



Next Stop for the Quantum Bus: A New Computer Age

FACULTY PROFILE

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— Robert J. Schoelkopf



Robert J. Schoelkopf, the William A. Norton Professor of Applied Physics and Physics, is an expert researcher in quantum transport, single-electron devices, and charge dynamics in nanostructures.

With Steven Girvin, deputy provost for science and technology and the Eugene Higgins Professor of Physics, Schoelkopf recently led a team of Yale scientists in a major breakthrough in quantum computing. “In order for quantum computing to work, we have to be able to transfer information between distant qubits on a chip,” Schoelkopf said. To accomplish this, the Yale scientists developed a quantum bus, which wired elements together for data transfer. “Using a wiring scheme is a key part of any computing system, but ours was the first demonstration on a quantum level.”

Although fully functional quantum computing is still several breakthroughs away, the advent of the technology will have massive implications. Schoelkopf said, “Even a modest quantum computer composed of a few thousand qubits would exceed the computational power of a classical computer the size of the entire universe.”

Schoelkopf is a graduate of Princeton University, earned his PH.D. at the California Institute of Technology, and worked as an electrical/cryogenic engineer in the Laboratory for High-Energy Astrophysics at NASA’s Goddard Space Flight Center. In 1995, he came to Yale as a postdoctoral researcher and joined the faculty in 1998, becoming a full professor in 2003. He has received the American Physical Society’s Joseph F. Keithley Award for Advances in Measurement Science and NASA’s Technical Innovator Award. In 2009, Schoelkopf was appointed the William A. Norton Professor of Applied Physics and Physics, which was established by Donald McClusky ’42, ’59 M.ENG. and honors William A. Norton, who is credited with creating the first engineering program at Yale in 1852.

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