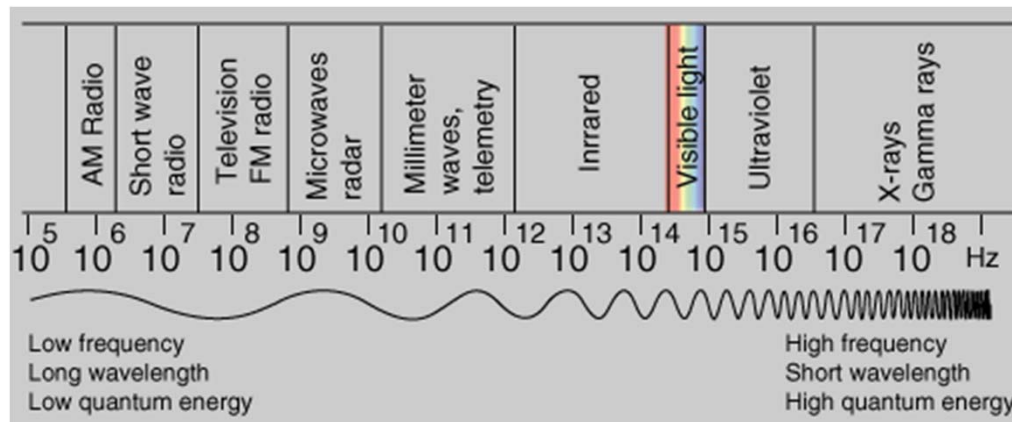


Lect. 1: Introduction

- ***What is light?***

- Wikipedia: EM radiation of a wavelength visible to human eye

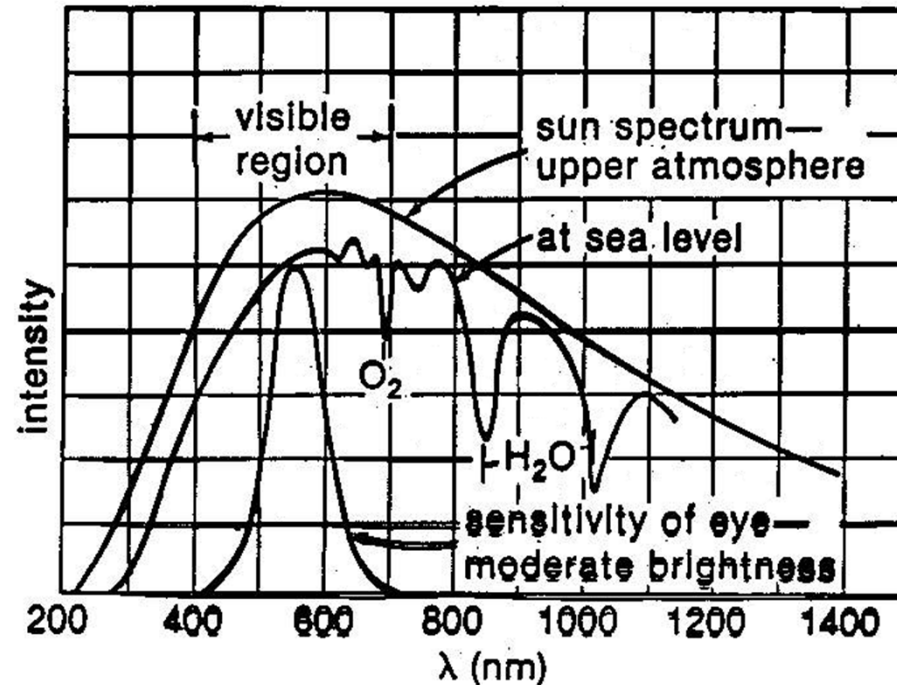


Visible light, Wavelength: 400-700 nm
Frequency: 430 - 750 THz
Photon energies: 1.65 - 3.1 eV

Why do we see only what we see?

Lect. 1: Introduction

Why do we see only what we see?

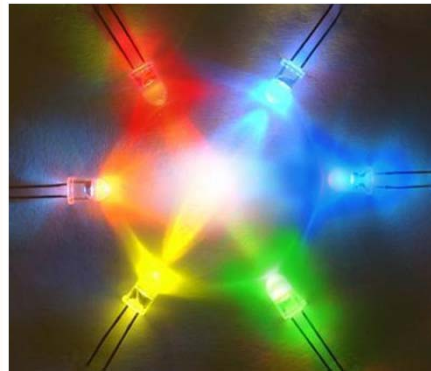


- Light from the sun has been the most abundant EM waves for very very long time!
- Why does the sun light have above spectrum?
Temperature of sun at the surface: about 5,500 deg C → Blackbody radiation
- Why is the sun so hot?

