Phoson Theory

Definition of phosons, quantization, conflict with the theory of Relativity, phoson model as a particle.

By: Yaseen Ali Mohamad Al Azzam

United Arab Emirates - Sharjah
Email: yaseenalazzam000@gmail.com

Tel : 00971507416742

Table of Consents (Part 1)

Abstract

By an alternative interpretation of Compton effect experiment, I concluded that waves generate electrons and that waves are quantized into units of mass (which I called phosons).

A phoson is defined as a fundamental unit of energy carrying variable mass and the origin of quantization where phosons are the waves particles which also comprise electrons' mass.

A model to describe the particles' behavior of phosons based on describing its propagation as a continuous interchange of two type of kinetic energies (spinning and translational) and a mass variation proportional to the translational kinetic energy is proposed.

Since theory of relativity states that waves' particle (photons) are massless which contradicts my phoson theory, a discussion to show its failure in defining relativistic mass and consequently relativistic time and length is included in this paper. .

Keywords

Compton Scattering effect, relativity, wave matter interactions, quantization.

PACS

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1 Definition of phosons

1.1 Phosons and Compton experiment

This section is to show that electrons and waves are comprised of the same type of particles (which I will call phosons for identification) where phosons work as fundamental unit of energy carrying variable mass.

This discussion assumes that any beam of light consists of rays of streams of phosons.

Compton's famous equation for the change in wave length

$\Delta\lambda = \frac{h}{m.c}\,(1 - cos\theta)$ was the major conclusion of his experiment (where *m* is the electron's mass).

This experiment was explained as a collision and scattering physical event using the principle of energy and momentum conservations to prove that light consists of particles which can scatter waves and eject electrons.

The part ($\Delta\,\lambda = \frac{\mathrm{h}}{\mathrm{m.c}}$) consists of constants and represents a full value of $\Delta\lambda$ when ignoring the fraction caused by the other part of the equation.

If each phoson occupies one wave length, then the frequency of the wave corresponds to the number of phosons in one second of the wave's ray (figure 1.1). Accordingly, the absence of phosons represents an increase in wave length and a decrease in frequency proportional to the number of missing phosons.

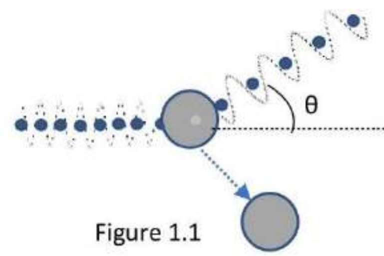


Figure 1.1

The results of Compton experiment gave two peaks of scattered waves, one for the part of the wave which is scattered without being involved in the interaction and the other is for the part of the wave after losing some of its phosons in the interaction at specific scattering angles.

The second peak at 90° and 180° scattering angles corresponds to a full Compton wave length and consequently a full interaction.

The interactions in this experiment are one of three types, the first is scattering without wave length alteration where phosons are not involved in the interaction, the second is with increased wave length which is a fraction of λ_c where the wave loses part of its phosons in a partial interaction and the third is at scattering angles 90° or 180° which represents a full interaction where the wave length increment equals to λ_c or $2\lambda_c$.

The latter case can have an interpretation other than what Compton gave. The first is the possibility to have a newly generated electron by the wave's phosons and the second is when both the wave and the electron are composed of the same identical number of particles, the wave's phosons replace the electron's phosons while the original electron's phosons being ejected as an electron which leads to the number of phosons in the electron and consequently the number of phosons involved from the wave.

Compton frequency *fc* ban be defined as the number of missing phosons in the scattered wave when the increment in wave length is equal to λ_c or $2\lambda_c$ which contributed in generating a new electron or involved in a full interaction (electron replacement and ejection).

The number of phosons in the ejected electron and the number of phosons lost by the wave are the same where we can conclude that the mass of the electron equals to summation of the masses of the wave's phosons involved.

