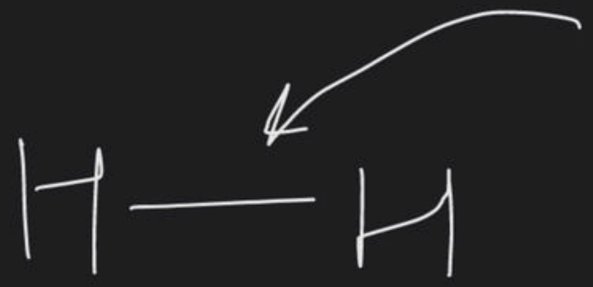
De-Broglie Hypothesis

Course on Atomic Structure for Class XI

akhilesh • Lesson 10 • Sept 10, 2021

43)



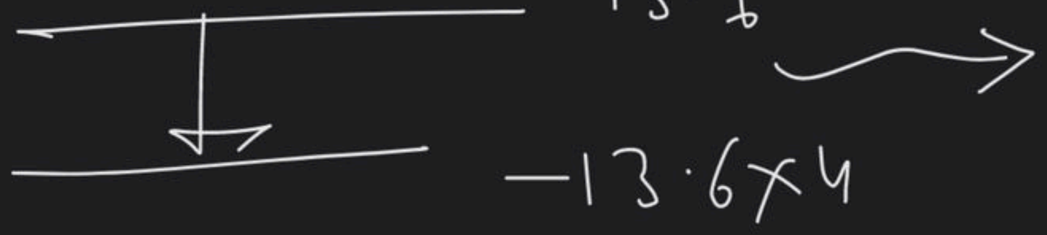
$$E = \frac{\frac{1240\,nm.\,eV}{253.7}}{x}$$

