



Rigetti and Riverlane Progress Towards Fault Tolerant Quantum Computing with Real-Time and Low Latency Error Correction on Rigetti QPU

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By integrating Riverlane's quantum error decoder into the control system of Rigetti's 84-qubit Ankaa™-2 system, the team was able to demonstrate real-time, low latency quantum error correction, a critical process for developing fault tolerant quantum computers

BERKELEY, Calif., Oct. 31, 2024 (GLOBE NEWSWIRE) -- Rigetti (Nasdaq: RGTI), a pioneer in full-stack quantum-classical computing, announced the successful demonstration of real-time and low latency quantum error correction on a Rigetti quantum computer.

Fault tolerance is the point at which lengthy operations can execute without a single error, due to the application of quantum error correction. Reaching this stage, and in turn realizing the full potential of quantum computers, will require the co-development of quantum error correction and quantum computing technologies. Rigetti and Riverlane's [recent work](#) demonstrating real-time and low-latency quantum error correction on Rigetti's 84-qubit Ankaa™-2 system is an important step in our journey towards developing fault tolerant quantum computers.

Among the quantum error correction resources being developed are classical algorithms that identify errors that occur during quantum computation. These classical algorithms are known as decoders. A challenge in improving the utility of decoders is addressing the problem of the backlog of computations that accumulates as the decoder processes data. To avoid the backlog problem, the decoding needs to occur at the same speed as the quantum circuit. This experiment demonstrated decoding times faster than the 1 unit/micro threshold for generating measurement data on a superconducting qubit device -- ensuring that the backlog problem is avoided and showcasing that low-latency feedback can be maintained during quantum error correction operations.

"High fidelities are not enough to make a quantum computer useful. There are a lot of classical computing components at play that make the system work, including with error correction. Our partnership with Riverlane to demonstrate quantum error correction technology integrated with our hardware is deeply important on our path towards fault tolerance," says Dr. Subodh Kulkarni, Rigetti CEO. "A significant benefit of superconducting qubits is that we can attain much higher gate speeds than other modalities. Rigetti's system gate speeds consistently achieve an active duration of 60-80ns, which is four orders of magnitude faster than systems based on ion traps and pure atoms. System speed is an important factor to enable hybrid computing with current CPUs/GPUs."

"To execute quantum error correction (QEC) at scale, we need QEC to happen in real-time and on real hardware. Our latest experiment with Rigetti represents a significant step towards these crucial requirements. It demonstrates the ability of Riverlane's QEC technology to integrate seamlessly with fast-feedback control systems, resulting in the world's first low-latency QEC experiment. It's an exciting mark of progress and will help unlock the next generation of quantum experiments that go beyond purely keeping logical qubits alive and into demonstrating the first building blocks of fault-tolerant quantum computing," says Steve Brierley, Riverlane CEO.

Rigetti's longtime partnership with Riverlane also includes collaborating on a 24-qubit Ankaa-class system at the UK's National Quantum Computing Centre where Rigetti will be integrating Riverlane's technology with the long-term objective of large-scale error correction.

About Rigetti

Rigetti is a pioneer in full-stack quantum computing. The Company has operated quantum computers over the cloud since 2017 and serves global enterprise, government, and research clients through its Rigetti Quantum Cloud Services platform. The Company's proprietary quantum-classical infrastructure provides high performance integration with public and private clouds for practical quantum computing. Rigetti has developed the industry's first multi-chip quantum processor for scalable quantum computing systems. The Company designs and manufactures its chips in-house at Fab-1, the industry's first dedicated and integrated quantum device manufacturing facility. Learn more at www.rigetti.com.

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Cautionary Language Concerning Forward-Looking Statements

Certain statements in this communication may be considered "forward-looking statements" within the meaning of the federal securities laws, including but not limited to, expectations with respect to the Company's business and operations, including its expectations related to its partnership with Riverlane and the use of Riverlane's quantum error decoder, expectations related to real-time low latency quantum error correction and the development of fault tolerant quantum computers. These forward-looking statements are based upon estimates and assumptions that, while considered reasonable by the Company and its management, are inherently uncertain. Factors that may cause actual results to differ materially from current expectations include, but are not limited to: the Company's ability to achieve milestones, technological advancements, including with respect to its technology roadmap, help unlock quantum computing, and develop practical applications; the ability of the Company to obtain government contracts successfully and in a timely manner and the availability of government funding; the potential of quantum computing; the ability of the Company to expand its QPU sales; the success of the Company's partnerships and collaborations; the Company's ability to accelerate its development of multiple generations of quantum processors; the outcome of any legal proceedings that may be instituted against the Company or others; the ability to maintain relationships with customers and suppliers and attract and retain management and key employees; costs related to operating as a public company; changes in applicable laws or regulations; the possibility that the Company may be adversely affected by other economic, business, or competitive factors; the Company's estimates of expenses and profitability; the evolution of the markets in which the Company competes; the ability of the Company to implement its strategic initiatives, expansion plans and continue to innovate its existing services; the expected use of proceeds from the Company's past and future financings or other capital; the sufficiency of the Company's cash resources; unfavorable conditions in the Company's industry, the global economy or global supply chain, including financial and credit market fluctuations and uncertainty, rising inflation and interest rates, disruptions in banking systems, increased costs, international trade relations, political turmoil, natural catastrophes, warfare (such as the ongoing military conflict between Russia and Ukraine and related sanctions and the state of war between Israel and Hamas and

related threat of a larger conflict), and terrorist attacks; and other risks and uncertainties set forth in the section entitled "Risk Factors" and "Cautionary Note Regarding Forward-Looking Statements" in the Company's Annual Report on Form 10-K for the year ended December 31, 2023, the Company's Form 10-Q for the three months ended June 30, 2024, and other documents filed by the Company from time to time with the SEC. These filings identify and address other important risks and uncertainties that could cause actual events and results to differ materially from those contained in the forward-looking statements. Forward-looking statements speak only as of the date they are made. Readers are cautioned not to put undue reliance on forward-looking statements, and the Company assumes no obligation and does not intend to update or revise these forward-looking statements other than as required by applicable law. The Company does not give any assurance that it will achieve its expectations.