The number of phosons involved equals to the decrease in frequency of the scattered wave

$f_c = c / \lambda_c$
$f_c = (m_e.c^2) /h$
$fc = 1.235589965 \times 10^{20}$ Hz

Compton frequency corresponds to number of phosons involved in the interaction and consequently the phoson's mass is the resultant of dividing the electron mass by this number.

$m_{phs} = m_e / f_c$ 1.1
$m_{phs} = 7.372497201 \times 10^{-51}$ *Kg. s* 1.2

Where m_{phs} is the phoson's mass and

$\lambda_c = h / (m_e.c) = (m_{phs.}\ c^2)/(me.c) = c / f_c$

Using the famous equation ($E = m.c^2$) we can also find the energy and mass of the phoson in an equivalent way where

$E = h = m_{phs}.c^2$ 1.3
$m_{phs} = h/c^2$ 1.4

Therefore, we can say that the ejected electrons in Compton experiment are composed (and can be generated) by f_c number of phosons and if one of these electrons is emitted fully as a wave (not ejected as an electron) it produces a wave with f_c frequency and $\lambda_{c.}$ Wave length.

Consequently, this implies that waves are quantized into phosons and electrons also are comprised of phosons.

1.2 Planks Constant unit

One of the definitions of frequency is the number of regularly occurring events in one second where the event and the output of the process are of the same type and have the same unit.

In Planks equation (*E = nhf), n* is a positive multiplication factor (integer) and *f* is the number of repetitions which means (*h*) is multiplied by two factors to get the energy *E* and the unit chosen to (*h*) is (*J.s*) which is (*kg.m²/s*) the unit of angular momentum.

There is no logic in understanding this equation as the repetitions of a constant angular momentum multiplied by a positive integer gives energy, *E* and in *h* should be of same the type and have the same unit.

If a wave duration of flow is one second, then its power and energy are the same and if the duration of flow is less than one second, power has no significance.

If the time of flow is greater than one second, the energy of the wave in one second is its power (p *= hf*) (J.s*/s*) while its energy after a specific time of flow *t* is (*E = h.f.t*) (*J.s*).

It is obvious that to get proper units, (Joule) for energy and (Joule/sec) for power, *h* should be measured in (Joules) and we can say: "The energy of one photon of a wave equals to the power of the wave and both are equal to *hf.*

In the black body radiation experiment, the energy is ($E = nhf$) where n is a positive integer taking values (1,2, 3….) representing wave amplification in forming standing waves.
In the photoelectric experiment, n = 1, that's why waves seemed to be quantized into photons of energy ($E = hf$) while, it's our measurement units which are quantized into values/s not the wave.
The only way to measure a contiouasly flowing wave of particles which corresponds to the input of an experiment (event) is by its energy per second i.e. its power which was considered as a particle called photon in interpreting the photoelectric experiment.
Accordingly, saying that waves are quantized into photons of energy $E = hf$ is just like saying that nature follows our manmade measurement units).
When we think of the electron mass as composed of *f* number of phosons and can be emitted as a wave with frequency *f,* then we should pay attention to that *f* in the first case is just a unitless number and in the second case is a frequency with unit (1/s).
Therefore, when using ($mc^2 = hf$), (f) is a unitless figure representing the number of phosons composing the electron mass with (h) in joules.
However, I will keep the unit (*J.s*) because all the history of quantum mechanics was based on this unit, noting the following:

$$\boldsymbol{E\,(J) = E_{phs}\,(J.s).\,f = hf} \quad \text{Where } E_{phs}\,(J.s) = h\,(J.s) \qquad 1.5$$

2.0 Relativity

2.1 Relativistic Mass

The claim that waves' particles have mass contradicts with the theory of relativity which is the most confusing and misguiding theory in the history of physics where it is a direct translation of mathematics and does not reflect reality.

After about 100 years of dealing with relativity, it became a default setting of our understanding of modern physics.

Relativistic mass was derived by combining the energy-mass behavior which happens at the speed of light with the energy-velocity behavior which happens at speeds below the speed of light using mathematical derivations based on assumptions to get a mixture of correct and wrong conclusions.

