Answer on Question #57578, Physics / Mechanics | Relativity

If Photon Energy is 6.6 x10^20 J, what is true about EM radiation? (useful quantities: h=6.6 X 10^-34 J s , and c=3.0 X 10^8 m/s How did you come up with your answer?

Find: λ – ?

Given:

$E=6,6\times10^{20}$ J

$h=6,6\times10^{-34}$ J×s

$c=3\times10^{8}$ m/s

Solution:

The energy of Photon:

$E = h\upsilon$ (1),

where h – Planck's constant,

υ – frequency of electromagnetic radiation

The wave length of the electromagnetic radiation:

$\lambda = cT$ (2),

where c – speed of light,

T– period of oscillation

Period of oscillation and frequency electromagnetic radiation are related of ratio:

$T = \frac{1}{\upsilon}$ (3)

(3) in (2): $\lambda = \frac{c}{\upsilon}$ (4)

Of (4) $\Rightarrow$ $\upsilon = \frac{c}{\lambda}$ (5)

(5) in (1): $E = \frac{hc}{\lambda}$ (6)

Of (6) $\Rightarrow$ $\lambda = \frac{hc}{E}$ (7)

Of (7) $\Rightarrow$ $\lambda=3\times10^{-46}$ m

The smallest wave length have γ- radiation ($\lambda=10^{-10}$ m – 10^{-13} m).

Electromagnetic radiation with length wave $\lambda=3\times10^{-46}$ m does not exist.

Answer:

It is not true.