MONTANA STATE UNIVERSITY | College of LETTERS & SCIENCE

Physics Colloquium

Friday, December 1, 2017
4:10 – 5:00 PM
Procrastinator Theater – Strand Union Building

Silicon Quantum Computation

Dr. Michelle Simmons, Scientia Professor of Physics
Centre Director & Work-Package Leader, Centre for Quantum Computation & Communication Technology
School of Physics, The University of New South Wales, Sydney, Australia

Abstract:

Instead of performing calculations one after the other like a conventional computer, quantum computers work in parallel, looking at all possible outcomes at the same time. This would allow us to solve problems in minutes that could otherwise take many thousands of years. Our government/industry/university consortium has built electronic devices using a single phosphorus atom in silicon. Each atom had to be put in place to engineer a particular effect to create electronic devices at the atomic scale for a 10-qubit prototype quantum computer. This opens the prospect of a silicon-based quantum computer, with the potential to transform finance, health, transportation and logistics industries and the computing and communications industries.

Why Quantum Computers Promise Computational Advantage

Dr. Mark B. Ritter
Distinguished Research Staff Member and Senior Manager, Physical Sciences
IBM T.J. Watson Research Center, Yorktown Heights, New York

Mark received his B. S. in Physics from MSU in 1981

Abstract:

Conventional computational power has increased roughly 18 orders of magnitude, or a billion-billion times in the last century, employing billions of transistors per processor chip. In this talk I will describe why quantum computers, even though they have a small number of quantum bits, or qubits, could have a computational advantage over any transistor-based computing technology. I'll review the status of IBM's superconducting qubit technology, describe the Quantum Experience, access to small (5 and 16 qubit) quantum computers on the web, and a quantum software development kit using Python Notebooks. I'll show computations we have already performed, and discuss key challenges, including the approximate number of qubits needed to achieve quantum advantage.

Hosts: Rufus Cone, MSU Department of Physics
George Keremedjiev, Director, American Computer & Robotics Museum

Part of the day-long celebration of the annual George R. Stibitz and E.O. Wilson Awards
http://www.compustory.com/
http://www.montana.edu/news/17275