$$430.53\ kJ/mol$$

$$y = \frac{\frac{430.53 \times 10^3\ J}{N_A}}{}$$

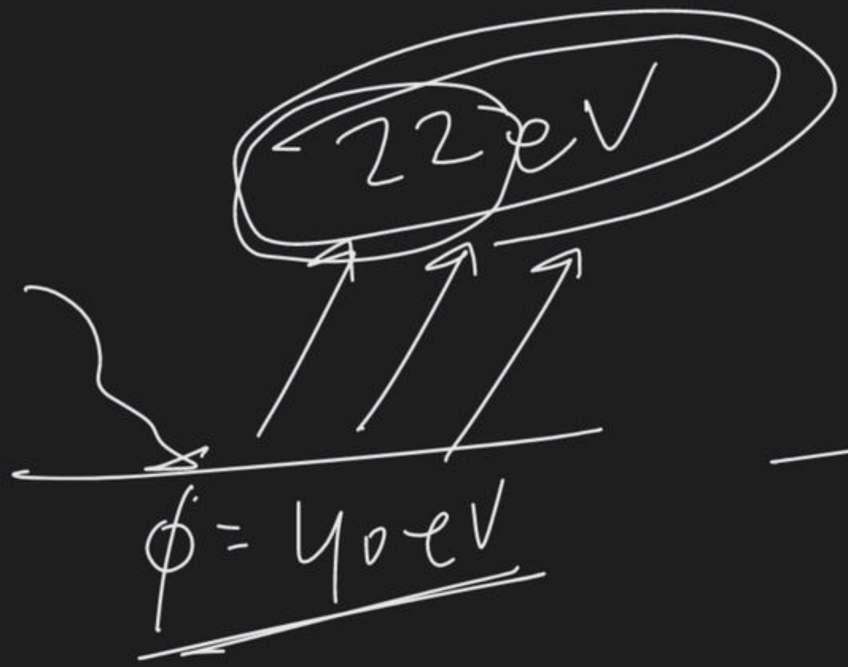
$$\frac{\frac{x-y}{x}}{} \times 100$$

42



13.6×3 ∴ 13.6

41



13.6×2 $eV = \frac{1}{2} mv^2$

$62 eV = \frac{hc}{\lambda}$

11 & 12

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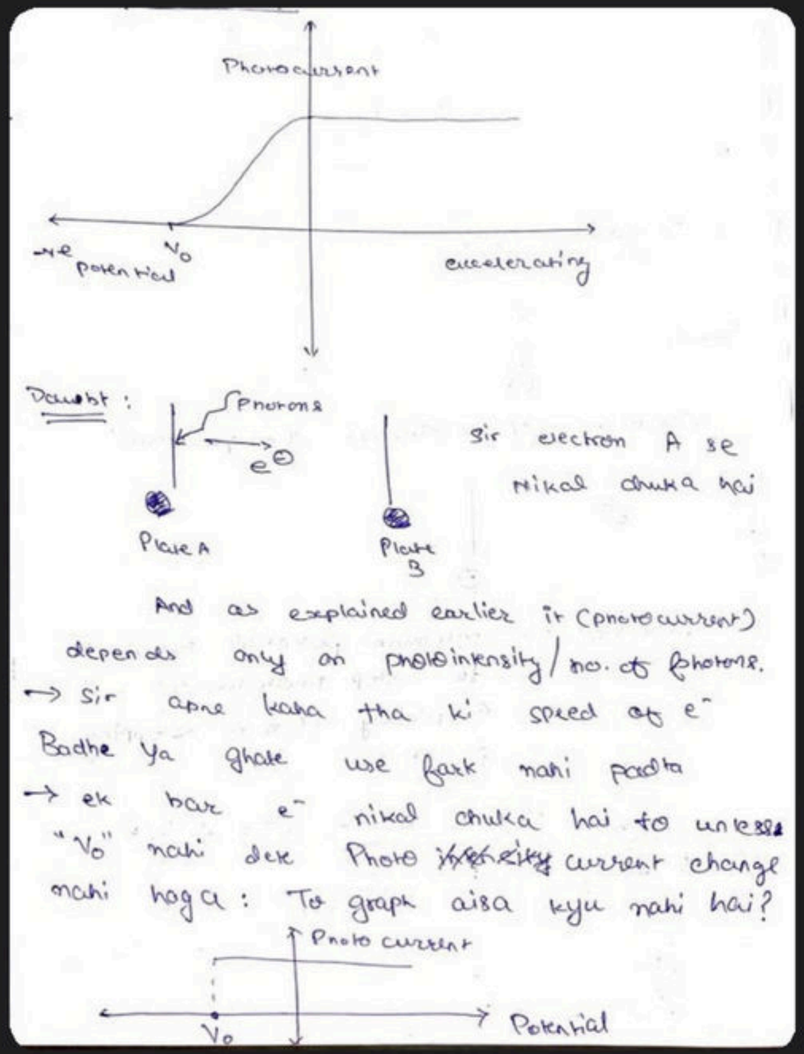
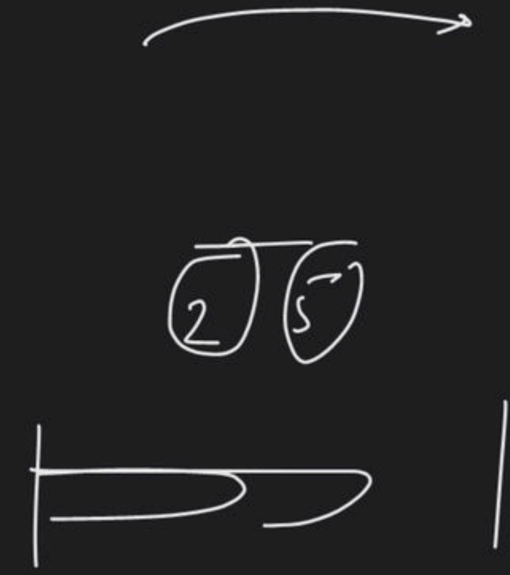
▲ 34 • Asked by Ridham

Sir photocurrent vs Potential ke graph se ek doubt hai





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▲ 12 • Asked by Dhruv

namasta sir sir q se zyada unki alag alag units mai galat ho raha hai uska koi method of prevention as take care kia tab bhi reh jata hai koi point