Experiments proved that waves' particles have momentum which is an exclusive property of mass.

I will start this discussion with a familiar derivation of $E=mc^2$ where an object of mass m is moving under an applied external force.

$$\partial k = \partial W = F.\partial s$$

Where F is an external force and W is the work done in a distance s.

$$F= \partial P / \partial t = \partial/\partial t\ (mv)$$

$$F = m\ \partial v/\partial t + v\ \partial m/\partial t$$

$$\partial k = \partial s.\ m\ \partial v/\partial t + \partial s.\ v\ \partial m/\partial t \quad (\partial s/\partial t = v)$$

$$\boldsymbol{\partial k = mv\partial v + v^2\partial m} \qquad 2.1$$

Also, ɣ is expressed as

$$m = m_o \Big/ \sqrt{1 - \frac{v^2}{c^2}} \qquad 2.2$$

$$m^2 = m_o^2 / (1 - v^2/c^2)$$

$$m^2c^2 - m^2v^2 = m_o^2c^2 \qquad 2.3$$

$$2mc^2\partial m - 2mv^2\partial m - 2m^2v\partial v = 0 \quad \text{(deriving equation 2.3)} \qquad 2.4$$

$$\boldsymbol{c^2\partial m = v^2\partial m + mv\partial v} \quad \text{(Dividing equation 2.4 by 2m)} \qquad 2.5$$

Comparing equation 2.1 with 2.5 we get

$$\boldsymbol{\partial k = c^2\partial m = mv\partial v + v^2\partial m} \qquad 2.6$$

$$E = k + m_oc^2 = c^2 (m - m_o) + m_oc^2 = mc^2$$

Equation 2.3 without squaring the masses is

$$mc^2 - mv^2 = m_oc^2 \qquad 2.7$$

if we derive equation 2.7 we get

$$c^2\partial m = 2mv\partial v + v^2\ \partial m \qquad 2.8$$

The following points are to be noted:

- Comparing equation 2.8 and 2.5, we find the same (***$c^2\partial m = \partial k$***) in equation 2.5 and (**$c^2\partial m = \partial k + mv\partial v$**) in equation 2.8.
- Because the left and right sides of equation 2.5 are not equal if understood as normal addition, an escape from this case is to multiply by 2m in equation 2.4 when going back to equation 2.2 converting the normal addition to a vector addition of scalar quantities.
  Actually, the left-side equals to each of the terms in the right side individually i.e. each works in a separate domain.
- Replacing m_ov (as it should be) by mv in equation 2.3 is behind the idea of relativistic mass.

From equation 2.8 and 2.1 with exchanging m by m_o for v < c i.e. (*$2mv\partial v$*) works when v varies, and mass does not.

$$c^2\partial m = \partial k + m_o.v.\partial v \qquad 2.9$$

At the speed of light where *$\partial k = ½\ mc^2 - ½\ m_oc^2$, equation 2.9 gives*

$$c^2(m-m_o) = (½\ mc^2 - ½\ m_oc^2) + m_ov^2/2 \qquad 2.10$$

$$½\ mc^2 - ½\ m_oc^2 = ½\ m_ov^2$$

$$\boldsymbol{mc^2 - m_oc^2 = m_ov^2} \qquad 2.11$$

………

At speeds below the speed of light, $\partial k = ½\, m_o v^2 - ½\, m_o v_o^2 = ½\, m_o v^2$ with $v_o = 0$, equation 2.9 gives

$$mc^2 - m_o c^2 = ½\, m_o v^2 + ½\, m_o v^2$$

$$\boldsymbol{mc^2 - m_o c^2 = m_o v^2} \qquad 2.12$$

Both equations 2.11 and 2.12 give

$$\boldsymbol{m = m_o\left(1+\frac{v^2}{c^2}\right)} \qquad 2.13$$

Equation 2.9 works for all speeds from zero to C and can be written as

$$\boldsymbol{c^2(m-m_o) - ½\, m_o v^2 = \Delta k} \qquad 2.14$$

Equation 2.13 defines the relativistic mass at the speed of light while mass does not change with increasing speed at speeds below the speed of light.