Lect. 1: Introduction

- *Why study light in **EEE**?* Many applications

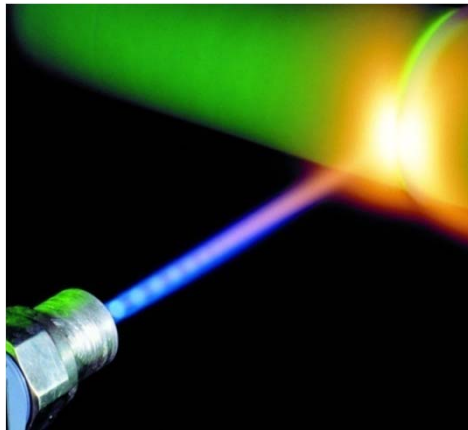
LED: Light Emitting Diode



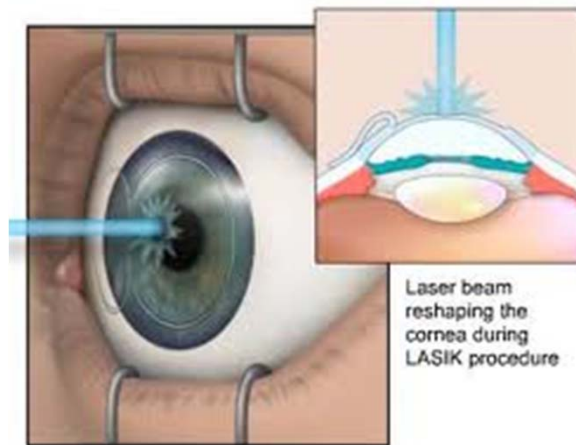
Lect. 1: Introduction

- *Why study light in EEE?* Many applications

LASER: Light Amplification by *Stimulated Emission* Radiation



Material Processing



