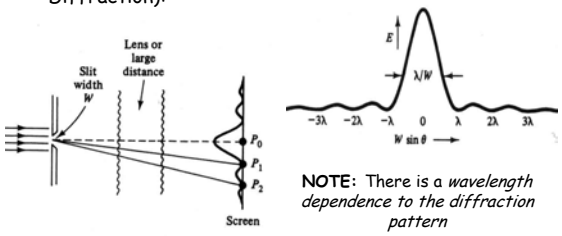
February 16, 2005

- **Exam #1**
  - ***TONIGHT!,*** 7 pm, B104 Angell

Fun with Diffraction!

- Consider the following experiment (Fraunhofer Diffraction):

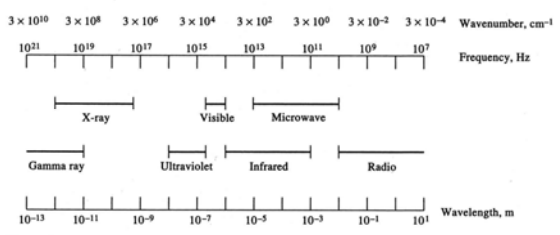


NOTE: There is a *wavelength dependence to the diffraction pattern*

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

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:

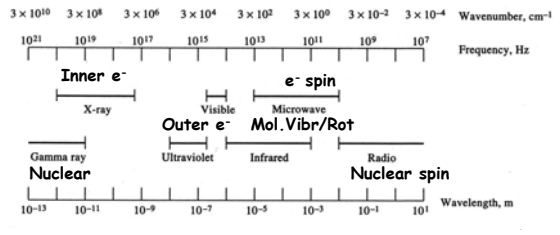
$$E = h\nu$$

- 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: Å = 10^{-8} cm = 10^{-10} m

    nm = 10^{-7} cm = 10 Å

    μm = 10^{-4} cm = 10^{4} Å
  - **Infrared (IR)**

    Wavelength: **μm**

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

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

Jablonski Diagram