IBM Newsroom

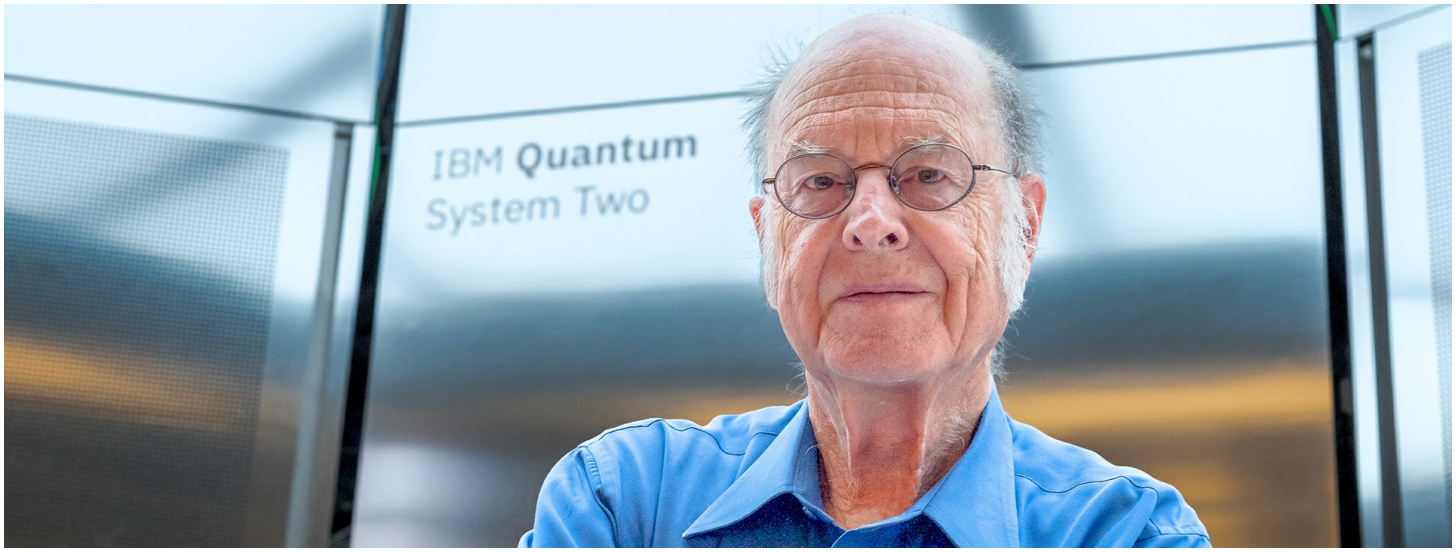
IBM Fellow and Quantum Pioneer Charles H. Bennett Receives A.M. Turing Award, Computing's Highest Honor

• Charles H. Bennett helped pioneer the foundations of quantum information science alongside co-laureate Gilles Brassard of Université de Montréal.

• Bennett's more than five decades at IBM Research helped transform quantum theory into practical advances like quantum cryptography, teleportation, and entanglement-based protocols.

• He is the seventh IBM awardee recognized by ACM, the Association for Computing Machinery, with the A.M. Turing Award.

• The recognition joins IBM's long legacy of shaping quantum computing and the enduring impact of researchers who defined the field.



