

The University of New Mexico Student Chapter of the Optical Society of America presents

## **Infrared Nanophotonics**

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## **Photonic Crystals, Plasmonics, and Metamaterials**

**Prof. S. R. J. Brueck**

Director, Center for High Technology Materials  
Professor of Electrical and Computer Engineering, Professor of Physics and Astronomy  
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**Wednesday, March 30<sup>th</sup>, at 11:00 am**

**Department of Physics and Astronomy, Room 1131**  
(North-West Wing Conference Room)

**A light lunch will be served after the talk**

The electromagnetic response of periodic, wavelength-scale structures have been of longstanding interest. Recently, several new, related directions of research have rekindled interest in this venerable field. These include the observation of anomolous transmission through arrays of sub-wavelength apertures in metal films, demonstrations of negative permeability “metamaterials” in the rf and  $\mu$ wave regimes, and the predictions and demonstrations (largely in the rf) of negative index materials (and predictions of diffraction-less “perfect” imaging in these materials). The infrared is a particularly attractive spectral regime for the study of many of these effects as a consequence of the near ideal properties of metals and of the convenience of a short wavelength so that structures can be many wavelengths across so that edge effects are negligible.

Recent results at CHTM in the fabrication and characterization of infrared metamaterials and related experiments including the first demonstration of a negative permeability in the mid-IR; enhanced transmission through a periodic coaxial array, and the first demonstration of a negative index plasmonic material at  $2\ \mu\text{m}$  will be presented. The concept of perfect imaging with negative index materials and the dependence of the spatial frequency bandwidth of this phenomenon on material parameters will be discussed with the conclusion that it will be difficult to practically achieve imaging improvements at infrared and visible wavelengths.

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