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▲ 13 • Asked by Anurag

KUCH BATAO SIR YE WALI PHOTO KE BAARE ME

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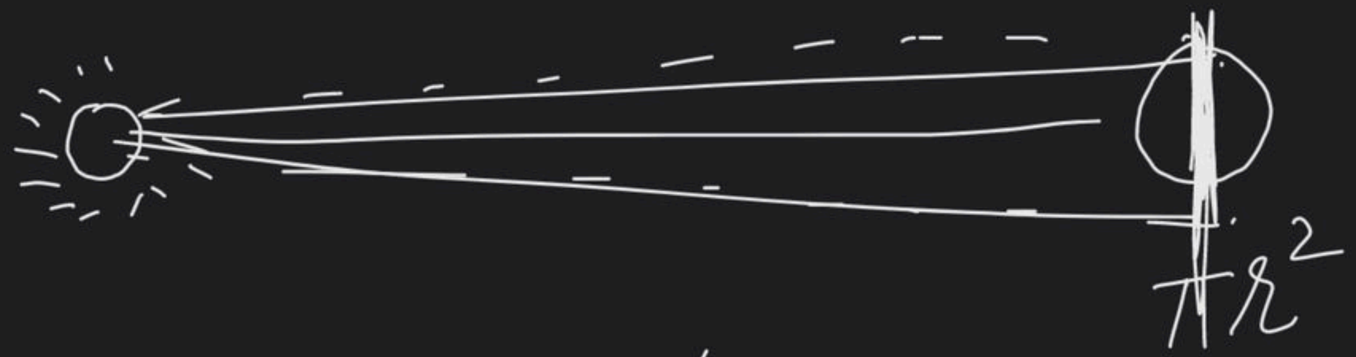
▲ 8 • Asked by Abhishek

SIR CONCEPT CLEAR HAI BUT QUESTIONS NHI BANTE ATOMIC KE. WHAT TO DO?