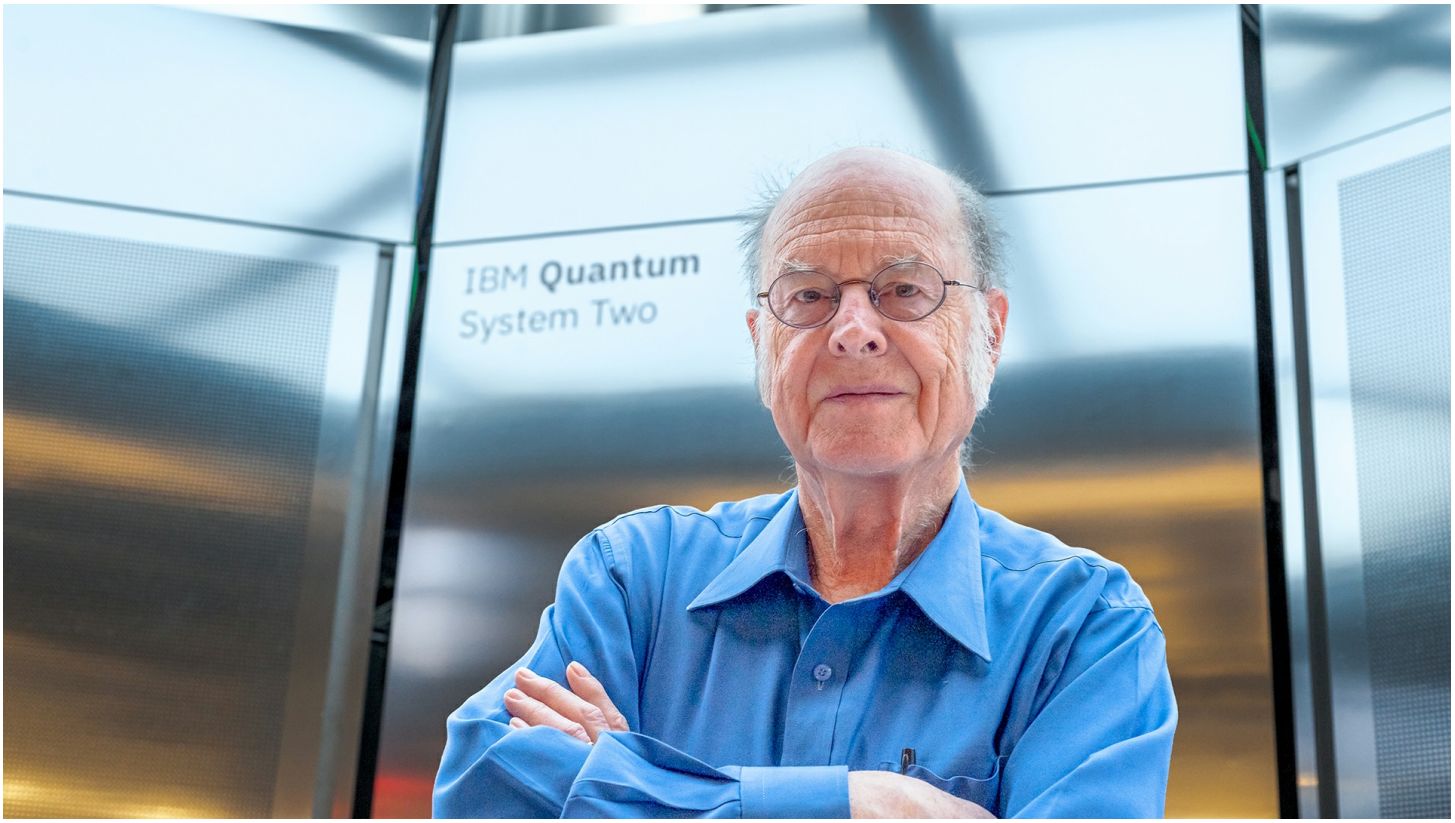
YORKTOWN HEIGHTS, N.Y., March 18, 2026 — Charles H. Bennett, a research scientist at IBM (NYSE: IBM) and IBM Fellow, has been named a co-recipient of the 2025 ACM A.M. Turing Award by the Association for Computing Machinery.

Described by the ACM as the "Nobel Prize in computing," the award cites Bennett for contributions that helped spark a "quantum revolution," establish the field of quantum information science and reshape how researchers think about computation, communication and the nature of information itself. He shares the award with longtime collaborator Gilles Brassard of the Université de Montréal, with whom Bennett melded physics and computer science together into an entirely new discipline.

Over a career at IBM Research spanning more than five decades, Bennett pioneered explorations of how the unusual behavior of matter at the smallest scales can be harnessed to process and transmit information in ways impossible for classical computers. His efforts helped lay the scientific groundwork for quantum cryptography, quantum teleportation and entanglement distillation — all concepts that underpin modern quantum information science and ongoing advances in quantum computing today.

Born to New York City music teachers in 1943, Bennett came of age as scientists built the first general-purpose computers and

uncovered the structure of DNA. Both inspired him to study biochemistry at Brandeis University and keep apace of computing. During his undergraduate studies, he was fascinated by Kurt Gödel's incompleteness theorems, which show some mathematical truths can never be proven within any system capable of performing arithmetic, such as a computer. Mapping this interest onto the nature of small molecules, Bennett recalled: "I got to wondering about the connection between physics and computation, and whether there might be physical processes that are fundamentally uncomputable."



Charles H. Bennett, a research scientist and IBM Fellow, has been named a co-recipient of the 2025 A.M. Turing Award by the Association for Computing Machinery. (Credit: IBM)

Bennett's curiosity drove him to explore the interplay between computation and the laws of physics as a graduate student at Harvard University, where he developed two pivotal professional relationships that helped shape the questions that would define Bennett's career.

