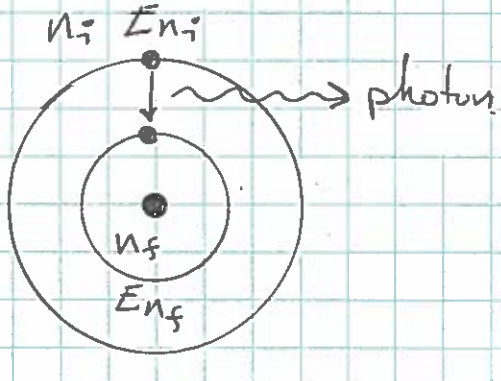
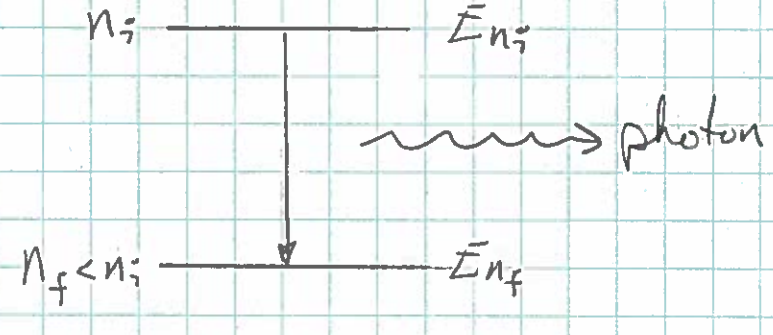
What does Bohr's theory predict for the Hydrogen spectrum?

Consider: emission





Photon Energy, $E_{ph} = |\Delta E_{e^-}| = |E_{n_f} - E_{n_i}|$

$$= \left| -\frac{13.6\text{eV}}{n_f^2} + \frac{13.6}{n_i^2} \right|$$

$$= 13.6\text{eV}\left(\frac{1}{n_f^2} - \frac{1}{n_i^2}\right)$$

$$= (13.6\text{eV})\left(\frac{n_i^2 - n_f^2}{n_f^2 n_i^2}\right)$$

Now, wavelength:

$$\lambda = \frac{hc}{E_{ph}} = \frac{hc}{(13.6\text{eV})\left(\frac{n_f^2 n_i^2}{n_i^2 - n_f^2}\right)} = (91.18\text{nm})\left(\frac{n_f^2 n_i^2}{n_i^2 - n_f^2}\right)$$

– perfect agreement with experiment!

for $n_i = 3$ & $n_f = 2$

$$\lambda = 656.5\text{ nm}$$

This is the bright red line in the Hydrogen emission spectrum.