Quantum in quantum theory of radiation

Packet of energy

Contents in radiation according to quantum theory of radiation

Packet of energy

Photons in quantum theory of radiation

Quantum of radiation

Electrical property of photon

Neutral

Expression for energy of photon in terms of frequency

$$E = hf$$

Expression for velocity in terms of frequency and wavelength

$$v = f \times \lambda$$

Expression for energy of photons in terms of wavelength

$$E = \frac{hc}{\lambda}$$

Magnitude of rest mass of photon

0

Term for dynamic mass of photon

Kinetic mass

Derivation for expression of dynamic mass of photon

- $$E = mc^2$$
- $$m = \frac{E}{c^2}$$
- $$m = \frac{hc}{\lambda c^2}$$
- $$m = \frac{h}{\lambda c}$$

Expression for dynamic mass of photon

$$m = \frac{h}{\lambda c}$$

Derivation for momentum of photon

- $$p = mc$$
- $$p = \frac{hc}{\lambda c}$$
- $$p = \frac{h}{\lambda}$$

Expression for momentum of photon

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

Change in frequency of photon on travelling from one medium to another

No change

Change in wavelength of photon on travelling from one medium to another

Changes

Change in speed of photon on travelling from one medium to another

Changes

Factors of photon that change as travelling from one medium to another

- Wavelength
- Speed

Nature of collision of photon with materials

Perfectly elastic

Photoelectric effect in modern physics

Emission of electrons from a metallic surface when light radiation of suitable frequency incidents on the surface

Threshold frequency in photoelectric effect

Minimum frequency to required to eject an photoelectron

Threshold wavelength in photoelectric effect

Minimum wavelength required to eject an photoelectron

Work function in modern physics

Minimum amount of energy required to eject and electron from a metal surface

Approximation of magnitude of work function of alkali metals compared to other metals

Less

Change in work function of increase in atomic number

Decreases

Change in work function in increase in temperature

Decreases

List of conditions at which work function of a metal decreases

- Increase in atomic number
- Increase in temperature of metal

Stopping potential

- Minimum retarding potential for which photo electric current becomes zero
- Amount of potential required to stop the electron having the maximum kinetic energy

Derivation for expression of stopping potential

- $$eV_0 = \frac{1}{2}mv_m^2$$
- $$V_0 = \frac{mv_m^2}{2e}$$

Expression for stopping potential

$$V_0 = \frac{mv_m^2}{2e}$$

Unit of stopping potential

Volt