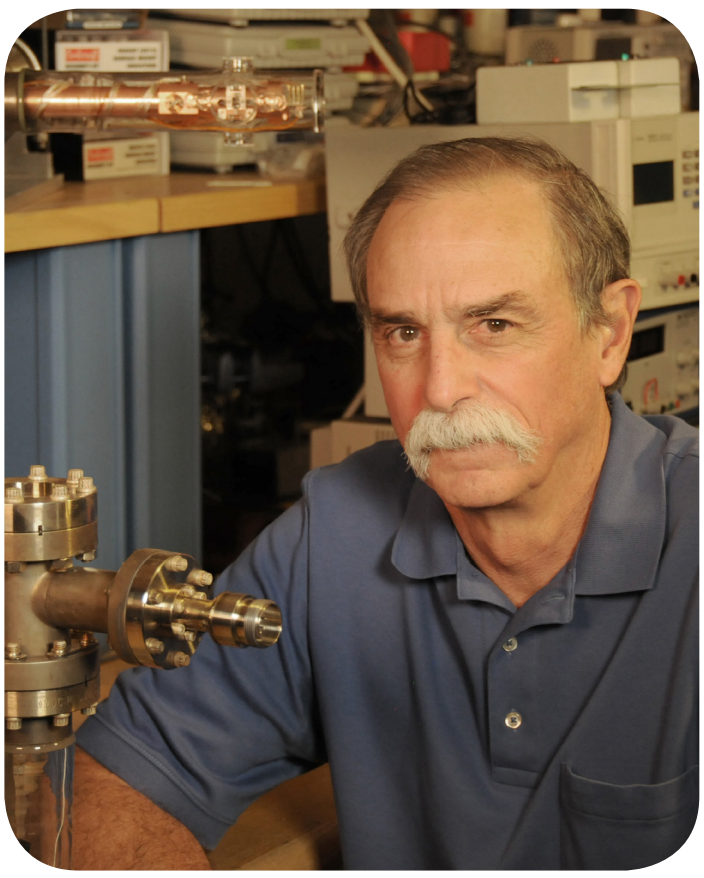
# John A. Lynch Lecture Series

# Quantum Computers and Raising Schrödinger's Cat




## David J. Wineland

**National Institute of Standards and Technology**


David J. Wineland is a Nobel-laureate physicist at the National Institute of Standards and Technology, Time and Frequency Division in Boulder, Colo. He was awarded the Nobel Prize in Physics with Sergi Haroche for "groundbreaking experimental methods that enable measuring and manipulation of individual quantum systems." He is a fellow of the American Physical Society, the American Optical Society, and was elected to the National Academy of Sciences in 1992. A highly decorated scientist, Wineland earned the National Medal of Science in the engineering sciences in 2007.

## WEDNESDAY, MARCH 18, 4:00 PM

## CAREY AUDITORIUM, HESBURGH LIBRARY

**A reception will be held at 3:30 p.m. in the Library Atrium.**

Quantum systems such as atoms can be used to store information. For example, we can store binary information in one of two energy levels of an atom, labeling the state with lower energy a "0" and the state with higher energy a "1." However, quantum systems can also exist in superposition states, thereby storing both states of the bit simultaneously, a situation that makes no sense in our ordinary-day experience. This property of quantum bits or "qubits" potentially leads to an exponential increase in memory and processing capacity. It would enable a quantum computer to efficiently solve certain problems such as factorizing large numbers—an ability that could compromise the security of current encryption systems. A quantum computer would also realize an analog of "Schrödinger's Cat," a bizarre situation where a cat could be simultaneously dead and alive. Experiments whose goal is to realize a quantum computer based on laser manipulations of atomic ions will be described.

This lecture is hosted by the Department of Physics.

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