The Double Slit Experiment-Explained

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Abstract

The wavelet envisioned by Huygen’s in diffraction phenomenon is re-interpreted as being polarized after passing through slit/hole which removed the electric field component from the Electromagnetic Radiation (EM-R), the remained wave consist of the Circular Magnetic Field (CMF), this CMF lost the speed of light and the electric field, hence it's a short distance travel field, originated from the CMF produced by accelerated electrons, integrated with the Electric Field (EF) during the Flip-Flop (F-F) mechanism producing EM-R; hence the passing of light through a single hole/slit resulted in a CMF which reproduced as rings on the monitor screen in single wave diffraction, while the interference of two such CMF in double slits experiment, produced constructive or destructive interference forming patches on the monitor screen; and the perceived electron diffraction is an enter of two CMF from a single electron into a slit then emerged to produce constructive or destructive interference, in addition to the electron which entered and emerged from the slit with the stronger CMF, the paper finally derived the origin of Planck ‘constant (h) for the second time; the logical interpretation of double slits diffraction will restore the common sense in the physical world, distorted by the pilot wave.

Keywords: Double slit experiment; wavelet; Circular magnetic field; Electron diffraction; Polarization; Origin of Planck’ constant

Introduction

In his explanation to the photoelectric effect in 1905, Einstein invoked quanta (photon) as theoretical justification to expel electron from the atom [1], which was viewed as a particle with zero rest mass [2], although the idea was rejected by many of his contemporary scientists lead by Millikan, [3], also famous were J.J. Thomson, Sommerfield, and Richardson [4], but with endorsement from Compton experiment in 1922 [5], scientists gradually accepted the notion that electromagnetic radiation is wave particle duality [6].

Contrary to light, where the discovery of diffraction preceded the wave theory, the electron diffraction was discovered as a consequence of a deliberate attempt to prove the wave nature of the electron [7], after de Broglie extended duality to particles in 1924 [8], then Davisson and Germer, explained the diffraction peak wave, generated by "electron wave," as the wavelength of Bragg formula, and resulted in diffraction pattern [9,10], that was confirmed differently by G. P. Thomson [11]; although the reflected electrons from the nickel crystal in Davisson and Germer experiment, occurred before detection of diffracted beams [12], which posed contradiction on how deflected electron could store reflected phantom wave? Regardless of that, both experiments became decisive in endorsing wave particle duality, making it acceptable, leading to new form of physics, contradicting the common sense and norm of life [13]. The ambiguity and uncertainty in this "electron wave," or "phantom wave" brought great confusions; which led some to introduced the pilot wave, thought as similar to electromagnetic field [14], a state of confusion led Einstein to express at several occasions, before his death in 1955, that "for fifty years, he failed to understand what quanta (photon) is" [15] which amount to doubt on photon's existence, but the wave particle duality became acceptable by lack of sound alternative. The re-interpretation of Photoelectric Effects, suggested the Magnetic Radiation Force (FmR) as embedded in Electromagnetic Radiation (EM-R) [16], similar in nature to Planck’ Radiation Energy (EmR) [17], while the production of Secondary Electromagnetic Radiation (S-EM-R) in "The Compton Effect Re-Visited" [18], consolidated the existence of an alternative interpretation base. This is based on exploring the characteristics of the Circular Magnetic Field (CMF) produced by energetic electrons [19], and the Spinning Magnetic Force (SMFc) produced by Spinning Magnetic Field (SMF), [20], it helped elaborating many phenomena, and subjected the double slit experiment into new analysis.

This paper is the fifth among series intended to prove the correctness of our "The Magnetic Interaction" [19] during a discussion [21], and since light represents more subtle and elusive problems than most other aspects of physical experience [22], and J. J. Thomson realized that the detection of a train of waves associated with the movement of electrons was not predicted by Maxwell's equations, emphasizing that, such a view of the electron had to be wrong [23], thus the existence of CMF produced by electron, not predicted by Maxwell's equation cast doubt about the acceleration mechanism for EM-R generation, and gives weight to the Flip-Flop (F-F) mechanism describing the transverse light wave mechanism [24], it helped explored and elaborated radiation energy, conditions initiating EM-R generation and the nature and characteristics of Planck’ Constant (h) [25], it explained the Radiation Magnetic Force (FmR) embedded in EM-R, a phenomenon puzzled Einstein for fifty years [15], while the Planck was explained as a parameter of constant elements within the energy transformation process [16], and the Compton Effect was interpreted as a production of Secondary Electromagnetic Radiation (S-EM-R) phenomenon [18], all these prepared the ground for the existence of an alternative interpretation in micro-physical world, based on wave matter interactions.

