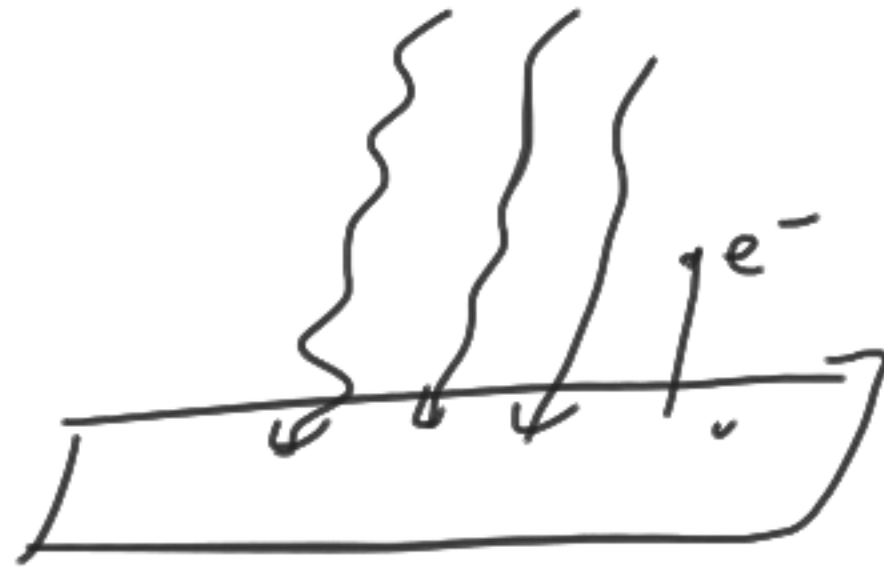


BPT-401

Photo electric effect



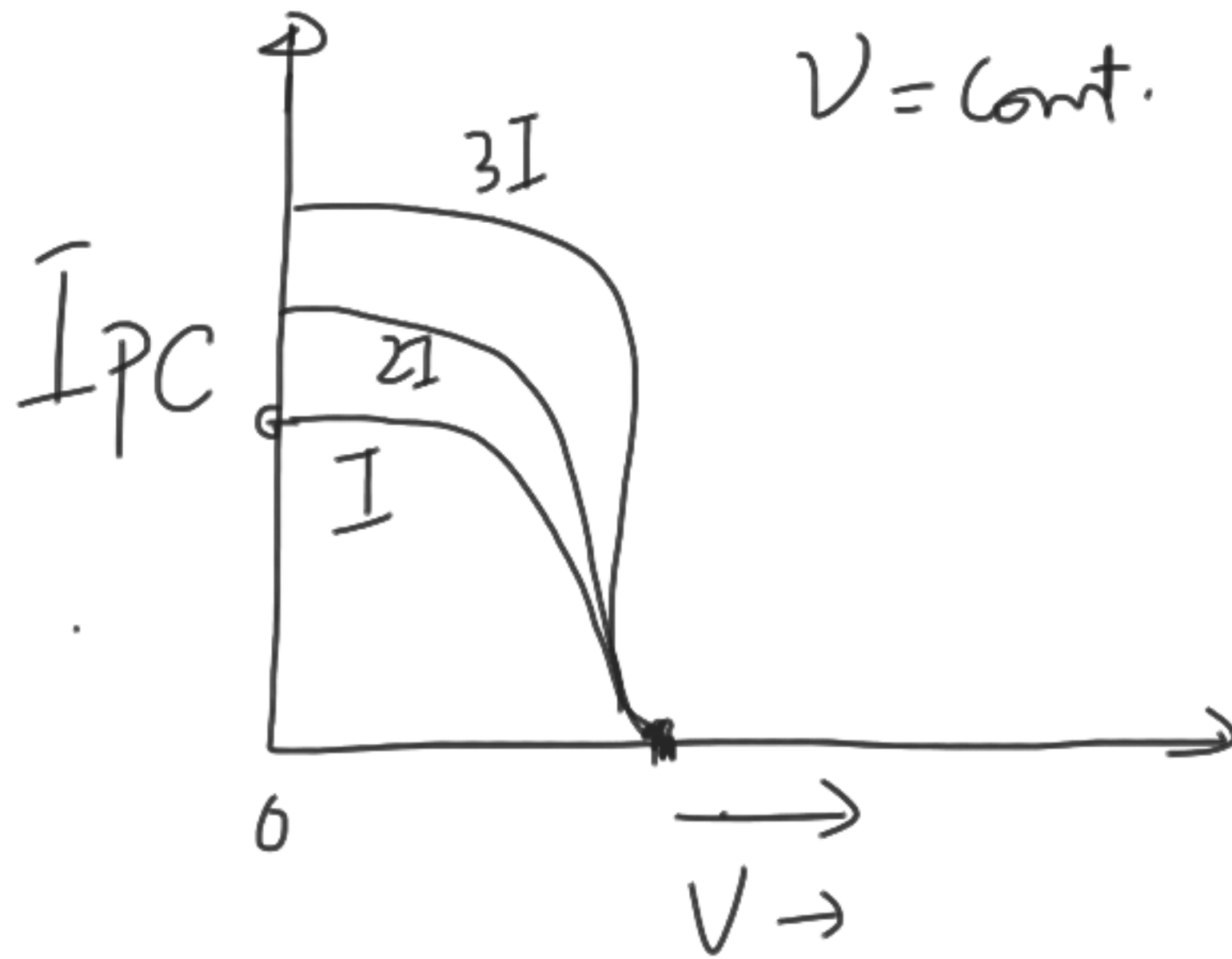
~~Wavelength~~ N

Date-17/04/2021

