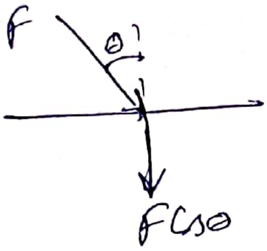
$$P = \frac{F\cos\theta}{A}$$



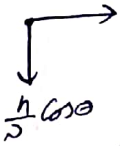
$$P = \frac{IA\cos^2\theta}{Ac}$$

$$\boxed{P = \frac{I}{c}\cos^2\theta}$$

(ii) $a = 0$, $r = 1$

$$p_i = \frac{h}{\lambda}\ (\searrow)$$

$$p_f = \frac{h}{\lambda}\ (\nearrow)$$



~~$\Delta P = \frac{2h}{\lambda}$~~

$$\Delta p = \frac{2h}{\lambda}\cos\theta$$

$$n = \frac{IA\cos\theta}{hc} \times \lambda$$

$$F = \frac{IA\cos\theta}{hc} \times \lambda \times \frac{2h}{\lambda}\cos\theta$$

$$\boxed{F = \frac{2IA}{c}\cos^2\theta}$$

⊥ hi hai — because change in momentum is in y-direction

$$\therefore\ P = \frac{F_\perp}{A}$$

$$\boxed{P = \frac{2I}{c}\cos^2\theta}$$

(iii) $r = r$, $a = 1 - r$

$$n_r = \frac{IA\cos\theta\,\lambda}{hc} \times r$$

$$n_a = \frac{IA\cos\theta\,\lambda}{hc} \times (1 - r)$$

$$\Delta P_r = \frac{2h}{\lambda}\cos\theta$$

$$\Delta P_a = \frac{h}{\lambda}$$

$$F_r = \frac{IA\cos\theta\,\lambda}{hc} \times r \times \frac{2h}{\lambda}\cos\theta$$

$$F_r = \frac{2IA\cos^2\theta}{c} \cdot r$$

$$F_a = \frac{IA\cos\theta\,\lambda}{hc}(1 - r) \times \frac{h}{\lambda}$$

$$F_a = \frac{IA\cos\theta}{c} \cdot (1 - r)$$

$$P_a = \frac{IA\cos^2\theta}{cA}(1 - r)$$

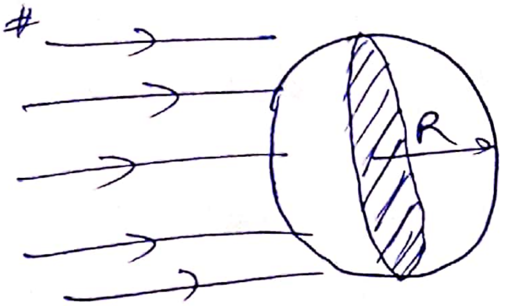
$$\boxed{P_a = \frac{I}{c}\cos^2\theta\,(1 - r)}$$

$$\boxed{P_r = \frac{2I\cos^2\theta}{c} \cdot r}$$

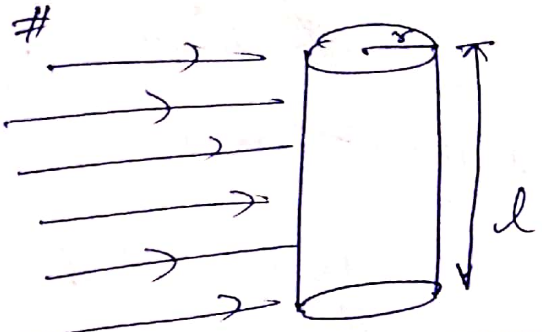
$$F_{net} = F_r + F_a$$

★ The force due to radiation on a symmetric body can be given by

$$\boxed{F_{net} = \frac{I}{c} \times \text{Projected Area}}$$



* $F_{net} = \frac{I}{c} \times \pi R^2$



$F_{net} = \frac{I}{c} \times 2r \times l$

Matter Waves :- De-Broglie

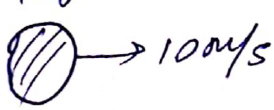
$\lambda = \frac{h}{mp}$

$\lambda = \frac{h}{mv}$

λ → Wavelength

mv → Particle Nature

Normal life 1kg

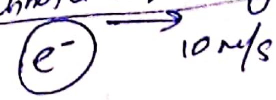


$\lambda = \frac{h}{mv}$

$\lambda = \frac{6.63 \times 10^{-34}}{1 \times 10}$

$\lambda = 6.63 \times 10^{-35} m$

Chhota life body



$\lambda = \frac{h}{mv}$

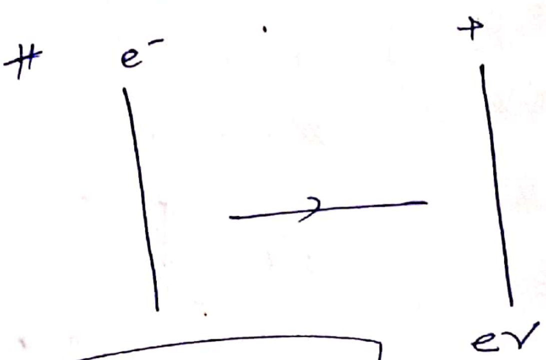
$\lambda = \frac{6.63 \times 10^{-34}}{9.1 \times 10^{-31} \times 10}$

