

Massachusetts Institute of Technology
Department of Physics

“Tunneling into a Majorana fermion”

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Abstract: I will discuss the tunneling of electrons into a superconducting system hosting a discrete spectrum of subgap levels. At subgap voltages current is generated by Andreev reflection and the classical relation between conductance and local density of states $dI/dV \propto \rho(r)$ does not work. We study the resonant behaviour of the conductance in this situation, as well as interference effects which appear when an electron has several resonant levels to tunnel into. Motivated by recent transport experiments on nanowires hosting Majorana fermions, we focus on conductance in a system with two weakly coupled Majorana modes. According to simple symmetry analysis, the zero-bias conductance for a single-channel contact should be zero in such a system. On the other hand, a single Majorana fermion is predicted to produce a $2e^2/h$ zero-bias peak. We show how the two situations (two Majorana modes and one Majorana mode) can be transformed into one another consistently when one Majorana mode is gradually removed from the system, and show that said zero-bias peak generically contains a narrow dip to zero on top of the peak.

12:00 noon
Friday, October 11, 2013
Duboc Seminar Room
Room 4-331

Host: Tim Hsieh/Chong Wang