

Center for Applied Mathematics Seminar

Charles Edison Lecture Series

Michael H. Freedman

Station Q Microsoft, University of
California, Santa Barbara

Will give a lecture entitled:

Creating the Quantum Computer

Monday, November 16, 2009

5:00 pm

**Location: 105 Jordan Hall of
Science**

*** Reception at 4:15 pm in the
Jordan Science Hall Galleria***



Abstract: 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 may wash over us again 100 years later.

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 one of the key physical ideas of the last 50 years the renormalization group tells us there are low temperature systems whose most important properties are topological in nature. The discrete nature of topology will allow us to control quantum mechanical evolutions in these systems with amazing precision. This is just what quantum computation requires.