PHY121: Applied Physics for Engineers

Wave Optics

LECTURE # 20

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1

Contents

Wave Optics

- Interference of light
- Diffraction of light
- Polarization of light

2

Wave Optics

"The branch of optics which treats light with explicit recognition of its electromagnetic wave nature."

3

Interference of Light

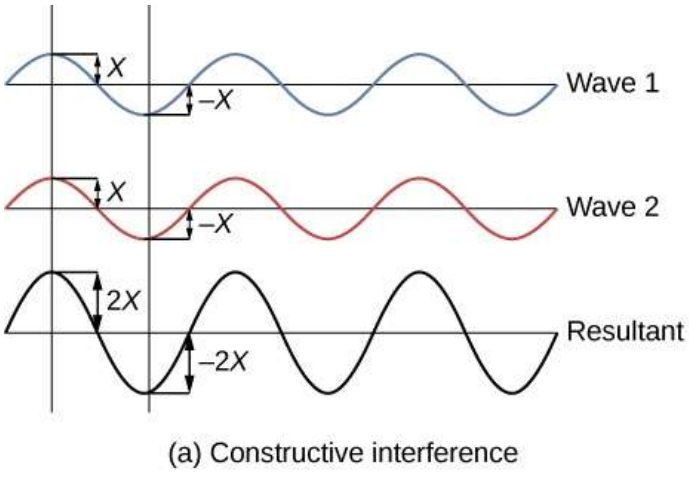
The charming colorful soap bubbles are a vivid example of interference of light.

4

Interference of Light

"When two or more light waves having the same frequency, same wavelength and same amplitude meet in a medium at a point, they cancel or enhance the effect of each other at that point. This phenomenon is called interference of light waves."

5

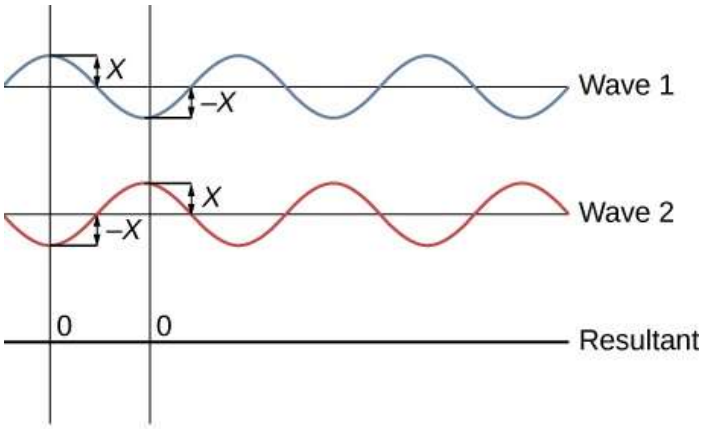


(a) Constructive interference

Constructive Interference

"In constructive interference, two waves of light reinforce each other."

6

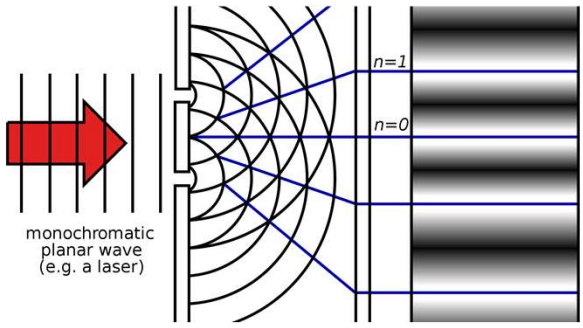


(b) Destructive interference

Destructive Interference

"In destructive interference, two waves of light cancel each other."

7



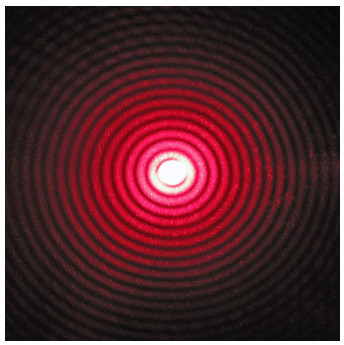
Young's Double Slit Experiment

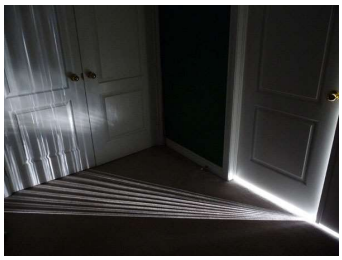
8

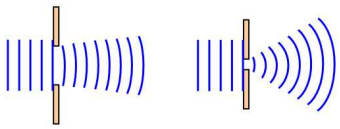
Diffraction of Light

"Diffraction is defined as the bending of waves around the corners of an obstacle or through an aperture into the region of geometrical shadow of the obstacle/aperture."

9







Diffraction of Light

10

Diffraction of Light

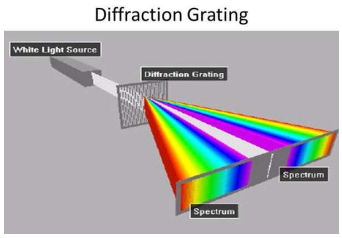
"Diffraction of light takes place if the size of obstacle is comparable to the wavelength of light."

