

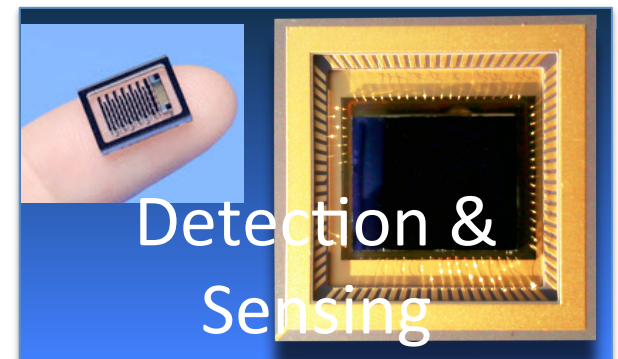
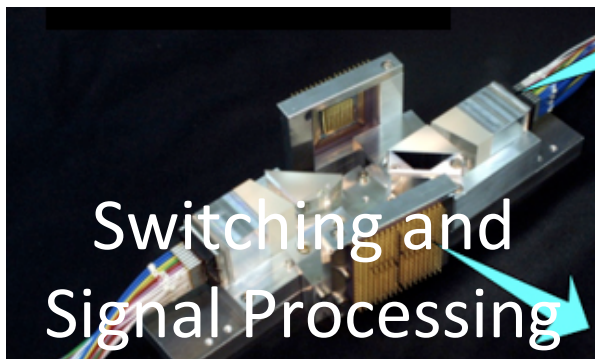
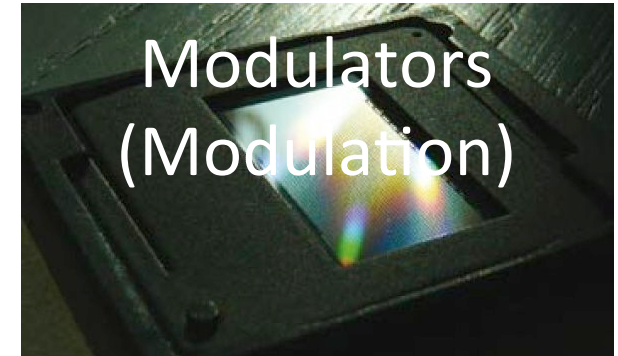
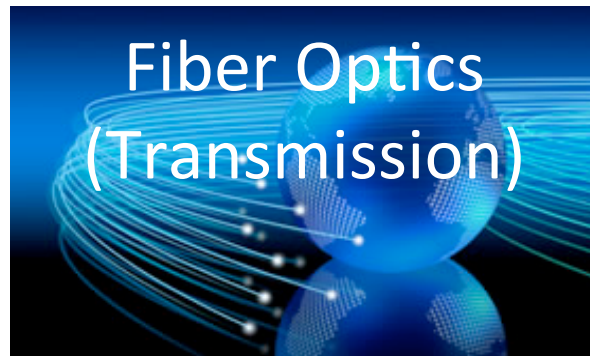
ECE 3rd and 4th year Information Session

Area 1: Photonics

***“Photonics** includes the generation, emission, transmission, modulation, signal processing, switching, amplification, and detection/sensing of light.”*

