

A happy blue year for quantum computers: IBM unveils Q System One

9 January 2019, by Nancy Cohen



A rendering of IBM Q System One, the world's first fully integrated universal quantum computing system, currently installed at the Thomas J Watson Research Center in Yorktown Heights, New York, where IBM scientists are using it to explore system improvements and enhancements that accelerate commercial applications of this transformational technology. For the first time ever, IBM Q System One enables quantum computers to operate beyond the confines of the research lab. Credit: IBM

At CES 2019, the Tuesday keynote by IBM CEO Ginni Rometty, walked attendees through the IBM lens of core areas of computing: and one of the four was quantum computing—which comes as no surprise for those who have been following IBM's aggressive role in taking it out of the labs and into the hands of those wishing to explore it more.

Reporting for *VentureBeat*, Kyle Wiggers said "Since 2016, as part of its IBM Q initiative, it's offered access to a quantum computer located in

Yorktown Heights, [New York](#), that's executed more than seven million quantum programs, the results of which have been cited in more than 120 published academic papers. And that's just the start, Rometty said."

IBM revealed its intentions for a [data center](#) mainly consisting of quantum computers. The Quantum Computational Data Center in Poughkeepsie, New York, will be a world's first.

The center will be for commercial clients—and hold that thought. Arvind Krishna, senior vice president of Hybrid Cloud and director of IBM Research, has spoken of their work to develop "practical quantum applications for business and science." This certainly resonate with the noise IBM has made in the past, that we need not resign ourselves to [quantum computing](#) as an out of reach concept primarily seen in labs.

Last year, IBM already was spreading the word that it saw quantum computing going mainstream within [five](#) years.

IBM has had some quantum devices and simulators available for use through the [cloud](#).

Meanwhile, IBM also unveiled Q System One. *Information Age* reporter Andrew Ross said it was "the world's first integrated universal approximate quantum computing system designed for scientific and commercial use. "What a [time](#) to be alive! Is quantum computing no longer just a concept or theory?" he asked.

That question can be assumed to be rhetorical. For IBM, it is no longer just a concept or theory. IBM is sharing details of what went into the design of Q System One for commercial use. The case is 9 feet tall and 9 feet wide. A half-inch thick borosilicate glass forms a sealed, airtight enclosure. The glass door opens effortlessly.

The team assembled the system for mechanical testing at Goppion's headquarters in Milan over the course of two weeks in the summer. Goppion is a Milan-based manufacturer of high-end museum display cases.

Frederic Lardinois in *TechCrunch*: "The 20-qubit system combines into a single package the quantum and classical computing parts it takes to use a machine like this for research and business [applications](#)."

Quantum computers are a different kind of computer based on the laws of quantum mechanics. That said, what would IBM have in mind that would make a difference for business and science in a newer commercialization phase?

An IBM video suggests the commercialization move could enable breakthroughs in materials and drug discovery, financial services and artificial intelligence.

Many would find it difficult to think about quantum computing on their computers when goals are confined to print out forms or check the weather or write a report. "But try asking one to simulate a single molecule like caffeine to understand how it impacts our brains?" asks a presenter in an IBM Research [video](#). Encoding information into quantum states, quantum computers make calculations that we only dream of today. ("Right now, we're not quite there yet," said [Lardinois](#), "but the company also notes that these systems are upgradable.")

Such as? Simply consider there are problems "too complex and exponential in nature for classical systems to handle," in the words of an IBM news release. "Future applications of quantum computing may include finding new ways to model [financial](#) data and isolating key global risk factors to make better investments, or finding the optimal path across global systems for ultra-efficient logistics and optimizing fleet operations for deliveries."

What's next in IBM's plan?

In the second half of this year, expect to hear about the opening of the IBM Q Quantum Computational

Center in Poughkeepsie. It will house advanced cloud-based quantum computing systems. These will be accessible to members of the IBM Q Network. The latter is described as a worldwide community of Fortune 500 companies, startups, academic institutions, and national research labs, exploring practical applications for business and science.

More information:

newsroom.ibm.com/2019-01-08-IBM-Quantum-Computational-Center-Use#assets_all

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APA citation: A happy blue year for quantum computers: IBM unveils Q System One (2019, January 9) retrieved 23 January 2019 from <https://techxplore.com/news/2019-01-happy-blue-year-quantum-ibm.html>

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