Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

" Majorana bound states in magnetic impurity chains and shortcuts to braiding Majoranas"

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Abstract: Chains of magnetic impurities placed on a superconducting substrateprovide a promising venue for realizing a topological superconductingphase. I will present an effective tight-binding description of theinduced subgap band of Shiba states which involves long-range (power-law)hopping and pairing amplitudes with unusual consequences for the localization of Majorana states and the topological phase diagram. I also discuss the interplay of electronic states in the impurity chain and in the Shiba band and the implications for the Majorana bound states. Furthermore I will talk about braiding of Majoranas. Performing braiding operations in a finite time introduces transitions out of the ground-state manifold and deviations from the nonabelian Berry phase. We show that these errors can be eliminated by suitably designed counter-diabatic correction terms in the Hamiltonian. We implement the resulting shortcuts to adiabaticity for simple protocols of nonabelian braiding and show that the error suppression can be substantial even for approximate realizations of the counterdiabatic terms.

***3:00pm**
Monday, November 17, 2014
***Duboc Seminar Room (4-331)**

Host: Liang Fu