--Wikipedia

Technologies



Applications

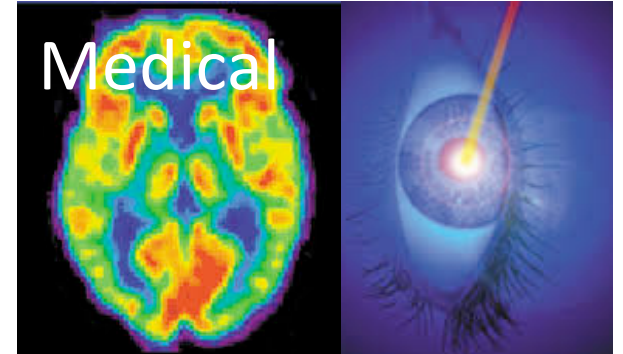
Optical
Communications



Consumer
Products



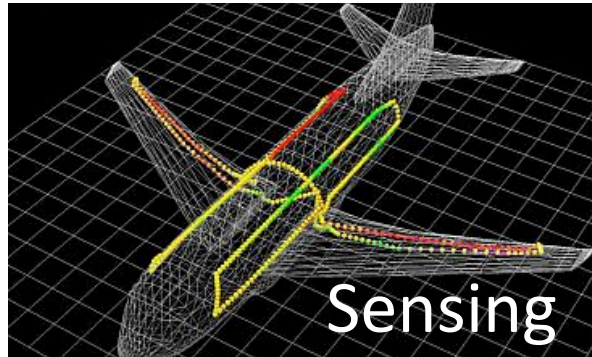
Medical



Green Energy



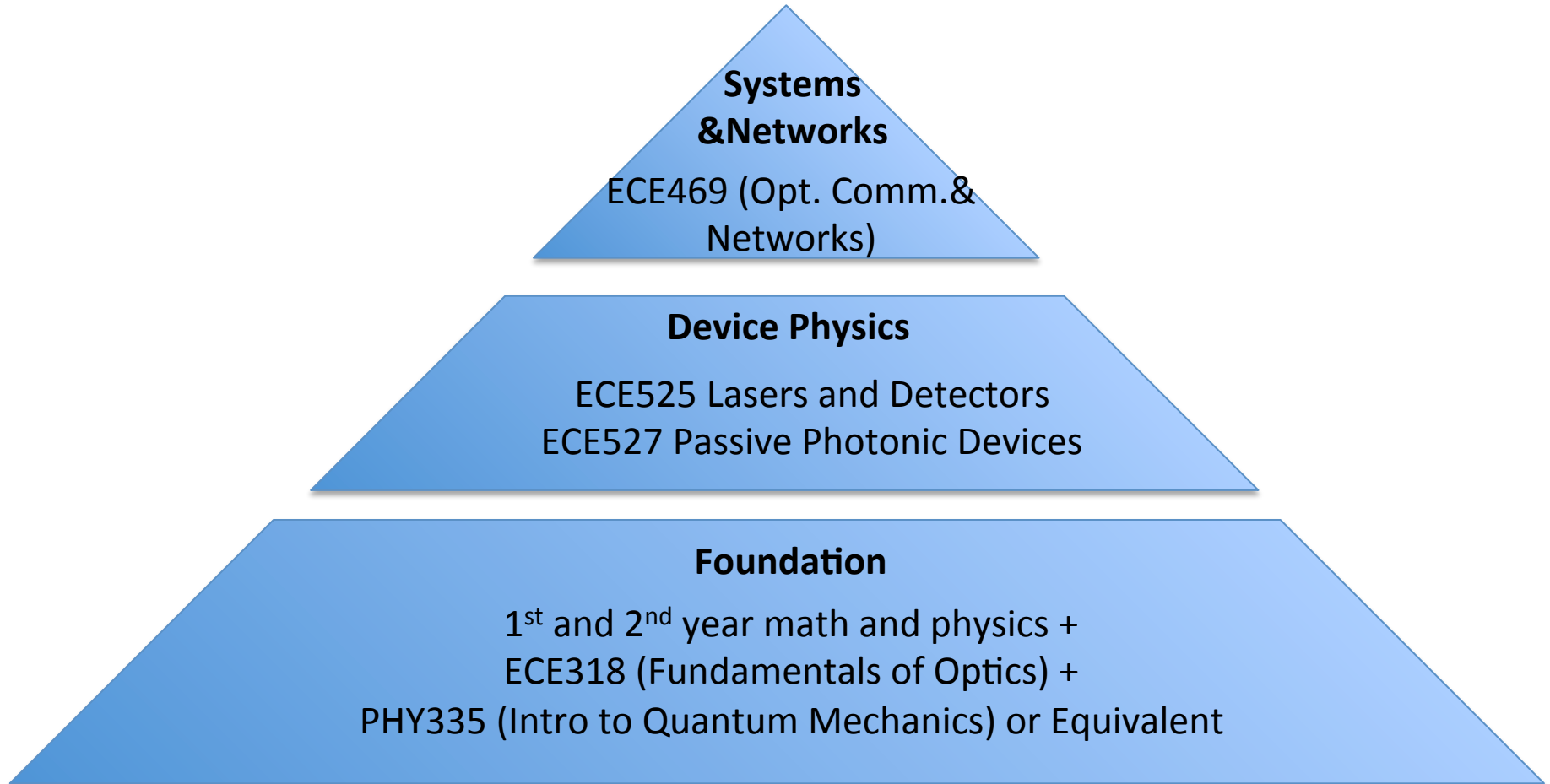
Sensing



Knowledge
Advancement

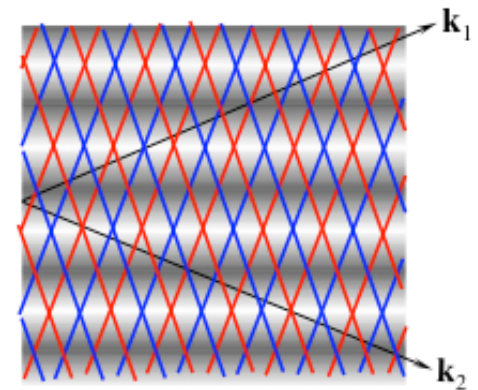


Interested in Photonics?



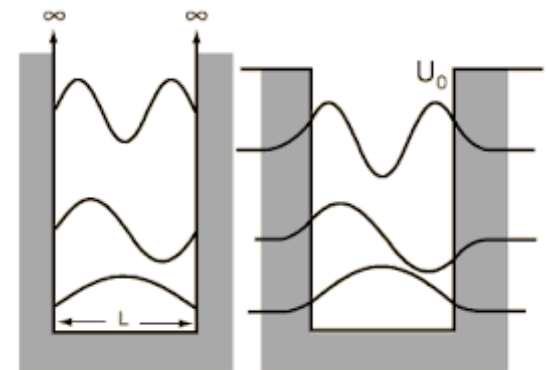
ECE318 Fundamentals of Optics

- Geometric Optics
 - Optical imaging systems
- Wave Optics
 - Maxwell's wave equations
 - Reflection, refraction, and total internal reflection
 - Interference (optical resonators, filters)
 - Diffraction (+ optical signal processing)
- Polarization Optics
 - Birefringence, waveplates, rotators
- Light and Matter