The first was with research physicist Stephen Wiesner, who in 1968 developed a concept of "quantum money" that could not be counterfeited, but had trouble gaining academic acceptance of his idea. Bennett ultimately helped Wiesner advance the concept and, in handwritten notes from a conversation in 1970, prophetically scribbled and underlined the phrase "quantum information theory" across the top of a page. The second was attending a lecture by IBM Fellow and physicist Rolf Landauer, whose work on the thermodynamics of computation argued that information is not abstract but a physical quantity governed by the laws of nature.

"Rolf Landauer recruited me to IBM because we shared an interest in the physics of computation," said Bennett, who still works out of the IBM Thomas J. Watson Research Center in Yorktown Heights, New York. "The lab was one of the few places where you could seriously explore questions like that with people who were all thinking about information in fundamental ways."

At IBM, Bennett wrote a landmark 1973 paper on logical reversibility of computation, showing that computation need not be fundamentally tied to energy dissipation in the way many had assumed. That work helped establish information as a physical

concept and set the stage for decades of breakthroughs in computing to come.

“IBM was an ideal place to do this kind of research because you had people working on the fundamental physics of computing and hardware, and in the same building people focused on the mathematics of computing. I could wander down the hall and talk to many people about fundamental ideas and in fields that, at that time, scarcely overlapped,” Bennett said. “That environment made it possible to grow the field of quantum information science into what it is today.”

Bennett and Brassard met at a 1979 computer science conference in Puerto Rico and hit it off as professional collaborators. By 1982, the duo co-authored a first-of-its-kind quantum cryptography paper with Wiesner. Two years later, they introduced the first practical quantum cryptography protocol, called “BB84” for “Bennett–Brassard 1984.” The work showed that two parties, i.e. “Alice” and “Bob,” could establish a secret key with security rooted in the laws of physics rather than potentially shaky assumptions about the difficulty of a particular computation. This idea remains one of the field's earliest and clearest demonstrations of how quantum mechanics can enable entirely new capabilities in computing.

Bennett also helped quantum information science leap from on-paper conjectures into real-world experimentation. Bennett and then-summer student John Smolin, now an IBM researcher, built the first quantum cryptography apparatus in Bennett’s office, and — joined by Brassard — carried out the first demonstration of BB84 in 1989. They made the custom two-meter-long device out of mirrors, polarizers, and photon detectors and ran it with software written by Brassard and his students. Bennett also co-authored a landmark 1993 study introducing quantum teleportation, which showed how an unknown quantum state could be transmitted using entanglement and classical communication, turning a once-philosophical curiosity into a practical resource for quantum engineering.

Today, the field Bennett helped establish has moved from foundational theory into increasingly powerful real-world systems and head-turning scientific results.

“Charlie is an inspiration to all of us. When many researchers saw quantum mechanics as a problem to solve for shrinking electronic components rather than a tool to be developed, he recognized the same physics could become a powerful new way to process and transmit information,” said **Jay Gambetta, Director of IBM Research and IBM Fellow** “That insight, and the decades of work that followed, helped lay the intellectual foundation for one of the most important scientific and technological frontiers of our time. Today at IBM, Charlie’s legacy is also seen in the work our teams are doing to build increasingly capable quantum systems and bring useful quantum computing to the world.”

Most recently, IBM unveiled an open, easy-to-integrate quantum-centric supercomputing architecture designed to scale quantum systems alongside classical computing resources, helping solve problems that classical methods alone struggle to address. The company also debuted a credible path to build IBM Quantum Starling, which it expects to be the world’s first large-scale, fault-tolerant quantum computer, and deliver it to customers in 2029.

ACM’s award is named after Alan M. Turing, the British mathematician who articulated the mathematical foundations of computing. The 2025 award is the organization’s first associated with quantum research and Bennett, who plans to donate part of his portion of a USD $1 million prize, is the seventh in a line of IBM researchers and scientists recognized for their work at the company.

Previous IBM-associated Turing Award recipients include John Backus (1977), honored for FORTRAN and the design of practical high-level programming systems; Kenneth E. Iverson (1979), recognized for APL and its influence on programming languages and notation; Edgar F. Codd (1981), for fundamental contributions to database management systems; John Cocke

(1987), for advances in compiler theory, computer architecture, and RISC; Frederick P. Brooks (1999), for landmark contributions to computer architecture, operating systems, and software engineering; and Frances E. Allen (2006), the first woman to receive the award, for pioneering optimizing compiler techniques and automatic parallel execution.

Read more about Bennett and his work that led to the award, here.

Watch the following short video about Bennett and the work that led to the award:

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