

Dear Colleague:

We are writing to announce the program "Topological Phases and Quantum Computation" to be held at the Kavli Institute for Theoretical Physics at the University of California, Santa Barbara, in the period 20 February -- 19 May, 2006, and to alert you that applications are now being accepted. We also encourage you to inform others who you think might be interested in applying. You'll find a general description of the program's goals below and information about KITP here: <http://www.kitp.ucsb.edu>.

The application deadline is 15 April, 2005. It's necessary for every applicant to apply online via the KITP web site, <http://www.kitp.ucsb.edu/apply/apply.html>

KITP programs differ from many conferences and workshops in that they create a situation where scientists learn from each other and actually do substantive research, often collaborating with other participants. To foster these interactions, KITP encourages all theory participants to stay for at least three weeks, and gives priority to applicants who plan to do this. We understand, however, that experimentalists generally cannot manage long visits, and we can be more flexible for them.

KITP provides office and computing facilities on its site at UC Santa Barbara and also provides help in finding living accommodations. Some level of financial support will be available, depending on the needs of the participants and availability of funds. Due to space and financial constraints, however, we may not be able to accommodate everyone who responds. Please understand that actual commitments of office space and financial support can be made only by written formal invitations from the KITP Director, David Gross.

If you think you'd like to participate, it will help us with our planning if you could apply early, including your proposed length of stay and any financial requirements. Again, feel free to bring this program to the attention of other interested colleagues.

Sincerely yours,

Sander Bais (bais@science.uva.nl)  
Chetan Nayak (nayak@physics.ucla.edu)  
John Preskill (preskill@theory.caltech.edu)

## "Topological Phases and Quantum Computation"

Sander Bais (Amsterdam)

Chetan Nayak (UCLA)

John Preskill (Caltech)

Quantum computers should be capable of performing tasks that would be inconceivable with conventional digital computers, but enormous scientific and engineering challenges must be overcome for scalable quantum computers to be realized. Topological quantum computation is a particularly appealing proposal for implementing quantum information processing, in which quantum states are encoded in the nonlocal degrees of freedom of a suitable topologically ordered physical system. Because of the nonlocal encoding, these quantum states are intrinsically resistant to the debilitating effects of local noise.

The main goal of this program is to address theoretical issues concerning the physical realization of topological quantum computers in condensed matter systems and thereby galvanize experimental efforts in this direction. The program will bring together researchers in topology, solid state physics, ultra-cold atoms, and computer science, many of whom have not collaborated before. We intend to assess the feasibility of topological quantum computing and map out a strategy for discovering or engineering a quantum medium conducive to universal quantum computation.