em wave theory
of light

few ev

2



$$I_{PC} \propto \text{Intensity}$$

Wem theory says ✓

$$V_1 > V_2 > V_3$$

✓ Intensity fixed

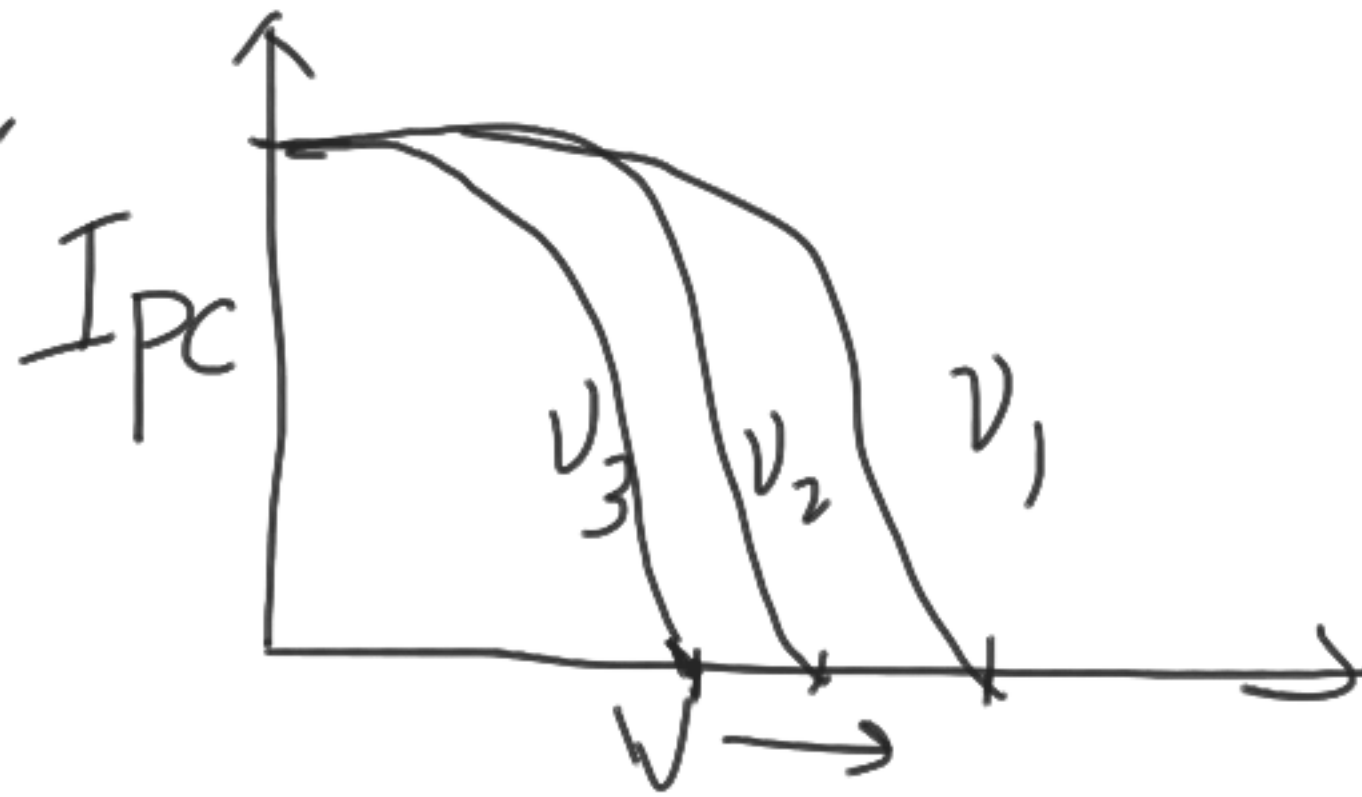
$$+V$$

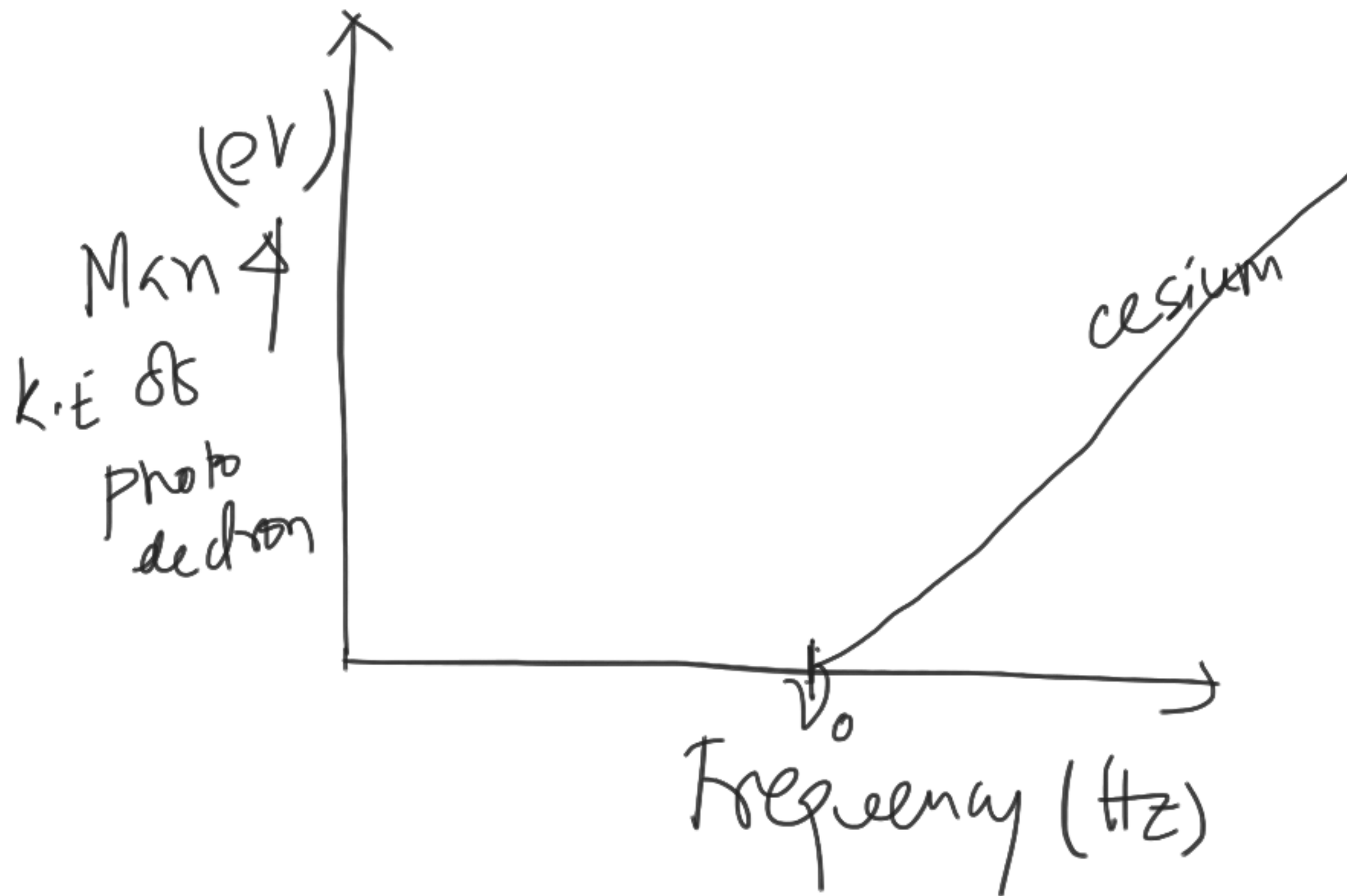
$$\downarrow$$

$$\rightarrow KE$$

✓

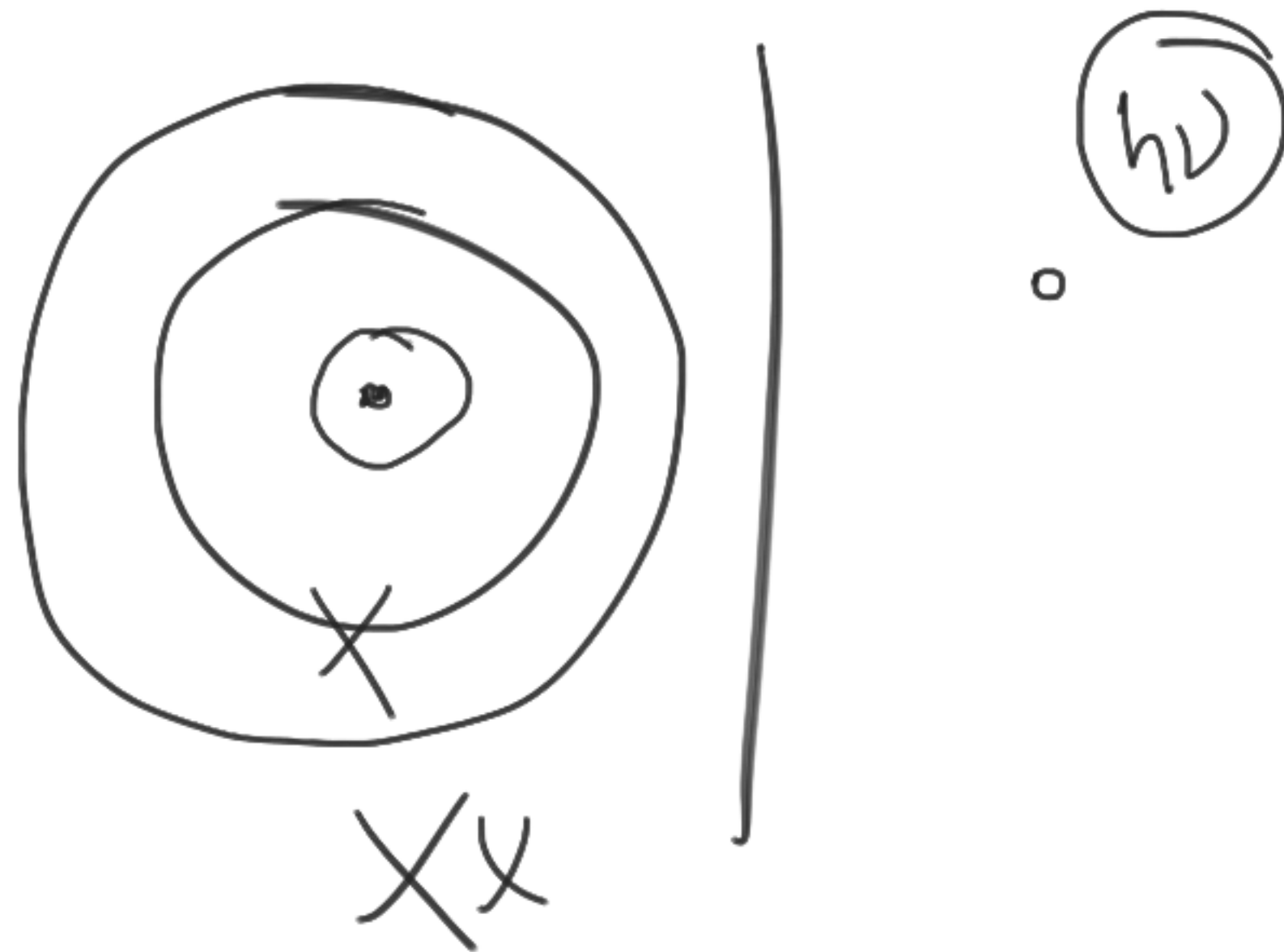
3





Quantum theory of light :

In 1905 Einstein gave a theory that the energy is concentrated in a small packet or photon.



