The Quantum Observer

Your monthly measurement of the quantum world

19 OCTOBER 2026

Quantinuum Sets New World Record in Quantum Error Correction

Quantinuum has announced a world-record error-correction result, reaching a logical fidelity of 99.9995% on its Helios commercial quantum computer. That is equivalent to about five errors per million operations.

Error correction protects information by spreading it across groups of physical qubits that together form one logical qubit. The new error rate is ten times lower than Quantinuum's own record from September, and 100 times lower than the best published result on any other hardware type, reported by Google Quantum AI on a superconducting system. September's record was set on the same Helios hardware using a different code, called Helix, while this time the team used a well-known colour code. Each increase in code distance reduced the remaining logical errors by a factor of 12. The colour code needed up to 37 physical qubits per logical qubit, compared with 10 for Helix.

Quantinuum says the accuracy is now within the target range for Apollo, its planned fault-tolerant quantum computer due in 2029, and its CEO believes a scaled-up system could reach the required reliability with fewer than a million physical qubits. The tests ran on Helios rather than a completed Apollo system.

The methods developed could be applied in materials science, superconductivity and molecular simulations for drug discovery. The partnership strengthens King's standing in quantum computing, creating a direct link with Google Quantum AI and giving students and researchers access to world-leading quantum hardware.

REFERENCE

Quantinuum. (2026, October 19). *Quantinuum Reports 99.9995% Logical Fidelity on Helios Quantum Computer*. HPCwire. https:/ HPCwire - Since 1987 – Covering the Fastest Computers in the World and the People Who Run Them

26 OCTOBER 2026

OpenAI Claims AI-Generated Proof in Quantum Field Theory

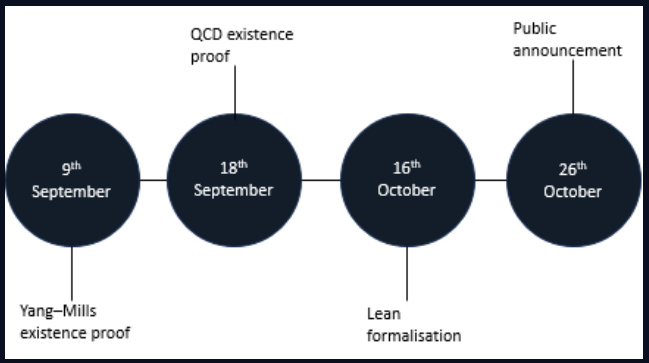
OpenAI has said its internal models produced a mathematically rigorous proof that certain interacting quantum field theories exist in four-dimensional spacetime. These include quantum chromodynamics (QCD), which describes how quarks and gluons interact through the strong force, and a unified theory containing the Standard Model's gauge fields and fermions. The work also includes a proof of the existence of pure Yang–Mills theory.

According to OpenAI, the models produced a natural-language proof of Yang–Mills existence on 9 September and one for QCD on 18 September, and the Yang–Mills result was formalised in the Lean proof assistant by 16 October. The work builds on an approach to constructive quantum field theory pioneered by the mathematician Tadeusz Balaban in the 1980s.

The claim is not yet verified. Yang–Mills existence is only part of one of the Clay Mathematics Institute's Millennium Prize problems, which also requires proving a mass gap, and OpenAI did not claim to have solved both. OpenAI has agreed to make the raw data public so the community can check it, and to fund a conference on the work

REFERENCE

OpenAI says its models produced three proofs in math, CS and physics. (2026, October 26). *Unite.AI*. https://www.unite.ai/openai-says-its-models-produced-three-proofs-in-math-cs-and-physics/



Timeline of OpenAI's claimed Yang-Mills and QCD proofs, September to October 2026. Illustration: QMS.