KAVLI INSTITUTE FOR THEORETICAL PHYSICS

Presents

The Thirty Eighth KITP Public Lecture

Sponsored by Friends of KITP

Michael Freedman

Topology, Physics, and Complexity:

The birthing of the quantum computer

Computers have wrought huge changes in what we do and how we live. But the underlying logic of our computers is of the 19th century. Computers might, instead, be designed to "think" in a quantum mechanical way. The tidal wave that brought us quantum mechanics is set to wash over us again 100 years later.

We cannot know in which ways the quantum computer will change our world, but there is reason to believe that quantum computing is the ultimate mode of information processing consistent with physics. So the short answer to, "What will quantum computers do?" is, "Everything possible."

Topology is geometry after you have forgotten local details; it deals with discrete structures. In physics local detail is usually of paramount importance, however there are rare low temperature systems whose most important properties are topological in nature. The discrete nature of topology may allow us to control quantum mechanical evolutions in these systems with amazing precision. This is just what quantum computation requires.

About the Speaker

Michael H. Freedman is a mathematician at Microsoft. In 1986, he was awarded a Fields Medal for his work on the Poincaré conjecture, one of the most famous problems of the 20th century.

Freedman was awarded a doctorate by Princeton University in 1973. After graduating, he was appointed a lecturer in the Department of Mathematics at the University of California, Berkeley. In 1976 he was appointed professor in the Department of Mathematics at the University of California, San Diego (UCSD). He was appointed the Charles Lee Powell chair of mathematics at UCSD in 1985.

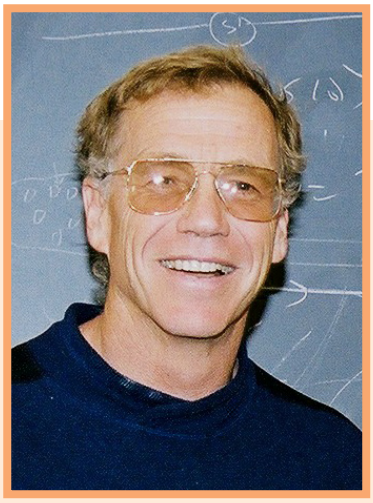
He has received numerous other awards and honors including Sloan and Guggenheim Fellowships, a MacArthur Fellowship, the National Medal of Science and the AMS Veblin Prize. He is an elected member of the National Academy of Sciences, and the American Academy of Arts and Sciences.

He currently works at University of California, Santa Barbara (at the Microsoft funded Station Q) where his team is involved in the development of the quantum computer.

Wednesday, November 5, 2008

8:00 PM (Reserved seats held until 7:50 PM)

Kavli Institute for Theoretical Physics, Main Seminar Room



Admission is Free

Seating is by RSVP only

Please e-mail:

events@kitp.ucsb.edu

or call

(805) 893-4111

by October 31, 2008.

Reserved seats are held until 7:50 PM

To make special arrangements to accommodate a disability, call the KITP at the number above.

LOT 10 PARKING

From the roundabout at Hwy 217, turn right onto Mesa Rd, merge into left lane, turn left at the first light into Lot 10 parking structure. **PARK**, **BUY a $3 permit** from the dispenser (near the elevator and stairs), **DISPLAY PERMIT** on dashboard. The KITP is right next door.

The KITP gratefully acknowledges its many friends in the community.

K I T P
Public
Lecture
Series