The equivalency in equation 2.14 means that accelerating a particle from rest to a speed (v) to gain a specific translational kinetic energy by an external force is equivalent to gaining the same kinetic energy at the speed of light when mass is increased from (m_o) to (m) by an initial energy equal to ½ $m_o v^2$.

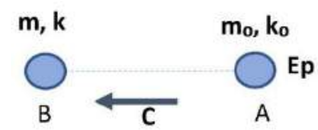


Figure 2.1

As an example, figure 2.1 shows a particle traveling at the speed of light from point A to point B with mass and kinetic energy (m_o, k_o) at point A and (m, k) at point B.

With no external source of energy or force, the energy at point A equals to the energy at point B

$$½\, mc^2 = ½\, m_o c^2 + Ep. \qquad 2.15$$

Where Ep. is an additional energy carried by the particle at point A in another form of energy which works as an initial potential energy.

$$½\, mc^2 - ½\, m_o c^2 = \Delta k = Ep \qquad 2.16$$

If we define Ep. in a translational kinetic energy scale to be equivalent to the energy required to accelerate the particle from rest to speed v (maximum value of v = c) with constant mass m_o, then

$$Ep = ½\, m_o v^2$$

Substituting in equation 2.15 we get

$$½\, mc^2 - ½\, m_o c^2 = ½\, m_o v^2 \qquad 1.17$$

$$\mathbf{mc^2 - m_o c^2 = m_o v^2} \qquad 1.18$$

$$\boldsymbol{m = m_o\left(1+\frac{v^2}{c^2}\right)} \qquad 1.19$$

Since the maximum value of v is C, then substituting C for v in equation 2.19 gives ($m = 2m_o$) Also, equation 2.16 with v equals to C is

$$\Delta k = ½\, m_o c^2 \qquad 2.20$$

$$\frac{\Delta m}{m_0} = \frac{v^2}{c^2} \qquad 2.21$$

If $Ep = ½\, m_0c^2$ at point A, the total carried energy is

$$k = k_0 + Ep = ½\, m_0c^2 + ½\, m_0c^2 = m_0c^2 \qquad 2.22$$

At point B with $m = 2m_0$ where all the energy Ep is converted to translational kinetic energy, the total carried energy is

$$E = ½\,(2m_0)\, c^2 = m_0c^2 \qquad 2.23$$

While the particle travels at the speed of light, it tends to resist motion by increasing its mass and converting the potential kinetic energy into translational kinetic energy until all the potential energy is consumed to reach to a translational kinetic energy equal to m_0c^2.

Thus, equation 2.1 should be understood as working in two domains, the first at speeds below the speed of light where translational kinetic energy increases with velocity under the effect of an external force and the second where translational kinetic energy increases with mass at the speed of light without the need of an external force but by an initial potential energy.

The theory of relativity combined the energy/mass behavior at the speed of light to the energy/velocity behavior at speeds below the speed of light to force both to act at speeds below the speed of light.

2.2 Relativistic time and length

The issue of time dilation and length contraction is not directly related to the subject of this paper, but I can't claim that part of relativity fails and keep the other.

When physical events are accompanied by a change in energy caused by a frame of reference or an object in a frame of reference, then the event is referred to that frame of reference.

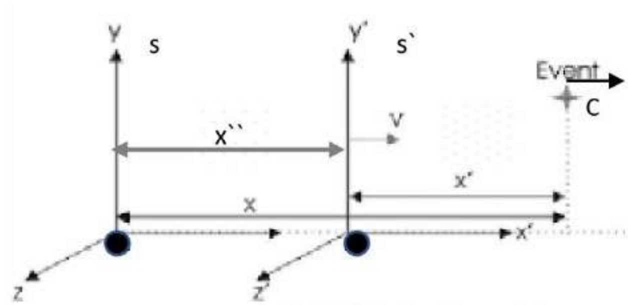


Figure 2.3

Figure 2.3 shows how the fundamental ideas of relativity were concluded about time and length.