Laser Surgery

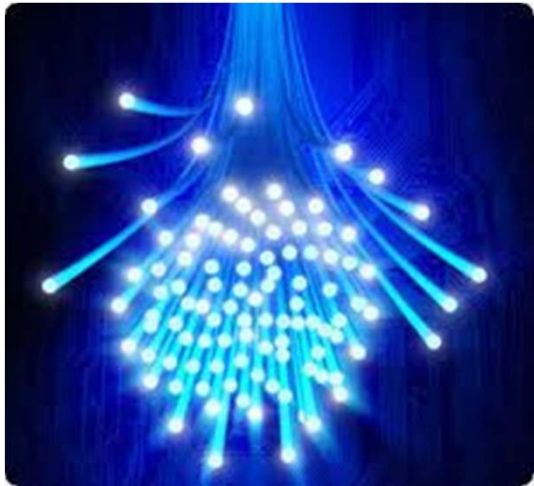


Hologram

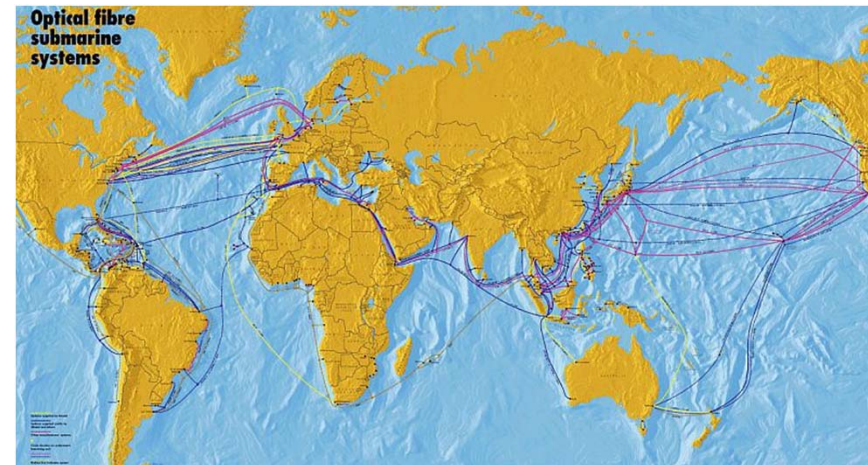
Lect. 1: Introduction

- *Why study light in **EEE**?* Many applications

Optical Communication



Light can travel inside fiber
with very small loss

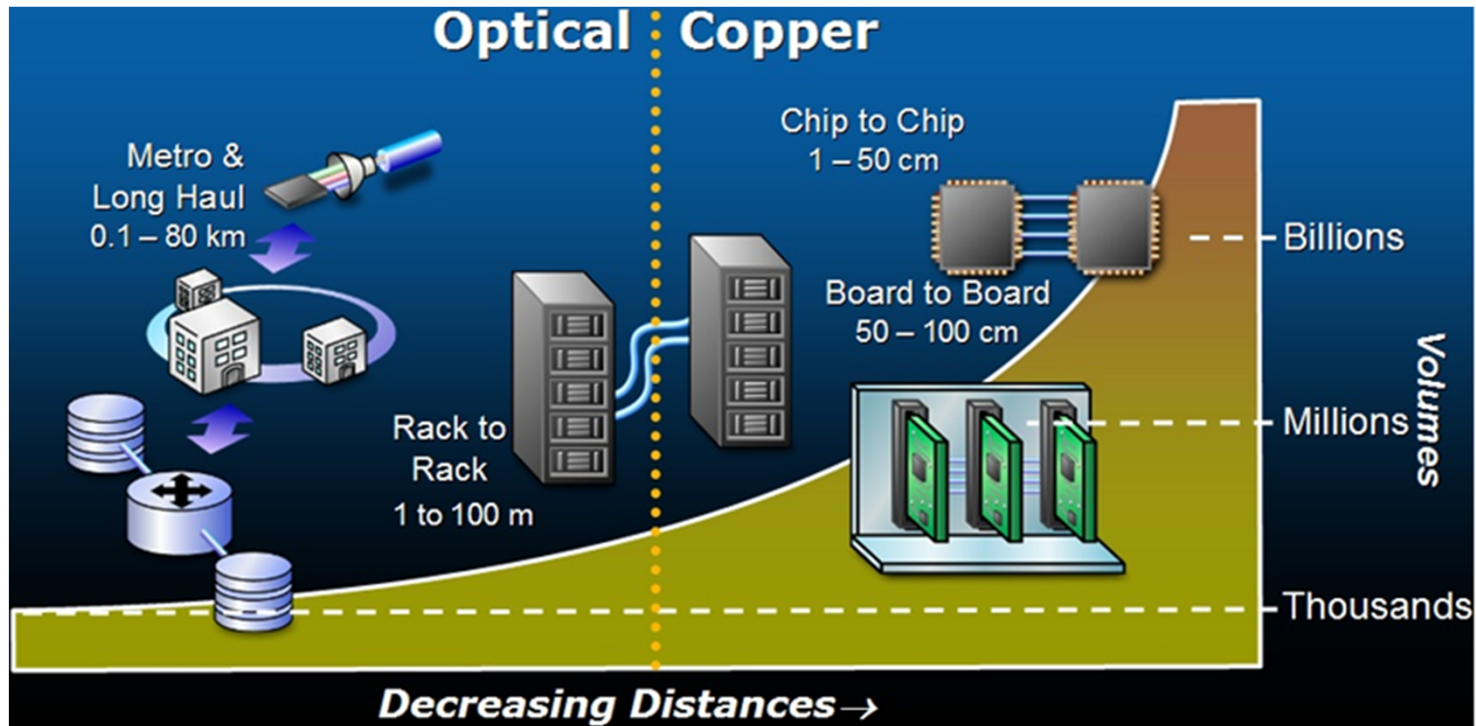


Key technology for internet revolution!

