

# *Chez Pierre*

Presents ...

**Friday, February 28, 2014**

**12:00pm**

**MIT Room 4-331**



## **Special Chez Pierre Seminar**

**Ashvin Vishwanath**

**University of California - Berkeley**

### ***“Emergent Supersymmetry at the Boundary of a Topological Phase”***

Spacetime supersymmetry, which exchanges bosons and fermions has been proposed as a fundamental symmetry but still awaits experimental verification. Here we theoretically show that supersymmetry emerges naturally in topological superconductors, which are well-known condensed matter systems. Specifically, we argue that the quantum phase transitions at the boundary of topological superconductors in both two and three dimensions display supersymmetry when probed at long distances and times. Supersymmetry entails several experimental consequences for these systems, such as, exact relations between quantities measured in disparate experiments, and in some cases, exact knowledge of the universal critical exponents. The topological surface states themselves may be interpreted as arising from spontaneously broken supersymmetry, indicating a deep relation between topological phases and SUSY. We discuss prospects for experimental realizations in films of superfluid  $\text{He}_3\text{-B}$ .