If the origins of the frames of reference S (*x, y, z*) and S` (*x`, y`, z`*) coincide at (t = t`= 0) when an event (light signal is emitted from the origin in the direction shown) and the frame of reference S` starts to move with a constant velocity v in the same direction away from the fixed frame S, then after a specific time t, the coordinates of the signal in the frame of reference S are (*ct,0*) and in S` are (*ct`,0*).

The two equations of Lorenz transformation used in relativity are

$$x = \gamma\,(x` + vt`) \qquad 2.24$$

$$x` = \gamma\,(x - vt) \qquad 2.25$$

Substituting for x and x ` we get

$$ct = \gamma\,(ct` + vt`) \qquad 2.26$$

$$ct` = \gamma\,(ct - vt) \qquad 2.27$$

solving for γ gives

$$\gamma = 1 / \sqrt{1 - v^2/c^2} \qquad 2.28$$

Equations 2.26 and 2.27 with ignoring ɣ are

$$ct = ct` + vt` \qquad 2.29$$

$$ct = ct` + vt \qquad 2.30$$

Equations 2.29 and 2.30 are exactly the same except that vt is replaced by vt`.

If (x = ct), (y = ct`), (z = vt) then we can write equation 2.27 as

$$y = \gamma\,(x - z) \qquad 2.31$$

An expression for find vt` is found as

$$(x / y) = ct / ct`$$

$$(t/t`) = (x/y)$$

$$t` = t.\,(y/x)$$

$$vt` = vt.\,(y/x)$$

$$vt` = z.\,(y/x)$$

Equation 2.26 becomes

$$x = \gamma\,\{y + z.\,(y/x)\} \qquad 2.32$$

solving equations 2.31 and 2.32 for ɣ we get

$$xy = \gamma^2\,\{xy + yz - yz + z^2.\,(y/x)\}$$

$$\gamma^2 = xy / \{xy - (z^2 / x^2)\}$$

$$\gamma = 1 / \sqrt{1 - \frac{z^2}{x^2}}$$

Substituting for z = vt and x = ct we get

$$\gamma = 1 / \sqrt{1 - \frac{v^2}{c^2}} \qquad 2.33$$

Thus, replacing (vt) by (vt`) in equation 2.24 and 2.26 is equivalent to adding the factor (y/x) in equation 2.32 to force the distance vt to be contracted.

x = ct and x` = ct` with the same velocity c, the distance x is contracted to x`, relativity applied the same factor of reduction to vt. This is similar to considering that mass changes at speeds below the speed of light by replacing $m_o v$ by mv in equations 2.2 to 2.4.

$$\gamma = (ct`/ct) = (t`/t) = y/x$$

Equations 2.31 and 2.32 become

$$y = (y/x)\,(x - z) \qquad 2.34$$

$$x = (y/x)\,\{(y + z\,(y/x)\} \qquad 2.35$$

Solving equations 2.34 and 2.35 gives the same value of γ

Substituting for x, y and z in equations 2.34 gives

$$ct' = (t'/t)\,(ct - vt)$$

$$ct' = ct' - vt' \qquad 2.36$$

$$ct = (t'/t)\,\{ct' + vt\,(t'/t)\}$$

$$ct = ct'^2/t + vt'^2/t \qquad 2.37$$

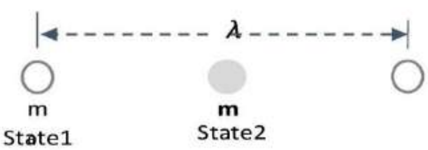
$$(ct)^2 = (ct')^2 + (vt')^2$$

Solving equations 2.36 and 2.37 produces the value of γ but we should note the following:

- vt in equation 2.36 is reduced twice by the factor (t'/t)
- ct' which is a reduced value of ct and reduced again by the factor (t'/t) in equation 2.36
- Equation 2.36 gives ($c = c - v$) which is impossible unless $v = 0$ and this equation is no longer describing relativity between frames.
- Equation 2.37 represents a conversion from normal addition to vector addition where normal addition does not work when the equation is not accurate.