Therefore, the diffraction of ripples through a single narrow opening, and two narrow openings [22], which was the bases for Huygen's principle of diffraction, explained with semi-circle water waves generated in pond [26], is reinterpreted as a Circular Magnetic Field (CMF) formed from this wave, and resulted from the polarized...
Electromagnetic Radiation (EM-R) when passed through a small hole/slit, thus removing the electric field quantity, leaving the magnetic field, hence the diffraction is interpreted as the interference of the resulted CMF which neither travel with speed of light, nor carrying electric field, the CMF is not semi-circle, rather it is a full circle, and composed of the magnetic portion of EM-R, it is the Circular Magnetic Field (CMF), which originated in the Flip-Flop mechanism and EM-R production [24].

Since Electron diffraction is the strongest evidence for the principles of wave-mechanics on which the whole of atomic physics is based [27], hence relating the CMF and EM-R characteristics to Young’s double-slit experiment, and the reinterpretation of wavelets as CMF, formed in single slit diffraction in CMF shape, and the interference of two such CMF in double slits experiment, resulted in constructive or destructive interference; while electron diffraction is interpreted as the interference of two CMF entered and emerged from two slits and originated from a single electron, which accompanied the strongest CMF through one of the two slits, the paper finally derived the origin and structures of Planck’ constant (h) for the second time [16].

As the understanding of the dynamical processes in chemistry, materials science and biology on micro scale stems almost exclusively from time-resolved spectroscopy [28] which emerged from the diffraction carried by Bragg and based on Huygen’s idea [29], therefore by elaborating the true mechanism of this field, would enrich and expand human understanding and unified the general level of human vision. In tackling this, it is better remember that, till early fifteen century, the Geocentric Model of the universe [30] was believed to reflect the true reality of the celestial bodies, forming an enforced centaury, the Geocentric Model of the universe [30] was believed to concentrate in the CMF (BCMF) [25], this is why the magnitude of CMF (BCMF) energy in Electromagnetic Radiation (EM-R) increased rapidly with frequency, because frequency is part of CMF formation [24] given as

\[ E = \frac{q V}{m c} \]  

Where, \( r_m \) is the magnetic radius in meter, \( c \) is the velocity of light in \( \text{m.s}^{-1} \), \( V_m \) is the electron velocity in \( \text{m.s}^{-1} \) and \( B_{\text{CMF}} \) is the CMF (B) in T.

The energy of Electromagnetic Radiation (EM-R) is shown to concentrate in the CMF (B_{\text{CMF}}) [25], this is why the magnitude of CMF (B_{\text{CMF}}) energy in Electromagnetic Radiation (EM-R) increased rapidly with frequency, because frequency is part of CMF formation [24] given as

\[ E = \frac{q V}{m c} \]  

Where, \( V \) is the Electron Diffraction Frequency in Hz, \( m_e \) is electron mass in kg, \( q \) is charge in Coulomb, \( h \) is Planck’s constant in J.s., and the Radiation Energy \( E_{\text{r}} \) in Joules. Table 1 give the variation of radiated energy with the CMF (B_{CMF}); using Eq(2) or Eq(21), this variation is also showed in the Secondary Electromagnetic Radiation (S-EM-R) [18], in which energetic CMF (B_{CMF}) interacted with strong Nucleus Spinning Magnetic Field (B_{1U}) [18] producing EM-R [25], both the magnitudes of the CMF and the Nucleus Spinning Magnetic Field (B_{1U}) are given in Table 1, the B_{1U} is derived by [25]

\[ B_{1U} = \frac{4 \pi m v B_{CMF}}{q} \]  

Where, \( V_f \) is Flipping Frequency (V_f) or radiation frequency in Hertz, and B_{1U} is the nucleus Spinning Magnetic Field (or the strong field). Substituting the equivalent of \( v \) in Eq (2) with \( v \) in Eq (3), the frequency is given by

\[ v = \frac{\sqrt{\frac{2 n B_{CMF} m V}{4 (V_f) B_{1U} q h}}}{s} \]  

Or as

\[ v = \frac{\sqrt{B_{CMF}^2 5.4482603543\times10^{19} 576990331e + 78}}{B_{1U}} \]  