 - Absorption
 - Refractive index
 - Laser basics



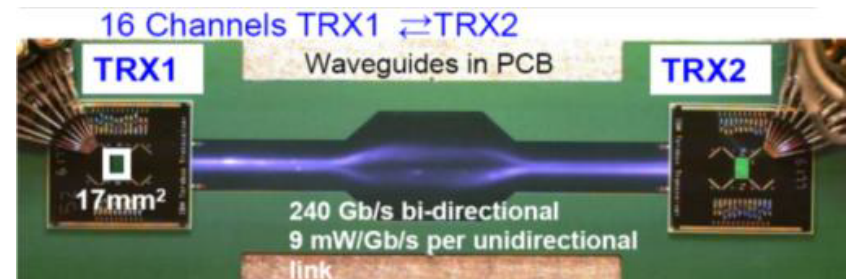
PHY335 Intro to Quantum Mechanics

- Blackbody radiation & Planck theory
- Photoelectric effect & Compton scattering
- Wave-Particle duality: electrons & photons
- Bohr model of hydrogen atom
- Schrodinger equation & its interpretation
- Quantum confinement: 1D and 3D (Cartesian and spherical)
- Quantum harmonic oscillator
- Superposition states & time evolution
- Heisenberg uncertainty principle
- Angular momentum
- Exchange symmetry: Fermions vs. Bosons



ECE527 Photonic Devices

- Electromagnetic plane waves
- Guided waves
- Optical devices
 - Modulators
 - Interferometers
 - Electrooptic devices
 - Electroabsorption



