction World Record by 10x, Validating Its Leading Path to Fault-Tolerant Quantum Computing by 2029

Descrizione

default watermark

COMUNICATO STAMPA â?? CONTENUTO PROMOZIONALE

BROOMFIELD, Colo., Oct. 19, 2026 /PRNewswire/ â?? Quantinuum (NASDAQ: QNT), a leading full-stack quantum computing company, today announced a world-record quantum error-correction result, achieving a logical fidelity of 99.9995% on its Helios commercial computer using the companyâ??s error-correction architecture. This marks Quantinuumâ??s second breakthrough in two months, demonstrating how its highly accurate trapped-ion hardware and flexible architecture work together to deliver rapid improvements in accuracy.

The achievement reinforces Quantinuumâ??s error-correction leadership and validates that its accuracy performance is now within the target range for Apollo, the companyâ??s planned universal fault-tolerant quantum computer expected to be available by 2029.

Quantinuumâ??s architecture is an end-to-end framework programmable through the companyâ??s developer platform. It integrates tailored AI decoders, all-to-all qubit connectivity, high-fidelity physical operations, and hardware-level error correction. This architecture also allows the company to test, refine, and combine different error-correction codes and optimize between accuracy and efficiency.

In the latest study, Quantinuum used a well-known â??color codeâ?? within this architecture to achieve the world-record logical fidelity result, which is equivalent to just five errors per million operations. The error rate is 10 times lower than Quantinuumâ??s own world record achieved last month and 100 times lower than the best published result across all other hardware modalities, which was reported by Google Quantum AI on a superconducting system.

â??With this result, weâ??ve proven that we have the error-correction architecture and trapped-ion technology required to achieve universal fault-tolerance,â?• said Dr. Rajeeb Hazra, CEO of Quantinuum. â??We have reduced error rates tenfold in rapid succession using a different code on the

same commercial hardware, demonstrating the flexibility of our error-correction architecture. Weâ??ve crossed the threshold necessary for exponential improvements in accuracy, reinforcing our path to Apollo and how we can help users unlock commercial value from quantum at scale.â•

The study also showed that logical errors fell exponentially as Quantinuum increased the â??code distance,â?? a technique used to understand how many physical qubits are needed to protect quantum information as the error correction scales. Each tested increase reduced the remaining logical errors by a record factor of 12, demonstrating increasingly effective error suppression as the code growsâ??a critical capability for scaling fault-tolerant quantum computing. Quantinuum believes this result suggests it can deliver fault-tolerance with significantly fewer qubits than are required for other modalities.

â??This is a significant milestone that quantum computing researchers have been working toward for many years,â• said Robin Blume-Kohout, Co-director of Sandia National Laboratoriesâ?? Quantum Performance Lab, who was not involved in the study. â??The paper demonstrates real, serious performance gains from quantum error correctionâ??a logical qubit nearly 100x better than its component physical qubits. A scaled-up version of this system could reach the reliability required for useful fault-tolerant computation at a feasible sizeâ??less than a million physical qubitsâ??which improves the outlook for practical quantum computing. These findings go a long way to retire one of the fieldâ??s central technical risks.â•

default watermark

In September 2026, Quantinuum used the same error-correction architecture with its Helix code to demonstrate record-setting logical memory and computation. Both studies ran on the same Helios hardware.

The two demonstrations illustrate how Quantinuum can rapidly prototype different error-correction codes within the same architecture to optimize for relative strengths in accuracy, efficiency, and speed. On Helios, Helix used 10 physical qubits per logical qubit, compared with up to 37 for the color code, while the color code delivered lower logical error rates. This provides insight into which applications pair best with each code as systems advance toward fault-tolerance.

Quantinuumâ??s error-correction architecture is flexible, allowing for adaptive syndrome extraction, which adjusts error-checking measurements during computation, and chain-mapping, which connects codes suited to different computational tasks. Together with efficient code structures and real-time decoding, these techniques provide multiple ways to reduce errors and resource requirements.