Each photon of light frequency ν have energy ' $h\nu$ '
Same as Planck's theory.

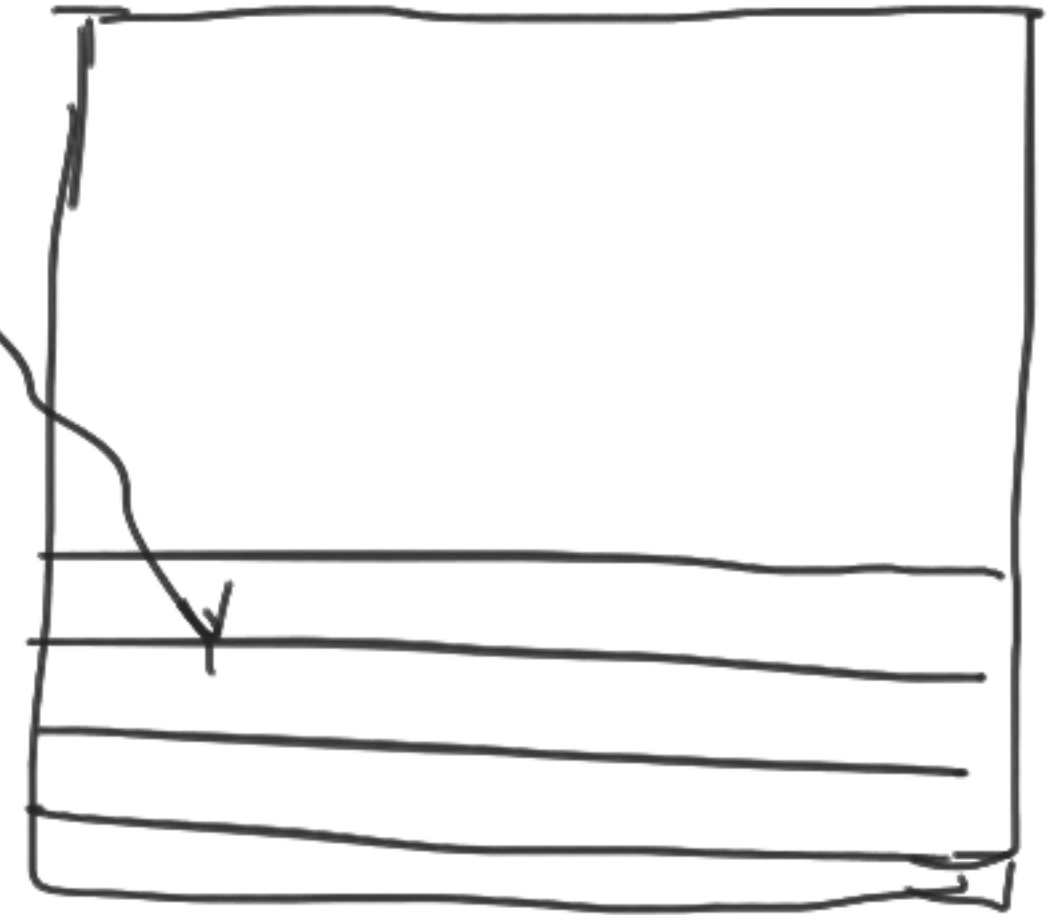
Planck

em wave

✓ Oscillators have energy in discrete level, $E = nh\nu$

\downarrow
0, 1, 2, ...