$\lambda = \frac{6.63}{9.1} \times 10^{-4} m$

↓

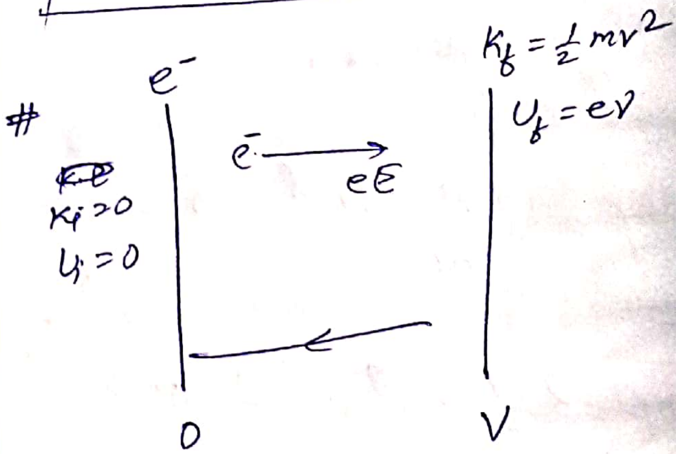
Comparable

#



$K.E_{max} = eV$

#



Now from E.C

$K_i + U_i = K_f + U_f$

$0 + 0 = \frac{1}{2} mv^2 - eV$

$eV = \frac{1}{2} mv^2$

Now,

$$\lambda = \frac{h}{p} \quad \text{--- (1)}$$

$\because$ $K.E = \frac{p^2}{2m}$

$$p = \sqrt{2m \cdot K.E} \quad \text{--- (2)}$$

Putting (2) in (1)

$$\lambda = \frac{h}{\sqrt{2m(K.E)}}$$

$$\boxed{\lambda = \frac{h}{\sqrt{2meV}}}$$

for e^-

$$\therefore \lambda = \frac{6.63 \times 10^{-34}}{\sqrt{2 \times 9.1 \times 10^{-31} \times 1.6 \times 10^{-19} \cdot V}}$$

$$\Rightarrow \boxed{\lambda = \sqrt{\frac{150}{V}} \; Å}$$

$$\Rightarrow \boxed{\lambda = \frac{12.27}{\sqrt{V}} \; Å}$$

(P.d)

* for Proton,

$m_p = 1.67 \times 10^{-27}$ kg

$$\boxed{\lambda = \frac{0.286}{\sqrt{V}} \; Å}$$

\# for duetrons.

$$m_d = 2 \times m_p$$

$$\boxed{\lambda = \frac{0.202}{\sqrt{V}} \; Å}$$

* for α-particle :-

$m_\alpha = 4m_p$

$$\boxed{\lambda = \frac{0.101}{\sqrt{V}} \; Å}$$

\# find out the de-Broglie wavelength of a monoatomic gas molecule at t temp.

$\therefore E = \frac{f}{2} nRT$

$f = 3$

$$K.E = \frac{3}{2} k.T$$

$$\lambda = \frac{h}{\sqrt{2m \cdot \frac{3}{2} kT}}$$

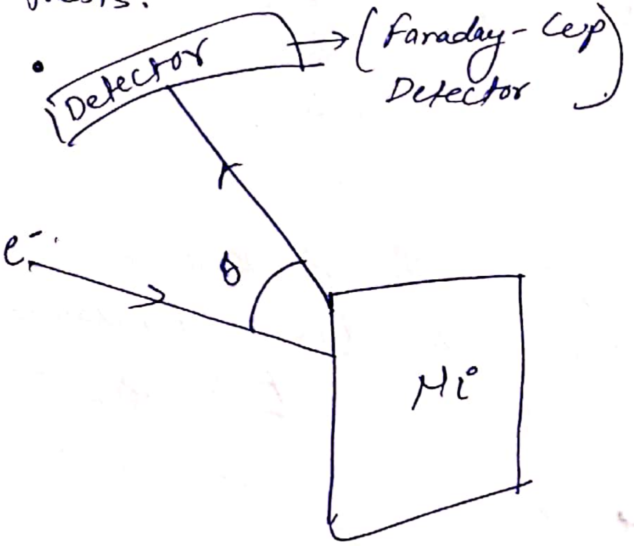
$$\boxed{\lambda = \frac{h}{\sqrt{3mkT}}}$$

→(De-broglie ko support).

⇒ Davisson-Germer Experiment :-

(1924) (x-ray diffraction)

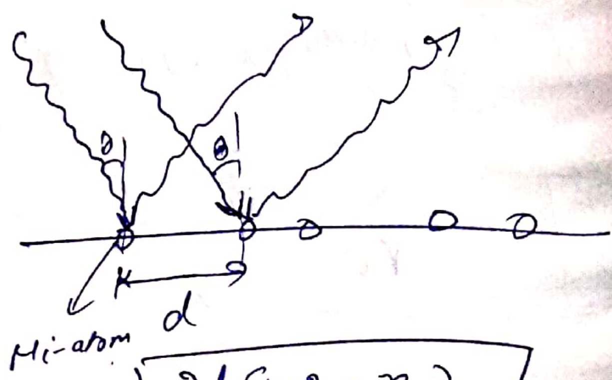
- This experiment prove that electron is a wave and supported the de-Broglie hypothesis.

- 

- It generate e^- by an electron gun.
- These e^- are made to fall on Nickel at Normal incidence.
- A detector was kept at various angles and current was checked by the scattered electrons.
- Strong maximas in the Intensity of reflected electron beam were found to occur at specific angles.

- Thus more current was recieved at some angles and these angles were analyzed.
- This angular position of maxima dependent on the accelerating voltage used to produce the electron.
- This behaviour was found to be same as x-ray diffraction pattern which means that the electron beam was being diffracted. (wave hypothesis proved)

- Atoms in a surface plane are arranged in rows with a distance 'd' that can be measured by (X-d) x-ray diffraction Techniques.
- These rows acts like diffraction grating with distance 'd' b/w the slits.



$$2d \sin\theta = n\lambda$$