Thus, it is clear that this theory was customized to give the same square root of relativistic mass which itself was based on mathematical work.

It is impossible to prove time dilation or length contraction experimentally because it is a pure imaginary idea.



3.0 Phoson model

The following points are fundamental to understand this model:

- At the speed of light, the source of mass increment is not the energy involved, mass and energy are conserved individually.
- Phosons as fundamental units of mass work as energy carriers.

Figure 3.1 shows a sketch of the proposed behavior of phosons while travelling as part of a wave.

Phoson is shown as a ring of varying mass where usually each wave length is occupied by one phoson (different stages of one phoson is shown in one wave length travel for clarity).

The phoson goes from state 1 to state 2 in half wave length and back to state 1 in the other half.

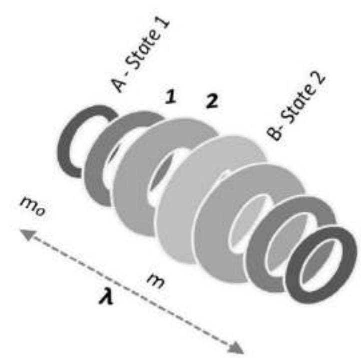


Figure 3.1

State1: The phoson has minimum mass m_o, minimum translational kinetic energy ($h/2$) and maximum spinning kinetic energy.

The ring shape comes from the high spinning with a moment of inertia ($\boldsymbol{I} = m.\,r^2$).

The phoson keeps a total energy expressed as

$$E_T = K + S \qquad 3.1$$

Where $\partial K/\partial t = - \partial S/\partial t$

$$K = ½\, m_o .c^2 \qquad 3.2$$

$$S = ½\, I.\, \omega^2 = ½\, m_o.\, r^2.\, \omega^2 \qquad 3.3$$

buy $(r.\omega = v)$

Where v is the tangential velocity of spinning, then

$$E_T = K + S = ½\, m_o c^2 + ½\, m_o v^2 = ½\, m_o.\, (c^2+v^2) = ½\, m_o c^2(1 + v^2/c^2)$$

When the phoson spins with maximum energy at (v = c), the total energy becomes

$$E_T = h = m_o\, c^2 \qquad 3.4$$

The spinning energy S is equivalent to the potential energy mentioned previously.

state 2: The phoson has maximum mass (m), maximum translational kinetic energy, and zero spinning kinetic energy.

The increase in translational kinetic energy is supplied by the spinning kinetic energy until it is consumed fully where the total energy becomes translational.

The increase in energy can't appear as an in increase in velocity but as an increase in mass i.e.

$$E_T = K = ½\, m.\, c^{2}$$

$$E_T = K = ½\, m_o\, (1+v^2/c^2).\, c^{2}$$

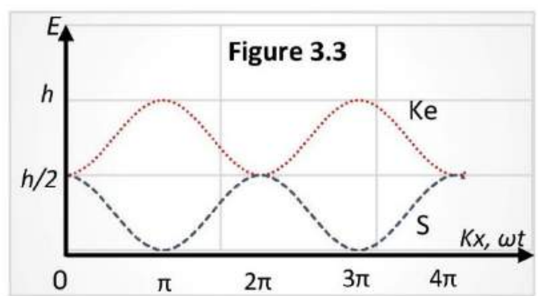
When $(v = c)$, m = $2m_o$ and

$$E_T = ½\, (2m_o).c^2$$

$$E_T = h = m_o.\, c^{2} \qquad 3.5$$

This is an unstable state of the phoson because it can't stay without spinning, so it starts to decrease its translational kinetic energy again and reduce its mass to suit this decrease with restoring its spinning energy back in the other half wave length.

During motion, the phoson maintains a constant translational kinetic energy equal to (h/2) beside the energy ($½\, m_o v^2$) exchanged with the spinning energy.