$h\nu \rightarrow$ wave



Einstein



~~•~~

$h\nu$

$$E = h\nu_0$$



$$KE = 0$$



$$E = h\nu$$



$$KE = h\nu - h\nu_0$$



$$h\nu = K.E_{\text{max}} + \phi$$



work function of the metal surface

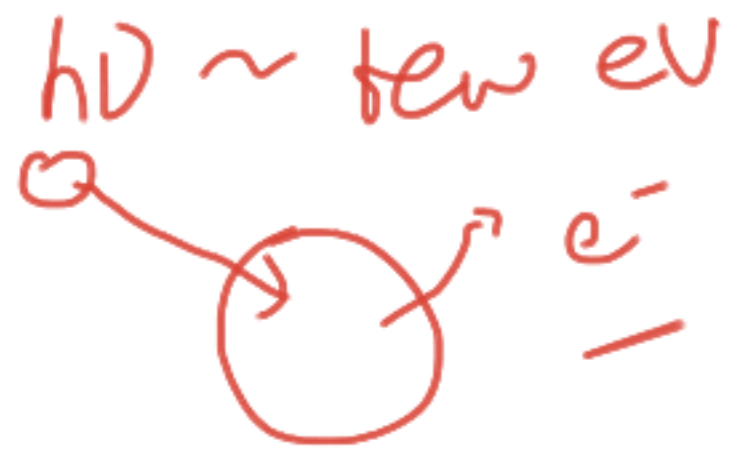
$$\phi = h\nu_0$$



cut off frequency -

① No delay \Rightarrow between absorption of radiation and emission photo-electron





✓ 2

$I_{pc} \propto \text{Intensity of light}$

Same ν frequency of light \Rightarrow $h\nu$

Intensity increases more photons



③ Higher frequency energy of the photon is higher

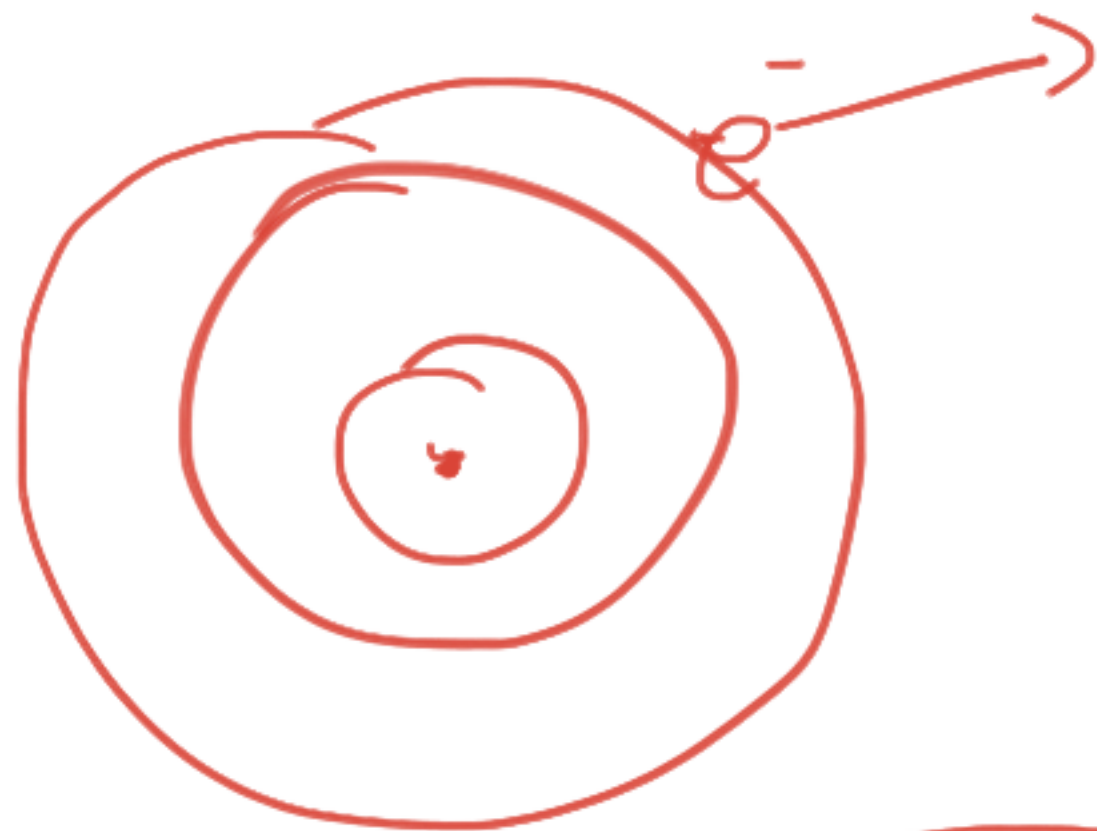
work function \Rightarrow
 ϕ

is the minimum energy required by the electron to escape the metal surface;

$$\phi = h\nu_0$$



\Downarrow
is half of the ionisation energy



$$\checkmark \frac{I_{pc}}{\checkmark} \Rightarrow \propto \frac{\text{Intensity}}{\checkmark}$$

$\checkmark \lambda_{ph} \sim 1.9 \text{ eV to } 3.3 \text{ eV}$

em wave, light visible to UV frequency range