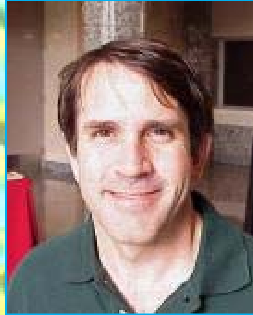
San Francisco State University

Physics & Astronmy

Monday, October 13th



Dr. Jonathan Pelz

Ohio State University

4:00 PM in TH 411

Refreshments served at 3:50 PM

Using Time-Resolved Scanning Kelvin Probe Microscopy to identify and localize electronic traps in AlGaN/GaN High Electron Mobility Transistors

Abstract:

GaN-based high electron mobility transistors (HEMTs) offer high frequency and high power performance for a variety of applications in wireless communications and RADAR systems. However, their performance and reliability are limited by electrically-active defects. Knowledge of the spatial distribution of specific traps and their impact on device performance is important for understanding performance and degradation in AlGaN/GaN HEMTs. Deep Level Transient/Optical Spectroscopy (DLTS, DLOS) are powerful techniques to identify and monitor specific trap populations, by measuring transients in trap occupancy as functions of trap filling conditions, temperature, and optical illumination. However, previous implementations of these techniques applied to HEMTs lack high lateral spatial resolution, and cannot directly distinguish ***where*** in the device specific traps are located. I will discuss our implementation of nm-resolution "nano-DLTS/DLOS" which uses Scanning Kelvin Probe Microscopy (SKPM), a technique based on Atomic Force Microscopy (AFM), to measure local surface potential transients (SPTs) with < 2 ms time resolution to monitor transients in local trap occupancy.