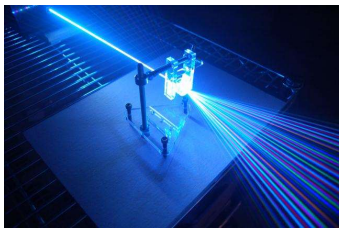
11

Diffraction Grating

"A diffraction grating is an optical component with a periodic structure that splits and diffracts light into several beams travelling in different directions."

12





Diffraction Grating

13

Polarization of Light

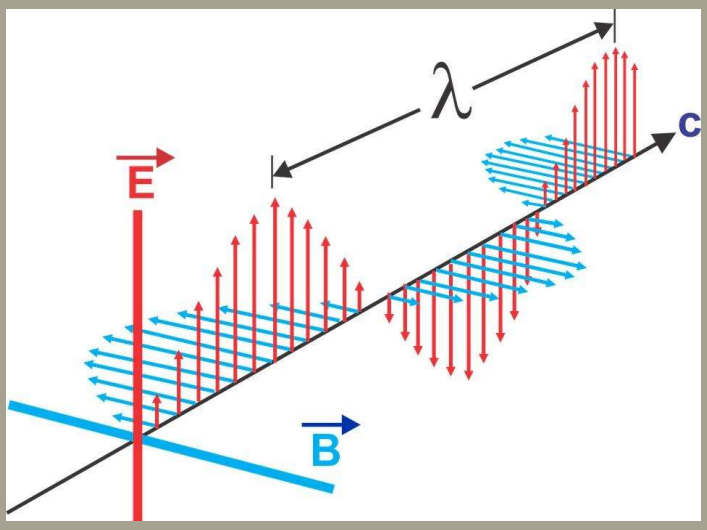
Today we know that light is a transverse electromagnetic wave just because of the phenomena of polarization of light.

14

Electromagnetic Waves

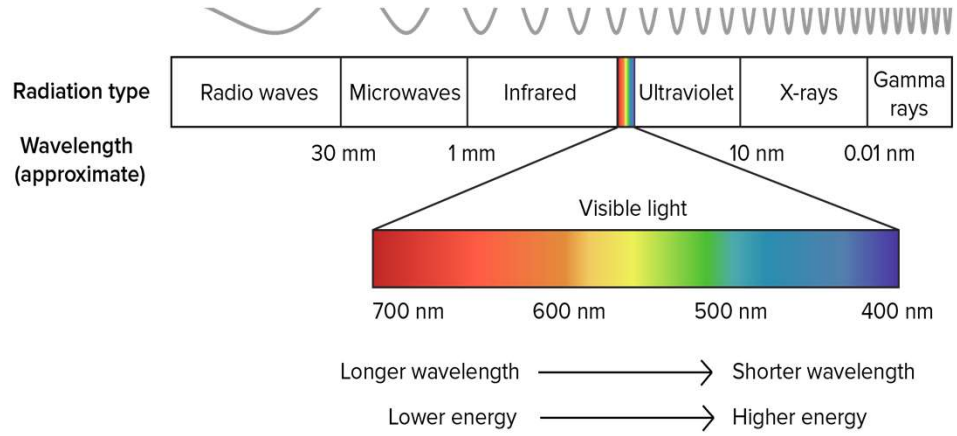
"Electromagnetic waves are the waves that are propagated by simultaneous periodic variations of electric and magnetic field intensity."

15



Electromagnetic Waves

16



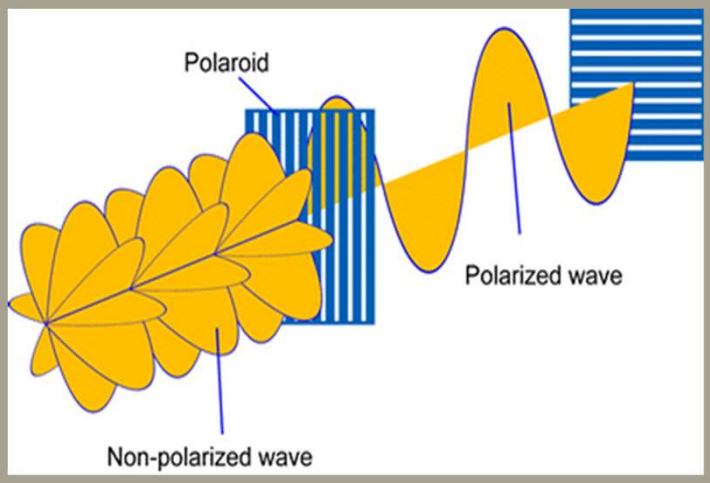
Maxwell's Rainbow

17

Polarization of Light

"The polarization of light refers to the removal of all but one plane so that the vibrations of the wave occur on only one plane."

18



Polarization of Light

19

Summary

- Wave Optics
- Interference of Light
- Diffraction of Light
- Polarization of Light

- "The branch of optics which treats light with explicit recognition of its electromagnetic wave nature."
- Constructive interference
- Destructive interference
- Young's double slit experiment
- "Diffraction is defined as the bending of waves around the corners of an obstacle or through an aperture into the region of geometrical shadow of the obstacle/aperture."
- "The polarization of light refers to the removal of all but one plane so that the vibrations of the wave occur on only one plane."

20

STAY BLESSED !

STAY FOCUSSED

21