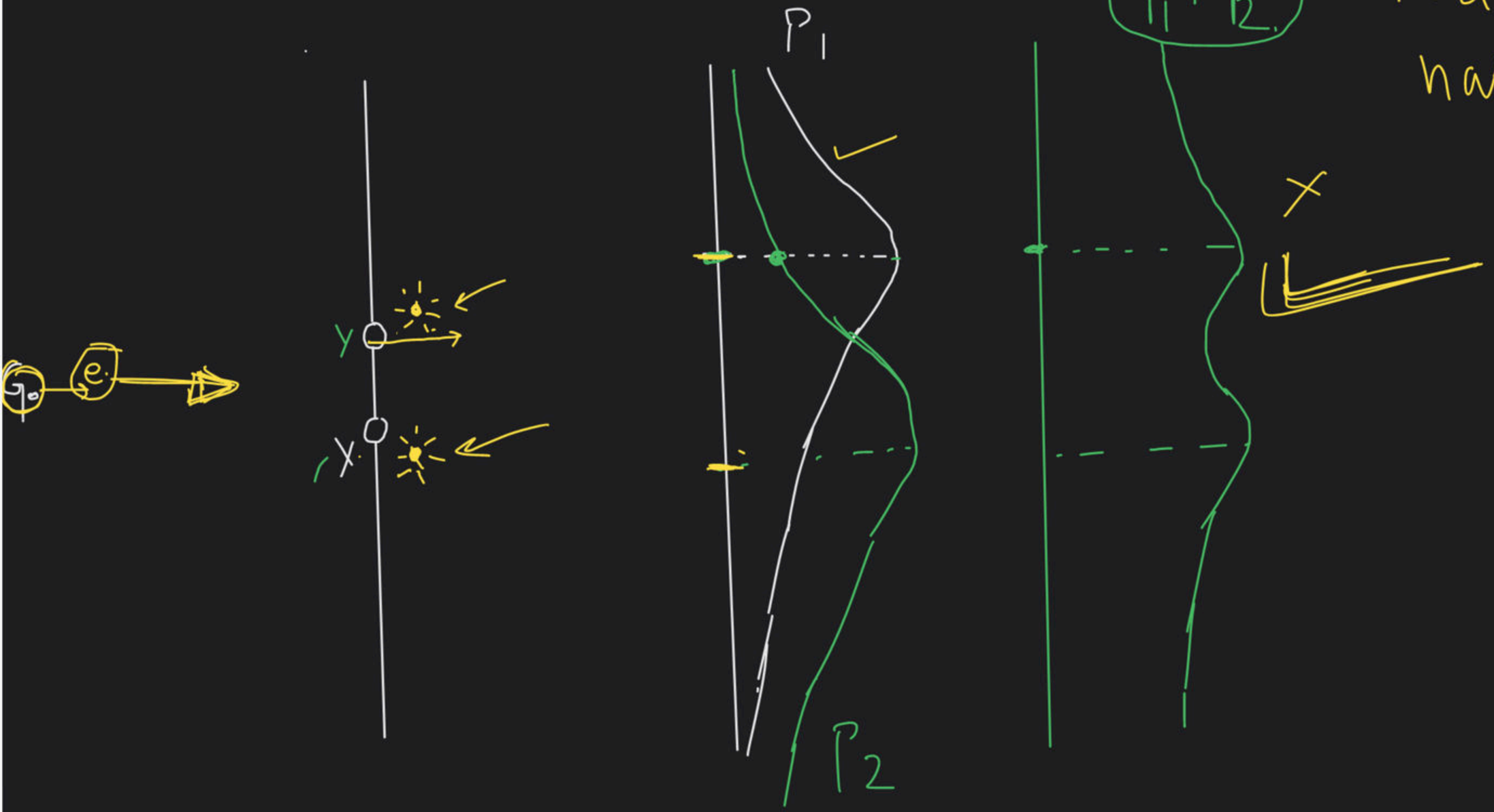
$$eV_0 = KE_{max} = h\nu - h\nu_0$$



$$\frac{n}{4\pi R^2} \times \pi r^2$$

$$\frac{2 \times 10^{20}}{4 \times 25 \times 10^{6}} \times 10^{-4} = 2 \times 10^{8}$$

De broglie hypothesis :



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

m = mass of particle

v = speed of particle

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

$$(mv)^2 = 2mKE$$

$$\lambda = \frac{h}{\sqrt{2 \cdot m \cdot KE}} = \frac{h}{\sqrt{2 \cdot m \cdot q \cdot V}}$$

In case of e^-

$$\lambda = \sqrt{\frac{150}{V}}\ A^\circ$$

Q. Calculate the debroglie λ of a particle of mass 6.62 gm moving 50 m/sec

$$\lambda = \frac{6.62 \times 10^{-34}}{6.62 \times 10^{-3} \times 50} = 2 \times 10^{-33} \text{ m.}$$

