



Weekly Seminar

Controlling and measuring electronic structure in complex axial and radial nanowire heterostructures

Leigh M. Smith

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Time: 4:00pm, Feb. 21, 2014 (Friday)

时间: 2014年2月21日 (周五) 下午4:00

Venue: Room 607, Conference Room A, Science Building 5

地点: 理科五号楼607会议室

Abstract

Substantial progress has been made in recent years in fabricating complex axial and radial nanowire heterostructures. In these structures the band structure can be modified through cubic and hexagonal polytypes, strains caused by lattice mismatch, or quantum confinement in core multi-shell structures. Understanding exactly how the electronic properties of the nanowire are changed in these heterostructures requires spectroscopies with high spatial, temporal and spectral resolution. I will discuss a series of examples of how novel optical spectroscopies can provide insights into changes in electronic structure within a single nanowire.

"Illuminating the Second Conduction Band and Spin-Orbit Energy in Single Wurtzite InP Nanowires,"

S. Perera, et al, Nano Letters 13, 5367 (2013).

"Optical, Structural, and Numerical Investigations of GaAs/AlGaAs Core-Multishell Nanowire Quantum Well Tubes," M.A. Fickenscher et al., Nano Letters 13, 1016 (2013).

Transient Rayleigh Scattering: A new probe of picosecond carrier dynamics in a single semiconductor nanowire, M. Montazeri et al, Nano Letters 12, 5389-5395 (2012).

Direct Measure of Strain and Electronic Structure in GaAs/GaP Core-Shell Nanowires, Mohammad Montazeri, et al., Nano Letters, 10, 880-886 (2010).

About the Speaker

Leigh Smith has been a faculty member of the Department of Physics since 1990. He received his BA degree with Highest Honors in Mathematics and Physics from the University of Virginia in 1982. After spending a year in the graduate program in Physics at Princeton University, he began his PhD research in the group of James P Wolfe at the University of Illinois in Urbana-Champaign. While at Illinois, he received fellowships from the National Science Foundation, IBM and Shell Oil Company. He was awarded a PhD in Physics in 1988 and worked for two years as a Postdoc in the group of Donald Wolford at the IBM Thomas J. Watson Research Center in Yorktown Heights, NY before arriving at the University of Cincinnati.

Leigh Smith is interested in using a variety of CW and time-resolved spectroscopies to probe the electronic, spin and vibronic states in a variety of semiconducting and metallic nanostructures. Such spectroscopies are combined with a variety of innovative slit- and spot-confocal microscopies in order to visualize the electronic states within a single nanostructure.