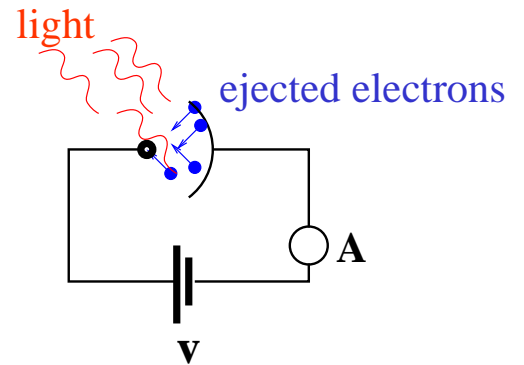


# Physics 113 -Lecture 10

## Light is a Particle !

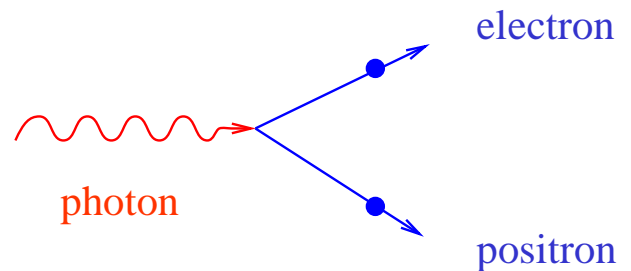
### photoelectric effect

$$hf = KE - W$$



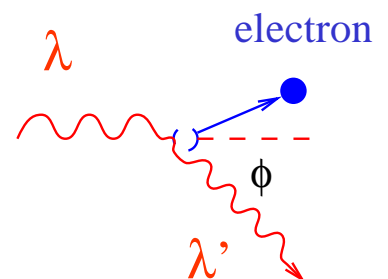
### electron pair production

Minimum Energy Photon  
 $hf = 2 m_e c^2$



### Compton scattering

$$\lambda' = \lambda + \frac{h}{m_0 c} (1 - \cos \phi)$$





# Bohr

angular momentum quantized

$$L = \frac{nh}{2\pi} \text{ where } n = 1, 2, 3, \dots$$

Electrons radiate by jumping between orbits emitting a single photon in the process

using Coulomb Force law with  $a = \frac{v^2}{r} \Rightarrow$

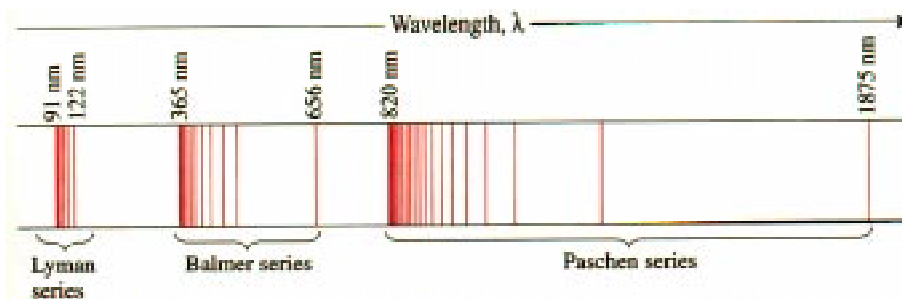
$$r_n = (.529 \times 10^{-10} \text{ m}) n^2$$

$$E_n = \frac{-13.6 \text{ eV}}{n^2}$$

## Bohr hypothesis explains atomic spectra

Experimentally :

$$\frac{1}{\lambda} = R \left( \frac{1}{n^2} - \frac{1}{m^2} \right) \text{ where } R = 1.097 \times 10^7 \text{ m}^{-1}$$



Bohr hypothesis is arbitrary though.

Basically chosen to fit atomic spectrum.