$$50 \text{ m/sec} = 50 \times 18/5 \text{ km/hr}$$

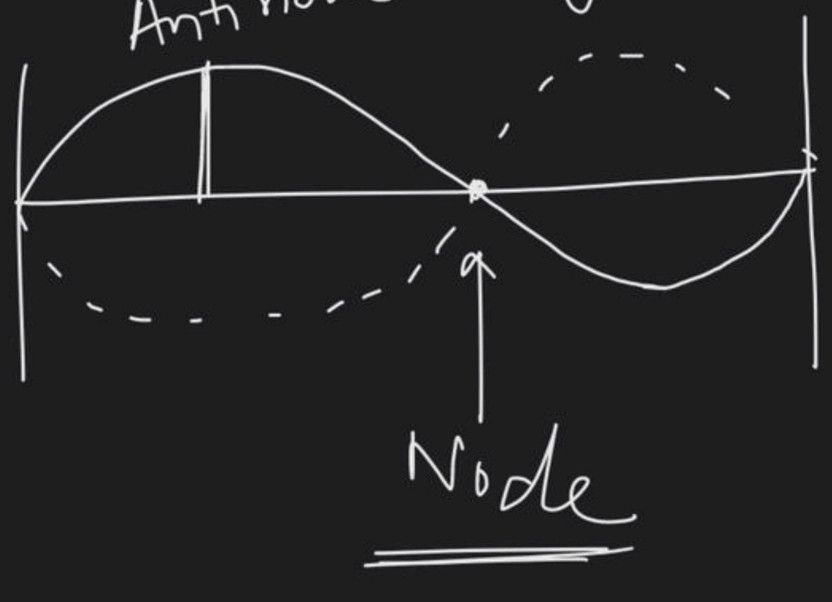
$$180 \text{ km/hr} \leftarrow$$

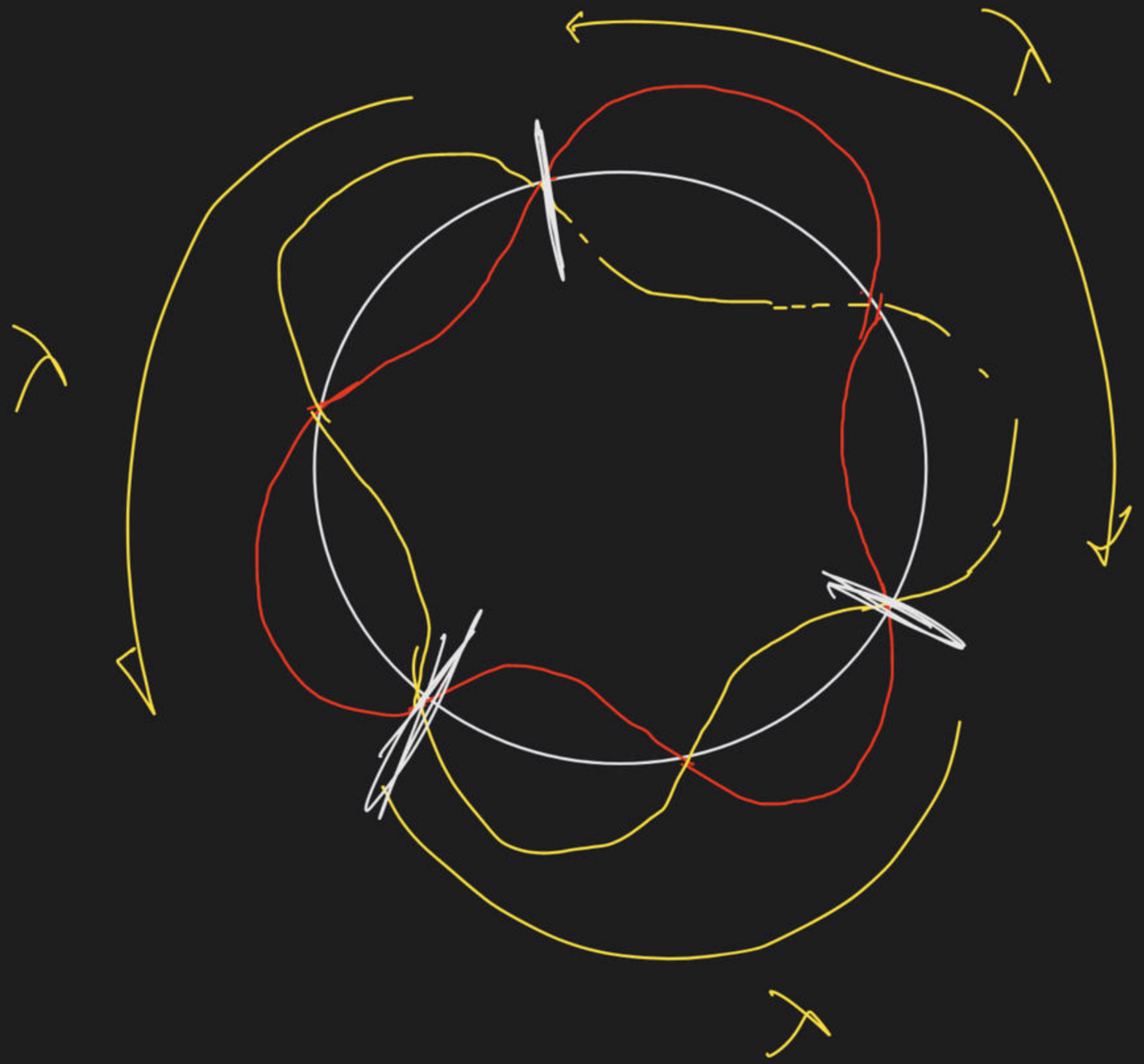
find λ of e^- having $KE = 1.5\ eV$.

$$\lambda = \sqrt{\frac{150}{1.5}} = \underline{\underline{10\ A^\circ}}$$

Derivation of Bohr's quantization of angular Momentum using De broglie hypothesis :-

