

Mass of Photon

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Abstract

Since ancient times, Light is an controversial topic and nowadays it's belived that light exists in 2 forms : particle and wave. But major part of light is "Photon". According to scientists, it's massless but it has momentum. But this rises some questions such as, how anything could exist without mass? Or how it's possible to have momentum without mass ? So according to me, Photon should have some mass.

Introduction

This topic is quite controversial since too long, but as per Einstein photon is a massless matter. But on the other hand, it has momentum ($p=mv$) as well. How's that possible without mass ? As per said by Sir Isaac Newton, that everything that has mass attract other object which having some mass. While as per Albert Einstein, light bend under the influence of gravity, that means attracted towards other object which definitely have some mass, and this theory was proved by Arthur Eddington. So whether Newton is wrong or Einstein ? Because, without mass light can't bend and light is made up of Photons. Therefore, photons should have some mass.

Research

As per History TV 18 channel, the theory of Einstein that light bends under influence of gravity is true and which was proved later by Arthur Eddington during Solar Eclipse in Zurich. So according to this, light has some mass. Therefore, photon has some mass. Whose full proofs and calculations are explained in this paper.

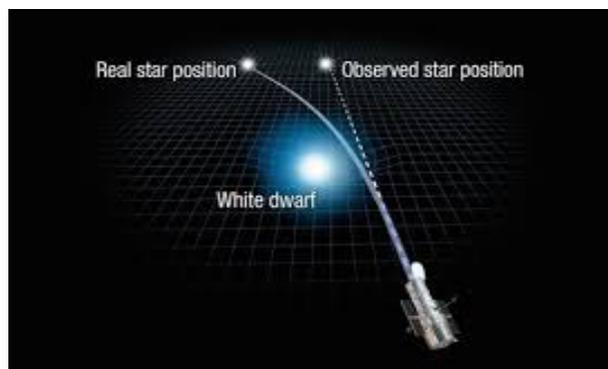


Fig 1 Light bending under the influence of gravity

Experimentation and Calculations

On the basis of Photoelectric Effect experiment by Albert Einstein, among many of his international tests this is one which tells that, when a photon falls on any surface it ejects one electron from that surface. And as per Law of Conservation of Momentum, the momentum should remain conserved in this process.

So, as Speed of Light (SL) = 2.99792458×10^8 m/s

Mass of Electron (ME) = $9.10938356 \times 10^{-31}$ kg

Refractive Index of Air (RA) = 1.000293

Velocity of Electron after Emission in Photoelectric Effect (VE) = 2.8×10^5 m/s

Mass of Photon = MP

Now, as per Law of Conservation of Momentum,

$(MP)(SL) = (ME)(VE)$

Therefore, by putting all the values,

$MP \times 2.99792458 \times 10^8 \text{ m/s} / 1.000293 = 9.10938356 \times 10^{-31} \text{ kg} \times 2.8 \times 10^5 \text{ m/s}$ - as light is travelling in air so, speed of light = c/RA

$MP = 9.10938356 \times 10^{-31} \text{ kg} \times 2.8 \times 10^5 \text{ m/s} / 2.99704645 \times 10^8 \text{ m/s}$

Therefore, Mass of Photon (MP) = $8.51047002 \times 10^{-34}$ kg

Conclusion

As per my research and knowledge it is confirmed that Photon has some mass which is 1/1000 times the mass of electron, which is $8.51047002 \times 10^{-34}$ kg.

Acknowledgment

As per my calculations and research it is proved that Photon is not massless and it has some mass, which is $8.51047002 \times 10^{-34}$ kg. So it can also be said that the wave nature of light doesn't exist and whatever we see and observe is just the particle nature of light.

References

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