

February 16, 2005

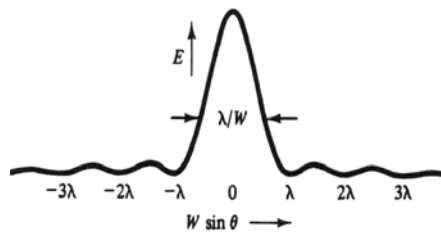
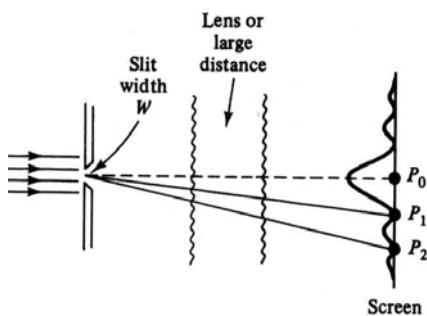
➤ Exam #1

➤ **TONIGHT!**, 7 pm, B104 Angell

1

Fun with Diffraction!

- Consider the following experiment (Fraunhofer Diffraction):



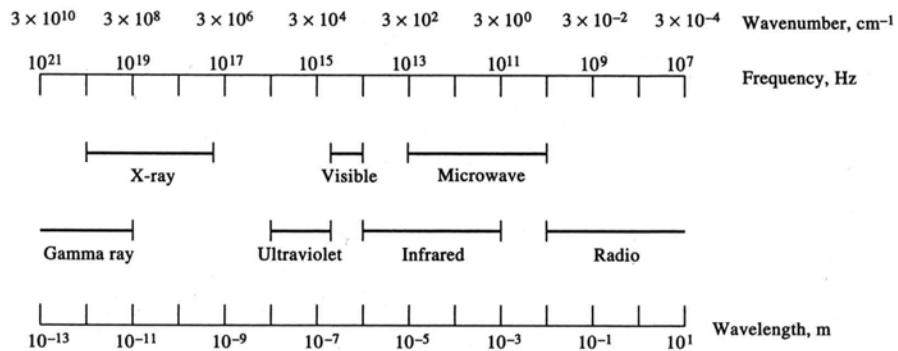
NOTE: There is a *wavelength* dependence to the diffraction pattern

See: <http://hyperphysics.phy-astr.gsu.edu/hbase/phyopt/sinlit.html#c1>

2

The Electromagnetic Spectrum

- EMR covers a very *wide range* of wavelengths and frequencies:



EMR: Particle Properties

- Energy of a *photon* can be related to its frequency:

$$E = h\nu$$

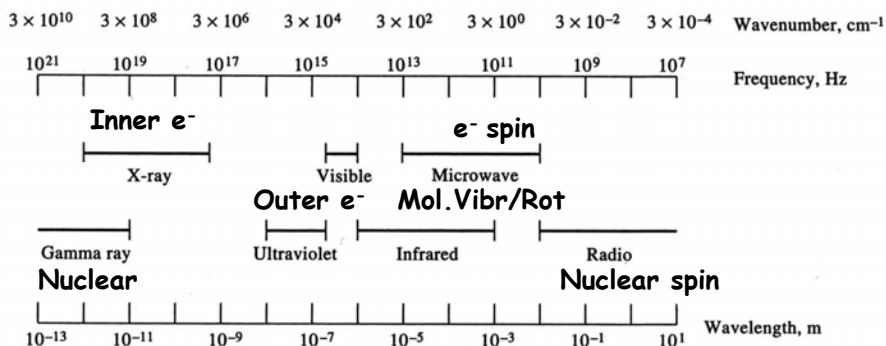
• Where h = Planck's Constant = 6.626×10^{-34} Joule-sec

• The photon energy is *inversely proportional* to the wavelength of the EMR:

$$E = hc/\lambda$$

Photon Energy: Absorption/Emission of EMR

- The EMR *ENERGY* determines which atomic/molecular properties can be probed via spectroscopy:



Units

- Varies with the spectral region:

- **UV/Visible**

Wavelength: $\text{\AA} = 10^{-8} \text{ cm} = 10^{-10} \text{ m}$

$\text{nm} = 10^{-7} \text{ cm} = 10 \text{\AA}$

$\mu\text{m} = 10^{-4} \text{ cm} = 10^4 \text{\AA}$

- **Infrared (IR)**

Wavelength: μm

Wavenumber($\bar{\nu}$): $\bar{\nu} = \lambda^{-1}$ (λ in cm gives cm^{-1})

NOTE: $\bar{\nu} \propto \text{Energy}$

Jablonski Diagram