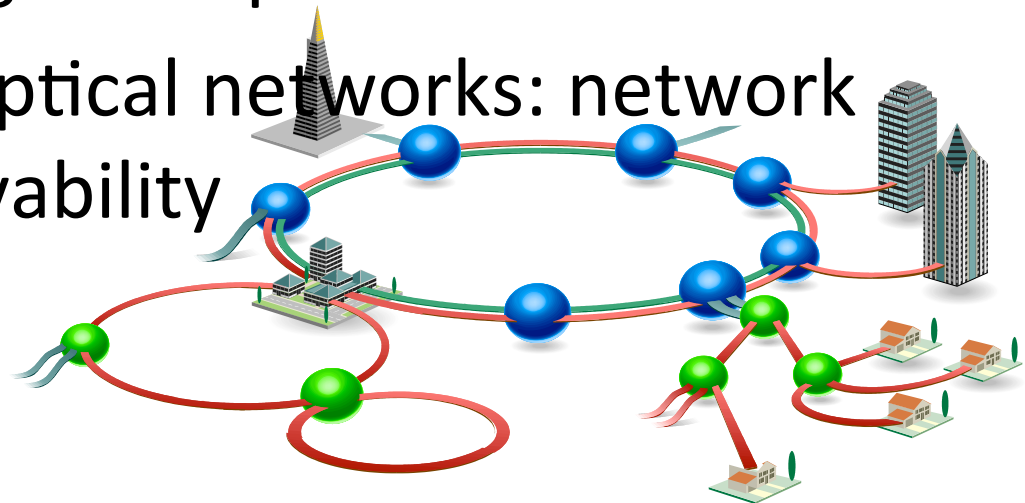
ECE525 Lasers and Detectors

- Semi-classical light-matter interactions
- Quantum-mechanical light-matter interactions
- Lasers
 - Basics
 - Semiconductor lasers
- Detectors and Noise
- Various topics in research and industry

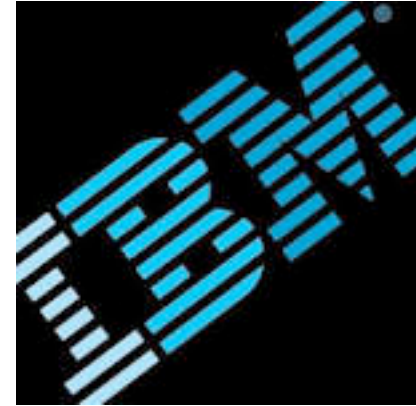


ECE469 Optical Communication & Networks

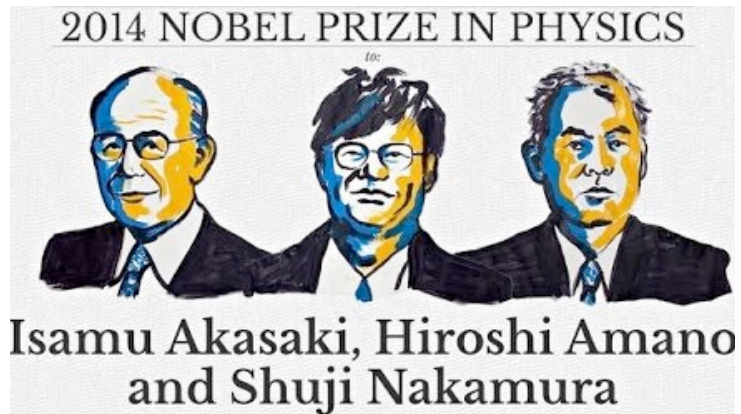
- Basic principles of transmitting data using light: How does an optical link work?
- Functional introduction to components used in optical communications
- System level design for optical links
- Design tools for optical networks: network routing and survivability



Photonics Industry



Recent Nobel Prizes in Photonics



2014: Blue LED



Eric Betzig



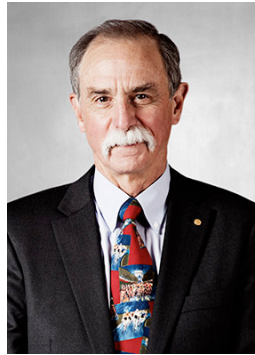
Stefan W. Hell



William E. Moerner

2014:
Super-resolved
Fluorescence
Microscopy

Recent Nobel Prizes in Photonics



2013: Quantum measurements
(including quantum optics)

Serge Haroche David Wineland



Charles Kao

2009: Fiber Optics



Willard Boyle



George Smith

2009: CCD imaging

International Year of Light



United Nations
Educational, Scientific and
Cultural Organization



International
Year of Light
2015

<http://www.light2015.org/Home.html>