



# Columbia University Optics and Quantum Electronics Seminar



## “Shining Light on Topological Insulators”

**Professor Nuh Gedik**

*Massachusetts Institute of Technology*

*Department of Physics*

**Date/Time:** Friday, December 6, 3.00PM

**Location:** Interschool Lab, 750 Schapiro / CEPSR

Food will be served (Turkish cuisine)

**Please RSVP to [yy2336@columbia.edu](mailto:yy2336@columbia.edu)**



**Abstract:** Topological insulators (TIs) are novel materials that do not conduct electricity in their bulk but possess exceptional conducting electronic states on their surface. These surface electrons have a number of highly unusual characteristics: (i) they behave like massless relativistic particles similar to photons (ii) their spin is locked perpendicular to their momentum and (iii) this state is robust against moderate disorder. Understanding and characterizing unique properties of these materials can lead to novel applications such as current induced magnetization or extremely robust quantum memory bits. In this talk, I will first give a brief introduction to these materials and then describe our recent experiments in which we used ultrashort laser pulses to probe and control properties of the topological surface states. Utilizing the short duration of these pulses, we succeeded in capturing femtosecond movies of the electronic energy bands in a three dimensional manner. These movies reveal an exotic hybrid state between electrons and light which was predicted theoretically but has never been observed in solids before.

**Bio:** Professor Gedik received his B.S. in Physics in 1998 from Bogazici University, Istanbul, Turkey and his Ph.D in Physics in 2004 from University of California, Berkeley. After his Ph.D, he moved to Caltech where he worked as a postdoctoral scholar. He joined MIT Physics Department as an assistant professor in January 2008.

Hosted by Prof. R.Osqood • For further information: call 212 854 4462