standing wave

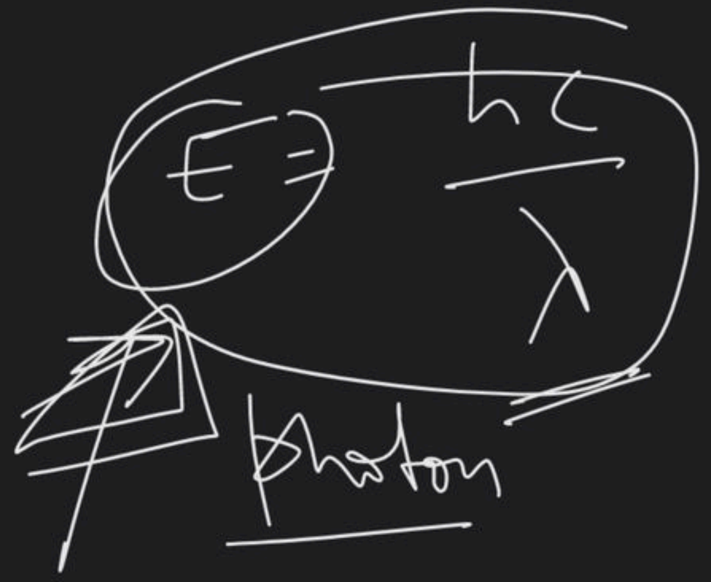




$$2\pi r = n\lambda$$

$$\frac{1}{\lambda} = R_H Z^2 \left[\frac{1}{n_1^2} - \frac{1}{n_2^2} \right]$$

photon



$$\lambda = \frac{h}{mv} = \frac{h}{\sqrt{2m \, KE}}$$

$$2\pi r = n \frac{h}{mv}$$

$$mvr = \frac{nh}{2\pi}$$

$$2\pi r = n\lambda$$

