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## Atom-based Si quantum solid-state devices: Building Feynman's room at the bottom one atom at a time

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In his famous 1959 lecture, Richard Feynman presaged nanotechnology, proclaiming that there was plenty of room at the bottom. I will describe work that we are doing at NIST to develop atom-scale, quantum, solid-state devices in silicon, realizing Feynman's vision for technology at the smallest scales. I will explain how and why we make solid-state devices that are only a few atoms in size, placed one-by-one with near atomic-scale precision, and I will describe the quantum physics that is revealed by these devices. As an example, I will focus on our work using tunneling, RF and optics to probe strongly correlated many-body systems.



Dr. Garnett W. Bryant is group leader of the Atom Scale Device Group at the National Institute of Standards and Technology (NIST), a fellow of the Joint Quantum Institute (JQI) of the University of Maryland and NIST and a fellow of the American Physical Society. Previously, he was at the McDonnell Douglas Research Laboratory from 1982 until 1990, and at the Army Research Laboratory from 1991 until 1994. He received his Ph.D. from Indiana University in 1978, had a postdoctoral position at Washington State University and a (US) National Research Council fellowship at NIST (then the National Bureau of Standards). His research has focused primarily on the theory of the electronic and optical properties of various condensed matter system. Current interests include condensed matter systems for quantum information technology, such as the optics and spin physics of quantum dots and quantum dot molecules, atom-based silicon electronics, and highly correlated, confined, low-dimensional electron systems in these quantum devices.

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