

> Date GIRISHAR KUMAR  
Assistant Professor Dept. of Physics<sup>M</sup>

Fri  Sat  Sun

D-III, G-C [REDACTED]

4) P-1

\* De-Broglie concept:- De Broglie speculate that the nature did not single light out as being the only matter which exhibits a wave-particle duality.

He also proposed that the ordinary 'particles' such as electron, protons or etc can exhibit wave in certain circumstances.

Quantatively He associated a wavelength ' $\lambda$ ' to a particle of mass ' $m$ ' moving at speed ' $v$ '

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

⇒ Proof:- By using Einstein equation

$$E = mc^2 \quad \text{--- (1)}$$

Now By Planck's constant

$$E = h\nu \quad \text{--- (2)}$$

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(P-2)

From Equ (i) and (ii)

$$mc^2 = h\nu$$

Through the Equ (i), De-broglie substitute  $v/\lambda$  for  $\nu$  and arrived at the final expression that relates wavelength  $\lambda$  particles with speed.

$$mv^2 = \frac{h\nu}{\lambda}$$

$$\Rightarrow \lambda = \frac{h\nu}{mv^2}$$

$$\Rightarrow \boxed{\lambda = \frac{h}{mv}} \text{ Proved.}$$

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