

# Physics Colloquium

## Michigan Technological University

Tuesday, May 13, 2008

11:05 - 11:55 am

Room 133, Fisher Hall

### Relativistic Quantum Physics at Your Pencil Tips: Dirac Fermion in Graphitic Carbon

**Philip Kim**

Department of Physics  
Columbia, University

#### ABSTRACT

The massless Dirac particle moving at the speed of light has been a fascinating subject in relativistic quantum physics. Graphene, an isolated single atomic layer of graphite, now provides us an opportunity to investigate such exotic effect in low-energy condensed matter systems. In this presentation I will discuss experimental consequence of charged Dirac Fermion spectrum in two representative low dimensional graphitic carbon systems: 1-dimensional carbon nanotubes and 2-dimensional graphene. Semiconductor device fabrication techniques combined with the development of new methods of nanoscaled material synthesis/manipulation enables us to investigate mesoscopic transport phenomena in these materials. The exotic quantum transport behavior discovered in these materials, such as ballistic charge transport and unusual half-integer quantum Hall effect both of which appear even at room temperature. In addition, the promise of these materials for novel electronic device applications will be discussed.

#### BIOGRAPHY

Professor Philip Kim received his Ph. D. in Applied Physics from Harvard University in 1999. He received Miller Postdoctoral Fellow in Physics from University of California, Berkeley during 1999-2001. He is now Associate Professor in Department of Physics at Columbia University. He has received numerous honors and awards, including Columbia University Distinguished Faculty Award (2007), National Science Foundation Faculty Career Award (2004) and Outstanding Young Researcher Award, Association of Korean Physicists in America (2002). Professor Kim has been working on electric, thermal and thermoelectric transport phenomena in nanoscaled systems. He has over 40 well cited scientific publications. Notably in recent years, Prof. Kim has demonstrated novel transport phenomena in carbon nanotubes and graphene.