The energy E_T is

$$E_T = \frac{1}{2} m_0\, .\, c^2 + \frac{1}{2}\, I.\, \omega^2 \qquad 3.6$$

$$E_T = \frac{1}{2} m_0.\, c^2 (\, 1 + \frac{r^2\omega^2}{c^2}) \qquad 3.7$$

$$E_T = \frac{1}{2}.\, m_0\, c^2 (\, 1 + \frac{r^2\omega^2}{c^2}) \qquad 3.8$$

$$E_T = ½\, m_o\, c^2(1+v^2/c^2) \qquad 3.9$$

This equation also shows how the translational kinetic energy increases at the speed of light where the term between brackets corresponds to the relativistic mass.

When (v = c) then $E_T = m_o c^2$

In trigonometric form, when ($S = h = ½ m_o c^2$) at ($v = c$) (figure 3.3) both energies can be expressed as

$$K = h/4 \{\cos (kx-\omega t)-\pi) + 3\} = h/4\{3-\cos(kx-\omega t)\} \quad 3.10$$

$$S = h/4\{\cos(kx-\omega t) + 1\} \quad 3.11$$

Figure 3.3 shows the behavior of translational and spinning kinetic energies when the initial potential spinning energy is ½ mc^2 where the phosons keeps a constant energy $m_o c^2$ all the time and in this case if ($m = m_{phs}$) then

$$f.\lambda = c = (m.c^2) / (m.c) = h / p$$

$$\lambda = h / pf = c / f \quad 3.12$$

$$k = 2\pi / \lambda$$

$$k = \omega.\frac{p}{h} = f.\frac{p}{\hbar} \quad 3.13$$

Where the wave number is the reciprocal of the wave length.

The energy between any two points like 1 and 2 in figure 3.1 is

$$½ m.c^2 + ½ I_1.\omega_1 = ½ (m + \Delta m).c^2 + ½ I_2.\omega_2$$

$$½. (\Delta m. c^2) = ½ I_1.\omega_1 - ½ I_2.\omega_2$$

$$\Delta k = ½ \Delta m. c^2 = \Delta S \quad 3.14$$

If the total change in mass $\Delta m = m_o$ in half wave length, then

$$\Delta K = \Delta S = ½ m_o .c^2 \quad 3.15$$

In the same way we can find the translational momentum to be

$$\Delta P = m_o. c \quad 3.16$$

With the increase in phoson's mass in half wave length, it generates a change in translational momentum which causes the force to increase in the same rate.

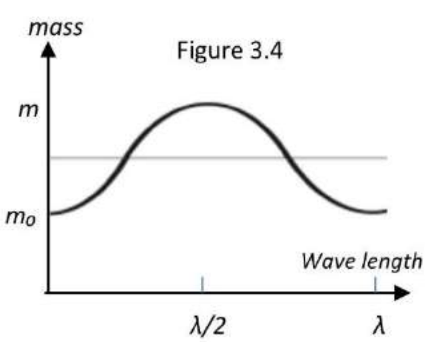


Figure 3.4

Figure 3.4 shows the change in phoson's mass during propagation when the initial energy is ½ $m_o c^2$.

Usually external forces make a change in velocity and consequently a change in momentum with constant mass.

In the phoson's case, the variable is the mass with constant speed, this mass variation produces a change in momentum which generates force.

The force produced by one phoson in half wave length is derived as

$$F = c.\partial m/\partial t$$

$$F = c\,(m-m_o)/t$$

$$F = 2m_o.c.\,f \qquad (t = T/2 \text{ and } \Delta m = m_o)$$

Where mass is in (*Kg. s*) and force in (*N.s*)

