RECAP

ABLES KOTA

Modern Physics

Sh-> Why is the ejection of electrons from the metal surface, a threat to wave nature of light?

G -> Light is not only a wave but an EM wave was just confirmed. And then

ejection of e^-

G-> The spark is barely visible with enormous visible light but became vigorous upon small UV light exposure.

Hertz, Hallwachs & Lenard in 1887-88, observed the spark in an attempt to produce EM wave by accelerating the electrons produced.

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Hertz' exp.

→ to eject e^- from metal surface

→ accelerate the e^-.

↳ passing them an oscillator

Hertz, Hallwachs & Lenard in 1887-88, observed the spark in an attempt to produce EM wave by accelerating the electrons produced.

G-> What is the average intensity on area A of a sound wave of speed v, angular frequency ω, amplitudes p_0/s_0, travelling in a medium of density ρ and coming out from a source of power P emitting a total energy U in time t?

A). $P_0^2/2\,\rho v$
B). $\frac{1}{2}\,\rho v\,\omega^2 s_0^2$
C). $\frac{1}{2}\,p_0\,\omega\,s_0$
D). P/A
E). U/At

P_ω = force × vel.

$P_\omega = (p \times A) \times \left(\frac{ds}{dt}\right)$

$P_\omega = p_0 A s_0 \omega \cos^2(\quad)$

$I = P/A =$

Displacement, $s = s_0 \sin(\omega t - kx)$
Pressure, $p = p_0 \cos(\omega t - kx)$
Power, $P = p_0\,\omega s_0 A \cos^2(\omega t - kx)$
Intensity, I = P/A

$p_0 = B k s_0$ $B = \rho v^2$

G-> amount of light means total light energy incident on the metal surface of area A in time t.
U = I A t

Partially answered the question

G-> What is the average intensity on area A of a sound wave of speed v, angular frequency ω, amplitudes p_0/s_0, travelling in a medium of density ρ and coming out from a source of power P emitting a total energy U in time t?

A). $P_0^2/2\,\rho v$
B). $\frac{1}{2}\,\rho v\,\omega^2 s_0^2$
C). $\frac{1}{2}\,p_0\,\omega\,s_0$
D). P/A
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Displacement, $s = s_0 \sin(\omega t - kx)$
Pressure, $p = p_0 \cos(\omega t - kx)$
Power, $P = p_0\,\omega s_0 A \cos^2(\omega t - kx)$
Intensity, $I = P/A$

Intensity is proportional to the square of amplitude.

Today's session starts now …

Sh -> What is meant by small or large amount of light? Is it the intensity of light wave?

Counter questions

G-> What is the average intensity on area A of a wave in a string travelling with speed v, angular frequency ω, amplitude S in a medium of linear density μ and coming out from a source of power P?

A). ½ μv $\omega^2 S^2$
B). P/A
C). 0
D). None

$$\text{Intensity} = \frac{\text{total Energy}}{(\text{time})(\text{Normal Area})}$$

RECAP

Q 1. Arrange in chronological order:

1). Corpuscles theory of light
2). Maxwell's theory of EM waves
3). Fresnel's experiment
4). YDSE
5). Huygen's principle
6). Hertz' observation

A). 1 -> 3 -> 2 -> 4 -> 5 -> 6
B). 1 -> 4 -> 3 -> 2 -> 5 -> 6
C). 1 -> 5 -> 4 -> 3 -> 2 -> 6
D). 1 -> 5 -> 4 -> 2 -> 3 -> 6

Q 2. A particle carries its inertia alongwith it what does a wave carry?

A). position
B). velocity
C). mass
D). disturbance

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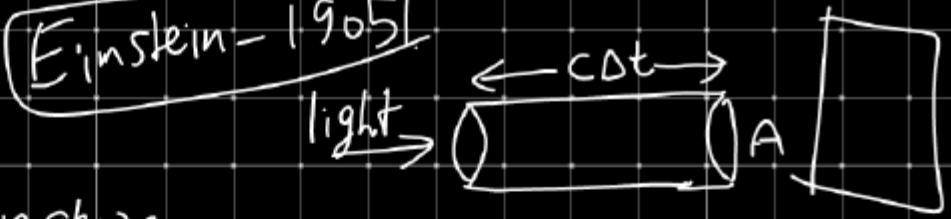
Intensity Perspective

Einstein – 1905



Q. Why can't wave nature of light explain PEE?

→ what is the intensity of light wave?

$$\ell = E_0 \sin(\omega t - kx)$$
$$B_0 \sin(\omega t - kx)$$

$$U_{av} = \tfrac{1}{2}\epsilon_0 E_0^2 = \frac{B_0^2}{2\mu_0}$$

↳ There is no term of freq/wavelength in U_{av}.

$$U = U_{av}(c\Delta t)A$$

$$I = \frac{U}{A(\Delta t)}$$

$$= U_{av} c$$

$$= \tfrac{1}{2}\epsilon_0 E_0^2 c$$

Force on $e^- = eE_0$