Quantinuum is combining its hardware, error-correction architecture, and full-stack software platform into an integrated system for fault-tolerant quantum computing. As customers prepare for this next era of computing, Quantinuum is providing the tools needed to develop and scale quantum applications capable of addressing challenges across materials science, chemistry, finance, logistics, and other critical sectors.

Read the full research here: quantinuum.com/fault-tolerance-by-2029

About Quantinuum

Quantinuum is a leading quantum computing company offering a full-stack platform designed to make quantum computing deployable in real-world environments. The company has commercially deployed multiple generations of trapped-ion based quantum systems built on the well-established QCCD

architecture, which it has implemented with novel designs and capabilities to achieve the industryâ??s highest accuracy levels based on average two-qubit gate fidelity. Quantinuum has active engagements with market leaders across pharmaceuticals, material science, financial services, and government and industrial markets, as well as academic and research institutions globally. The company has a global workforce of approximately 800 employees, including top scientists and researchers. Over 70% of its technology team holds PhDs or Masterâ??s degrees. Quantinuumâ??s headquarters is in Broomfield, Colorado, with additional facilities across the United States, United Kingdom, Germany, Japan, Qatar, and Singapore. For more information, please visit www.quantinuum.com.

Forward-Looking Statements

This press release contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended, which are intended to be covered by the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. All statements other than statements of historical fact are forward-looking statements, including statements about Quantinuumâ??s path to and the expected timing of Apollo, its planned universal fault-tolerant quantum computer, by 2029; the expected performance, scalability and resource requirements of Quantinuumâ??s logical error-correction architecture, error-correction codes and trapped-ion hardware, including the number of physical qubits required to achieve fault tolerance relative to other approaches; the pace of future improvements in logical error rates, Quantinuumâ??s ability to help customers prepare for and realize commercial value from fault-tolerant quantum computing; and the potential impact of quantum computing on sectors including materials science, chemistry, finance and logistics. Words such as â??aim,â?• â??anticipate,â?• â??believe,â?• â??confidence,â?• â??could,â?• â??expect,â?• â??explore,â?• â??intend,â?• â??may,â?• â??path,â?• â??plan,â?• â??potential,â?• â??seek,â?• â??suggest,â?• â??will,â?• â??wouldâ?• and similar expressions identify forward-looking statements, although not all forward-looking statements contain these words.

default watermark

Forward-looking statements are based on Quantinuumâ??s current expectations and assumptions and are subject to risks and uncertainties that could cause actual results to differ materially from those expressed or implied. These risks include, among others: the results described in this press release were achieved in experimental settings and may not be able to be replicated at a larger scale, in logical computation, or in commercial use; Quantinuum may be unable to scale its systems, increase qubit counts or integrate its hardware, error-correction framework and software as planned; Quantinuum may not achieve its technology roadmap, including Apollo, on the expected timeline or at all; the pace of technical progress in quantum computing; Quantinuumâ??s ability to maintain the availability and performance of its systems, including Helios; competition, including advances by companies using other quantum computing modalities or architectures; the availability of funding, personnel and government support; and the other risks described under â??Risk Factorsâ?• in Quantinuumâ??s Quarterly Report on Form 10-Q for the quarter ended June 30, 2026 and its subsequent filings with the Securities and Exchange Commission. Forward-looking statements speak only as of the date of this press release. Quantinuum undertakes no obligation to update any forward-looking statement, except as required by law.

press@quantinuum.com

View original content to download multimedia:https://www.prnewswire.co.uk/news-releases/quantinuum-breaks-error-correction-world-record-by-10x-validating-its-leading-path-to-fault-tolerant-quantum-computing-by-2029-302912631.html

Copyright 2026 PR Newswire. All Rights Reserved.

COMUNICATO STAMPA â?? CONTENUTO PROMOZIONALE: Immediapress Ã¨ un servizio di diffusione di comunicati stampa in testo originale redatto direttamente dallâ??ente che lo emette. Lâ??Adnkronos e Immediapress non sono responsabili per i contenuti dei comunicati trasmessi

â??

immediapress/pr-newswire

Categoria

1. Comunicati

default watermark

Tag

1. ImmediaPress

Data di creazione
Ottobre 19, 2026
Autore
redazione