$$F = 2P_o.\,f \qquad m_o.c = P_o$$

$$F = P.f \qquad P = 2P_o \qquad 3.17$$

To find the energy $k = F.\lambda/2$

$$k = P.f.\,\lambda/2$$

$$k = m.c.f.\lambda\,/2$$

$$k = \tfrac{1}{2}\,mc^2$$

$$k = m_oc^2 \qquad 3.18$$

4.0 Conclusions

Phosons and quantization

- As another interpretation of Compton experiment, the wave used in the experiment generates the ejected electrons or replace it with the same number of particles (which I called phosons).
- Waves are quantized into phosons which are described as discrete fundamental energy carrying variable mass particles.
- Electron's mass is comprised of phosons.
- Phoson mass is (m_{phs} =7.372497201x10^{-51} Kg. s) is its mass when its translational and spinning kinetic energies maintain a total energy of h (6.626x10-^{34} J.s) during propagation.
  Thus, a wave can generate electrons only when each phoson has an initial spinning energy equal to ½ m_oc^2 with a total energy of h (J.s) energy.
- Phoson, *h* or mc^2 have the same meaning, any object which complies with $E = mc^2$ should be comprised of phosons.
- If an electron is emitted as a wave, it will produce a wave with frequency equals to the number of phosons comprising it with a wave length fulfilling the relation $c = f.\lambda$
- The energy of the phoson is equal to m_oc^2 only when it is equal to *h*.

Plank's constant

- Plank's constant is a fundamental unit of energy repeated each wave length of the wave with unit (*J.s*) which is the unit of angular momentum and was chosen to avoid the time involvement.
- Keeping *h* in (*J.s*) and *f* in (*1/s*) is to avoid time involvement but energy and any derived parameter to describe phosons follow the unit of h (J.s) like (Kg. s), (N.s). etc.

Relativity

The theory of relativity is a reflection of mathematical derivations which are based on assumptions combining the energy – mass behavior which happens at the speed of light with the energy – velocity behavior which happens at speeds below the speed of light to give either correct conclusion describing wrong events or wrong nonpractical theoretical conclusions.

- Any object does not experience an increase in its mass when travelling at speeds below the speed of light.
- When a particle of mass m_0 travels at the speed of light, its mass varies following its translational kinetic energy.
- The equations which describe relativistic mass at the speed of light is

$$c^2(m-m_0) - \frac{1}{2} m_0 v^2 = \Delta k$$

$$m = m_0 \left(1+\frac{v^2}{c^2}\right)$$

  Where v represents an increase in energy not velocity
- Accelerating a particle from rest to a speed v to gain a specific kinetic energy by an external force is equivalent to gain the same kinetic energy at the speed of light when mass is increased from m_0 to m by an initial energy equal to $\frac{1}{2} m_0 v^2$.
- At the speed of light, the potential energy increases the translational kinetic energy with increasing mass while at speeds below the speed of light the translational kinetic energy is increased by increasing velocity only.
- When the wave particle has an initial potential energy $\frac{1}{2} m_0 c^2$, then it maintains always an energy equal to $h = m_0 c^2$ and in this case it can generate mass.
- While mass varies only at the speed of light, time and length are nonrelativistic physical variables at all speeds.

Phoson Model

The model describing the particle behavior of waves' phosons is based on:

- Phoson is a ring of mass which propagates by a continuous energy interchange between translational and angular (spinning) kinetic energies accompanied with a continuous mass variation following the translational kinetic energy.
- Each phoson occupies one wave length and has two peak states, one with minimum translational kinetic energy, maximum angular kinetic energy and minimum mass and the other is with maximum translational kinetic energy, zero angular kinetic energy and maximum mass where it travels between the two states in half wave length.
- Phoson keeps h/2 translational kinetic energy all the time besides the energy it gains during interchanging with the spinning initial potential energy.
- Phoson's mass varies between its original mass m_0 and double the original mass when its initial spinning energy is $\frac{1}{2} m_0 c^2$.

With phoson's mass $m = m_{phs,}$ and initial energy $\frac{1}{2} m_o c^2$ the wave length and number can be expressed as

$$\lambda = h / pf = c / f$$

$$k = \omega . \frac{p}{h} = f . \frac{p}{\hbar}$$

The force produced by one phoson in half wave length is

$$F = P.f \text{ where } P \text{ is the momentum of maximum mass}$$

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