

IBM Opens Quantum Computation Center in New York; Brings World's Largest Fleet of Quantum Computing Systems Online, Unveils New 53-Qubit Quantum System for Broad Use

Fleet of ten quantum systems benefit from the industry's most powerful hardware with improved stability to propel quantum computing forward

ARMONK, N.Y., Sept. 18, 2019 /[PRNewswire](#)/ -- Today, IBM (NYSE: [IBM](#)) announced the opening of the IBM Quantum Computation Center in New York State. The new center expands the world's largest fleet of quantum computing systems for commercial and research activity that exist beyond the confines of experimental lab environments. The IBM Quantum Computation Center will support the growing needs of a community of over 150,000 registered users and nearly 80 commercial clients, academic institutions and research laboratories to advance quantum computing and explore practical applications.

The global community of users have run more than 14 million experiments on IBM's quantum computers through the cloud since 2016, and published more than 200 scientific papers. To meet growing demand for access to real quantum hardware, ten quantum computing systems are now online through IBM's Quantum Computation Center. The fleet is now composed of five 20-qubit systems, one 14-qubit system, and four 5-qubit systems. Five of the systems now have a [Quantum Volume](#) of 16 – a measure of the power of a quantum computer – demonstrating a new sustained performance milestone.

IBM's quantum systems are optimized for the reliability and reproducibility of programmable multi-qubit operations. Due to these factors, IBM's systems enable state-of-the-art quantum computational research with 95 percent availability.

Within one month, IBM's commercially available quantum fleet will grow to 14 systems, including a new 53-qubit quantum computer, the single largest universal quantum system made available for external access in the industry, to date. The new system offers a larger lattice and gives users the ability to run even more complex entanglement and connectivity experiments.

"Our strategy, since we put the very first quantum computer on the cloud in 2016, was to move quantum computing beyond isolated lab experiments conducted by a handful of organizations, into the hands of tens of thousands of users," said Dario Gil, Director of IBM Research. "In order to empower an emerging quantum community of educators, researchers, and software developers that share a passion for revolutionizing computing, we have built multiple generations of quantum processor platforms that we integrate into high-

availability quantum systems. We iterate and improve the performance of our systems multiple times per year and this new 53-qubit system now incorporates the next family of processors on our roadmap."

Advances in quantum computing could open the door to future scientific discoveries such as new medicines and materials, vast improvements in the optimization of supply chains, and new ways to model financial data to make better investments. Examples of our work with clients and partners, include:

- **J.P. Morgan Chase** and IBM posted on arXiv, [Option Pricing using Quantum Computers](#), a methodology to price financial options and portfolios of such options, on a gate-based quantum computer. This resulted in an algorithm that provides a quadratic speedup, i.e. whereby classically computers need millions of samples, our methodology requires only a few thousands of samples to achieve the same result, when comparing to classical Monte Carlo methods. This may allow financial analysts to perform the option pricing and risk analysis in near real time. The implementation is available as open source in Qiskit Finance.
- **Mitsubishi Chemical**, Keio University and IBM simulated the initial steps of the reaction mechanism between lithium and oxygen in lithium-air batteries. Available on arXiv, [Computational Investigations of the Lithium Superoxide Dimer Rearrangement on Noisy Quantum Devices](#) is a first step in modeling the entire lithium-oxygen reaction on a quantum computer. Better understanding this interaction could lead to more efficient batteries for mobile devices or automotive vehicles.
- **The IBM Q Hub at Keio University, in collaboration with their partners Mizuho Financial Group, and Mitsubishi UFJ Financial Group (MUFG)** proposed in the arXiv pre-print, [Amplitude Estimation without Phase Estimation](#), an algorithm that reduces the number of qubits and circuit length of an original methodology proposed by IBM for quantum risk analysis in financial applications.

To learn more about IBM Quantum, visit www.ibm.com/ibmq.

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