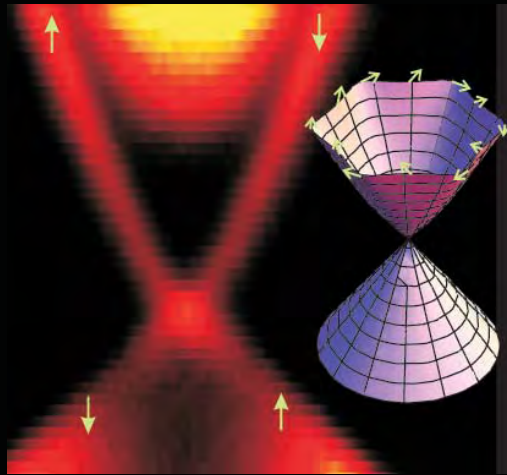


M. Zahid Hasan

“Experimental Discovery of Topological Insulators and Related Superconductors”

Most quantum states of condensed matter are categorized by the symmetries they break. The remarkable discovery of charge Quantum Hall effects (1980s) revealed that there exists an organizational principle of matter based only on the topological distinctions, but in the presence of time-reversal symmetry breaking. In the past few years, theoretical developments suggest that new classes of topological states of matter might exist that are purely topological in nature in the sense that they do not break time-reversal symmetry, and hence can be realized without any applied magnetic field: "Quantum Hall-like effects without Magnetic Fields." This talk describes our discovery of new, topologically ordered states of matter (topological insulators) and discusses the unusual electromagnetic, spin, and superconducting properties this novel phase of quantum matter might exhibit and their potential applications.



M. Zahid Hasan is an Associate Professor (with tenure) of Physics at Princeton University. He obtained his Ph.D. in 2002 from Stanford University, working at SLAC and Brookhaven National Laboratory. He was then a Robert H. Dicke Fellow in fundamental physics at Princeton and held several extended visiting appointments at Bell Laboratories (Murray Hill) and Lawrence Berkeley National Laboratory, and joined the Faculty rank at Princeton. His research has focused on quantum Hall-like topological phases, exotic correlated superconductors, quantum phase transitions, topological quantum computing physics, and analogues of Hawking radiation. In recent years, he, along with his team, has experimentally discovered topological order in bulk solids (3-D topological insulators) including the single-Dirac-cone series using spin-resolved and phase-sensitive spectroscopic measurements.

Wednesday, September 15, 2010 | 3:00 p.m.

Note change to third Wednesday

CAPS
COLLOQUIUM

Bldg. 402 | APS Auditorium
Argonne National Laboratory