$$2\pi \left(0.529 \frac{n^2}{z} \text{Å}\right) = n\lambda$$

$$2\pi \left(0.529 \frac{n}{z}\right)\text{Å} = \lambda$$

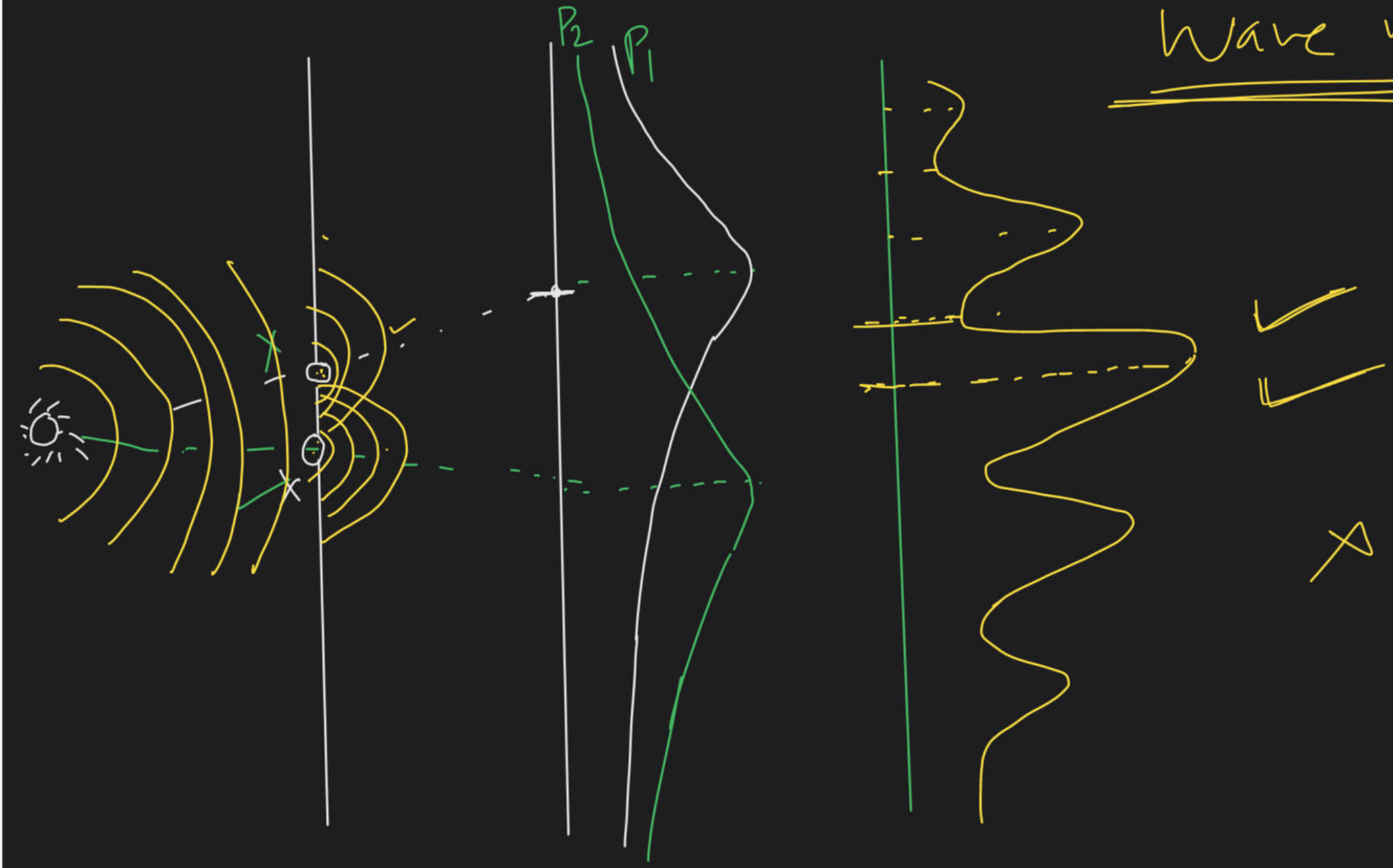
$$\lambda = \frac{h}{mv}$$

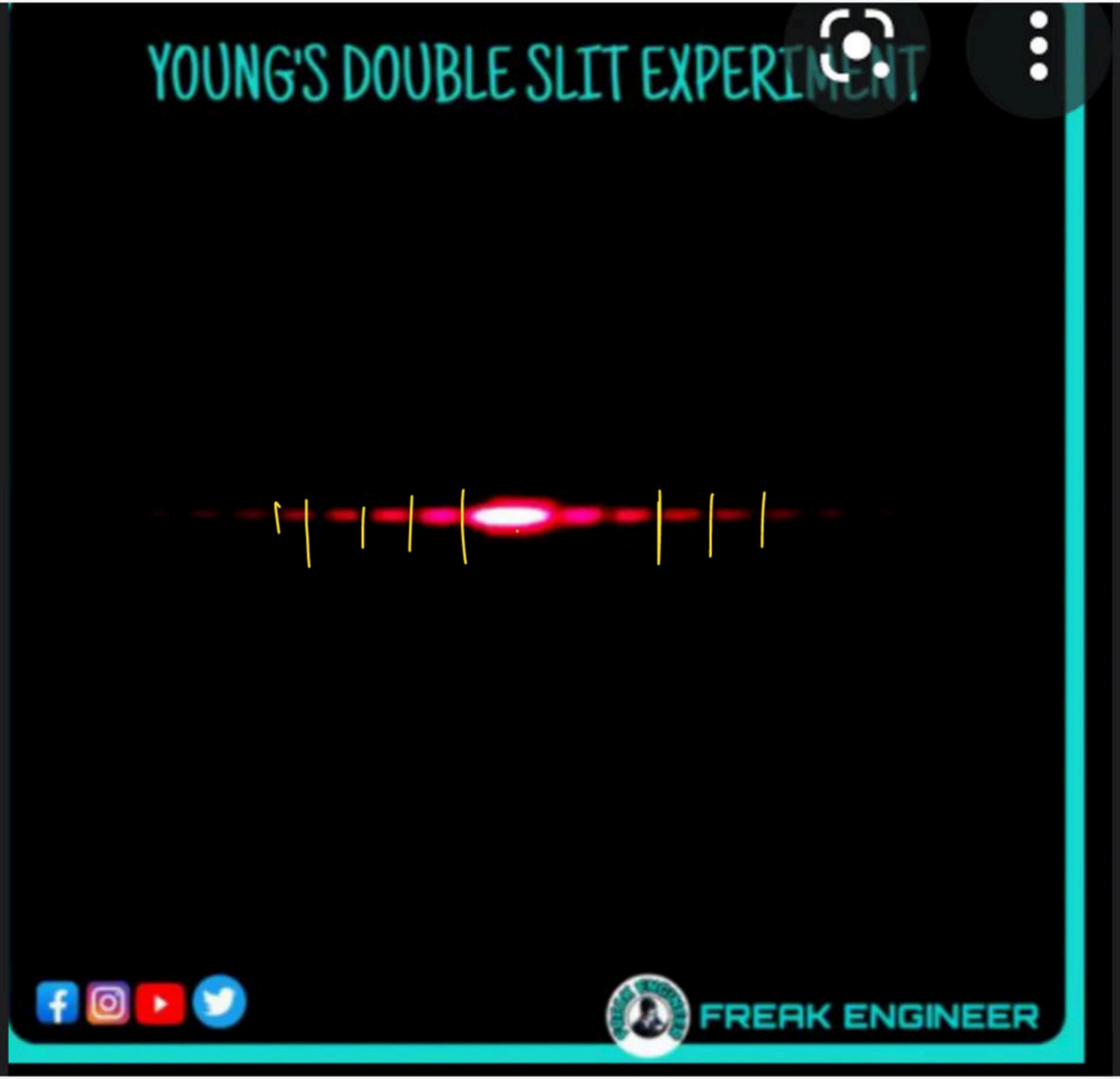
Clash of titan by BBC

S-1 4C — 51

B-1 42 - 48

Wave nature

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