



## Physics Colloquium

Friday September 29th, 2010  
4:10 – 5:00 pm, 108 EPS

### " Electronic Detection of Plasmons" Stan Guthrie, Yale University

**Abstract:**

At ultra-sub-wavelength scales, surface plasmon polaritons (SPPs) allow an optical signal to propagate electronically, scattering to farfield photons when necessary. A localized discontinuity in the dielectric constant can cause photons at the sharp tip of a metallic nanowire (NW) to excite a SPP, which can, after propagation to the far end of the NW, be re-converted to photons at the far end and detected in free space. As reported previously, we optically observed propagation exponentially dependent on length, as well as polarization dependence. We have recently achieved simultaneous optical and electrical detection of this SPP, using conventional farfield optical microscopy coupled with an electrical detection system based on semiconducting nanowire field effect transistors (NW-FETs). The increased sensitivity of the NW-FET allows detection of the presence of a weak plasmon even in the case when farfield photons are not detectable. Furthermore, since excitation only occurs at a sharp tip and not along the smooth portion of the NW, we are able to locate the exact position of SPP excitation, and hence the NW tip, even in the case of a weak SPP, by utilizing the NW-FET plasmon detector.

**Host:**  
TBA