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DUAL NATURE OF LIGHT WAVES A THEORETICAL PROOF

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ABSTRACT: According to Newton's corpuscles theory of light, planks quantum theory light is particle nature and Maxwell Electromagnetic theory and Huygens wave theory light is wave nature. Some experiment shows light has particle nature and some experiment shows light has wave nature. Therefore according to situation both nature of light is accepted and light has dual nature

KEYWORDS: Corpuscles, quantum, Electromagnetic, dual.

1. INTRODUCTION

The concept of particle is easy to understand it has mass situated at some definite point and can move from one point to another point. This particle is specified by mass, velocity, momentum, energy. The concept of wave is little difficult than particle a wave is nothing but disturbance spread out in medium without changing form. Wave is specified by wavelength, frequency, phase velocity, amplitude and intensity. Number of theories is proposed to explain light is particle nature or light is wave nature. And finally accepted light has dual nature according to situation.

2. RESULT AND DISCUSSION

The following theory is proposed to explain nature of light.

2.1 Corpuscular theory of light: In 1675 Isaac Newton were proposed corpuscular theory of light according to this theory a sources of light emits tiny, weightless and elastic particles called corpuscles. The different colors of light are due to different size and mass of particles. The corpuscle travel with very high speed (Halliday, *et. al.* 2008). The motion of corpuscle is rectilinear because it is unaffected by the force of gravity. This theory can not explain interference of light, diffraction and polarization.

2.2 Wave theory of light: In 1678 Christian Huygens proposed theory according to this light is propagated in the form of waves. The different colors of light are due to different wavelengths of light waves. To explain propagation of light Huygens assumed presence of hypothetical medium called luminiferous ether which was supposed to be present everywhere in the universe

and having zero density, perfect transparency and elasticity (Gaur & Gupta, 2011).

This theory can not explain rectilinear propagation of light, photoelectric effect.

2.3 Electromagnetic theory of light: In 1873 Clerk Maxwell proposed theory according to this theory light waves are transverse in nature and electromagnetic waves. In electromagnetic waves electric field vectors $\overrightarrow{E}$ and magnetic field vectors $\overrightarrow{B}$ are vibrate mutually perpendicular in the same phase. Both $\overrightarrow{E}$ and $\overrightarrow{B}$ are perpendicular to the direction of propagation of light.

Velocity of light $C = 1/\sqrt{\mu_0\varepsilon_0}$

Where μ_o and ε_0 are absolute magnetic permeability and absolute electrical permittivity of free space. - No material medium is required for propagation of electromagnetic waves. This theory explained polarization and failed to explain photoelectric effect, Raman Effect.

2.4 Quantum theory of light: In 1900 Max. Plank proposed theory according to this theory emission of light is not continuous and light is emitted in the form of small packets called photon. Energy of photon

$$E = h\nu = hc/\lambda$$

The light energy is absorbed or emitted as integral multiple of minimum amount of energy called quantum energy ($E = h\nu$). This theory explain phenomenon of photoelectric effect and Compton Effect and can not explain interference and polarization (Satish, 2001).

3. CONCLUSION

Number of theories put to explain the nature of light as above some experiments shows light is particle nature and some experiments shows light is wave nature. Therefore according to situations light has dual nature.

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