



*Karl F. Herzfeld, 1892-1978*

Department of Physics  
The Catholic University of America  
presents the 30<sup>th</sup>



## **Karl Herzfeld Memorial Lecture**

### ***Shrinking ubiquity to the nanoscale: New uses for an old technology***

**Dr. Michael J. Naughton**  
Ferris Professor of Physics  
Boston College

I used to marvel at my children watching TV while talking on the telephone while surfing the internet while listening to the radio. Of course I think they're smart and savvy kids, but I refer not to (nor approve of) their multitasking. Instead, it's the technology that delivers all of that information content into my home using a mere single wire that is of interest. This wire is a coaxial cable, something that has been in use for over 150 years, starting with the first successful trans-Atlantic connection between Europe and North America. Inspired both by the ubiquity and the special electromagnetic properties of the "coax" that makes such multitasking possible, we are presently exploring and expanding the limits of its utility. By reducing its diameter 10,000 times, we have created a "nanocoax" that can transmit visible light on subwavelength size scales, something no optical fiber can do. We have also found that nanocoax arrays form the basis of a new architecture for high efficiency solar cells, a microscope that beats the diffraction limit, ultrasensitive chemical and biological sensors for cancer detection, and a neuro-electronic interface capable of peering inside individual neurons. This talk thus addresses the past, present and potential future of the coaxial cable.

**Friday, November 4, 2011 at 4:00 PM**  
in the Karl Herzfeld Auditorium of Hannan Hall - Room 108

Reception immediately following lecture

*Parking and other information:* (202) 319-5315 or <http://physics.cua.edu>