

Chez Pierre

Presents ...

Wednesday, March 2, 2011

12:00pm

MIT Room 4-331



SPECIAL CHEZ PIERRE SEMINAR

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"Unconventional Electromagnetic Scattering"

In conventional electromagnetic structures, photons travel both ways, allowing discontinuities to readily scatter light and induce losses. Photonic chiral edge states, on the other hand, permit electromagnetic waves to propagate only in a single direction. Obstacles and disorder can no longer reflect waves, which exhibit 100% transmission in numerical simulations even across seemingly-impassible perfectly-conducting barriers introduced into the waveguide. I will explain how such phenomena, analogous to chiral edge states in integer quantum Hall effects, can arise from magneto-optical photonic crystals. Generalizing earlier predictions by Raghu and Haldane, I show that the key requirement is related to a topological invariant of the bulk bands known as Chern number. I also present our experimental results verifying the existence of these novel phenomena. I will discuss the implications of these novel photonic states in creating conservative potential landscapes through momentum transfer. I will also discuss prospects of controlling electromagnetic scattering with time-dependent piezoelectric fibers, whose properties can be modulated over broad range of frequencies.