Lect. 1: Introduction

- *Why study light in **EEE**?* Many applications

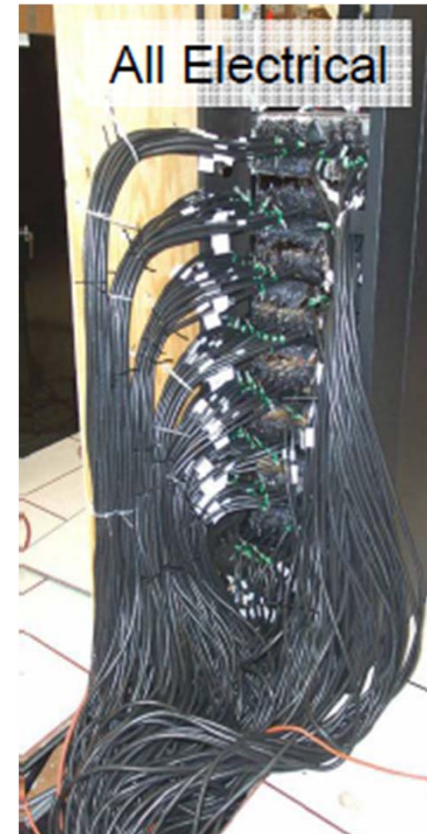
Optical Interconnect



Lect. 1: Introduction

- *Why study light in **EEE**?* Many applications

Data center for cloud computing



Lect. 1: Introduction

- *Why study light in EEE?*

Many applications in Information Technology

Information Transmission: Optical Communication/Interconnect

Information Display: LCD, LED, Hologram

Information Storage/Recovery: CD, DVD, Hologram

Medical Applications: Surgery, Imaging

What are we going to do in this course?

Lect. 1: Introduction

- Goals:

Learn the basic properties of light and photonic devices that control light property for useful applications

- Teaching Staffs

- Lecturer: Prof. Woo-Young Choi (최우영)

Room: B625, Tel: 02-2123-2874

Email: wchoi@yonsei.ac.kr, Web: tera.yonsei.ac.kr

- T.A.'s: Young Kwan Cho (조영관)

joyoungkwan0122@gmail.com

Room: B629, Tel: 02-2123-7709

- Class Hours

- Lecture: Mon. 2:00-3:50 pm, Wed. 1:00-1:50 pm at B041

Lect. 1: Introduction

- Textbook:

Class notes (Available in PDF before lecture at yscec)

References:

- *Field and Wave Electromagnetics* by Cheng
- *Optoelectronics and Photonics* by Kasap
- *Fundamentals of Photonics* by Saleh and Teich

- Grades

- 3 Tests: 20 points x 3 times = 60 points
- Design Projects: 10 points x 3 times = 30 points
- Attendance and homework: 10 points
(- 1.0 for absence, -0.25 for being late, No homework: -1.0)

Lect. 1: Introduction

● Lunch Meeting:

Students are encouraged to participate in lunch meetings with fellow students and professor. Lunch meetings will be held on Wed. from 12:00 - 12:40 in my office. Sign-up sheets will be available. We can have free conversation on the course, future career plans, etc. Sandwiches and drinks will be provided. A sign-up sheet will be available soon.

Lect. 1: Introduction

- Class Schedule

- Part 1: Lightwave
- Part 2: Waveguides
- Part 3: Optoelectronic Devices

Lect. 1: Introduction

- Class Schedule (Tentative and subject to changes)

- Part 1: Lightwave

- Lect. 1: Introduction

- Lect. 2: Light as EM waves

- Lect. 3: Light propagation in medium

- Lect. 4: Dielectric interface

- Lect. 5: Total internal reflection

- Lect. 6: Interference

- Lect. 7: Multiple dielectric interference

- Lect. 8: Interferometers

- Lect. 9: Diffraction

- Lect. 10: Diffraction Gratings

Test 1, Design Project 1

Lect. 1: Introduction

- Class Schedule (Tentative and subject to changes)

- Part 2: Waveguides

- Lect. 11: Metallic waveguide

- Lect. 12: Dielectric waveguide I

- Lect. 13: Dielectric waveguide II

- Lect. 14: Waveguide devices I

- Lect. 15: Waveguide devices II

- Lect. 16: Optical fiber

- Lect. 17: Dispersion in optical fiber

Test 2, Design Project 2

Lect. 1: Introduction

- Class Schedule (Tentative and subject to changes)

- Part 3 : Optoelectronic Devices

- Lect. 18: Light as a particle

- Lect. 19: Interaction between light and matter

- Lect. 20: Optical pumping

- Lect. 21: LED

- Lect. 22: Laser

- Lect. 23: Semiconductor laser

- Lect. 24: Single-mode semiconductor laser

- Lect. 25: Photodetectors

- Lect. 26 - 30 : Additional topics in optoelectronics if time is available

Test 3, Design Project 3