Therefore, and as given by Eq (4), the radiation energy and frequency for each CMF (B_{CMF}) given in Table 1 is related to the magnitude of Nucleus Spinning Magnetic Field (B_{1U}) which trigger it [18] as given by Eq(3), the same is the conclusion of high energy scientists, that the shortest radiation/particle bursts of x-rays and y-rays are produced by the highest power laser [38], substoping \( v \) in Eq(3) with \( v \) in Eq(4) the relation between B_{CMF} and B_{1U} is given by [25]

\[ \text{Table 1: The Circular Magnetic Field (B_{CMF}) produced by energetic electron represents Electromagnetic Radiation Energy (E_{r}), carried by wave of specific frequency.} \]
slit, suggested different mechanism; and since water wave composed
mechanism behind the entering and emergence of light from a hole/
thus complicated the single aperture pattern; therefore, re-studying the
perspective not the physical dynamics of the slits on the emerged waves,
these showed the diffraction been conceived from the geometrical
light and dark on the screen is the diffraction pattern [40], therefore,
just one wavetrain apply to all wavetrains, and the resulted patterns of
conditions for constructive/destructive interference which apply to
difficult if not impossible to achieve [40], and since diffraction is “the
narrow slits which are the source of just one Huygens’ wavelet are
explained in connection with the semi circle water waves generated in
openings [32, 22], was the base behind Huygen’s principle of diffraction,
explained in connection with the semi circle water waves generated in
pond [26], and the pattern resulted from the superposition of diffracted
waves from both slits is interpreted as that produced by two point
sources vibrating in phase [22]; but the produced circular wave train in
water, and the overlapping interference by two ripple pattern produced
by two vibrating points source in phase [22], clearly shows the circular
nature of the produced waves, and the resulted interference produced
a diffraction [40], therefore Young’s double slits experiment shown in
Figure 1A, in which light is shown to propagate from the source to the
two slits, where the propagated wave is always perceived as consisting
of single wave, while Electromagnetic Wave (EM-W) consist of electric
and magnetic fields [41], unfortunately the shape of this wave have been
mixed with semi-circle water waves generated in pond, interpreted as
synonymous to magnetic wave [26], as shown in Figure 1A; but since it
was discovered that, the electric field (E-F) produced in series of time-
lapse photographs, is always either pointing up or down [34], similar
to the circularly polarized light [42], and since both experiments
showed electric field as raising and falling along the propagating
path and interpreted as moving vertically, and as polarization of light
is the filtering of one component of the incident beam [43], thus the
perceived double slit shape in Figure 1A, is neither the correct shape
of EM-R entering the slit, nor the correct shape emerging from the slit,
therefore the true shape of EM-R entering the slit is the one shown in
Figure 1C; hence the passing of EM-R through a slit/hole, removed
it’s electric field due to polarization process, hence the slit as a filter
component restrained the electric field, hence the wavelet entering the
slit is part of the Circular Magnetic Field (CMF) designated as δ-CMF
shown in Figure 2A, therefore the emerged wavelet is re-interpreted
as a change in the EM-R, where the resulted wave neither travel with
speed of light, nor carrying electric field, the wave is not semi-circle,
rather it is a full circular wave, and composed of the magnetic part
of the EM-R, this is designated as the Circular Magnetic Field (CMF),
which originated from the Circular Magnetic Field (CMF) produced
by accelerated electrons [24] as given by Eq.(1), and shown in Figure
2B, therefore the CMF (or B_CMF) as magnetic part of electromagnetic
radiation contained the radiation energy given by Eq (2) and shown in
Table 1, hence from Eq (2), the CMF (B_CMF) of this energy is given by

\[
B_{CMF} = \sqrt{\left(4\pi \right)^2 \frac{\nu^2 E_R}{m_e c^2} T} \quad (6)
\]

Replacing \(E_R\) in Eq(7) with \(\nu h\), hence B_{CMF} is given in terms of frequency as

\[
B_{CMF} = \sqrt{\left(4\pi \right)^2 \frac{\nu^2 h}{m_e c^2} T} \quad (7)
\]

The CMF given by Eq(8) is to be derived in term of frequency, the
B_{CMF} is given by

\[
B_{CMF} = \sqrt{C_{\nu} V^2} \quad T \quad (8)
\]

Where, \(C_{\nu}\) is the constant of radiation it is equal to
\(1.311364619620884691409896280354e^{-9} \text{T}^2\). Hz\(^{-5}\) (F\(^{1}\), s\(^{5}\)).

The CMF (B_{CMF}) given by Eq(9), is in terms of frequency, while the
frequency \(\nu\) in Eq (8) can be written as

\[
\nu = \frac{E^2}{h^2} = \frac{B_{CMF}^2 m_e c^6}{2 \left(4\pi \right)^2 q^2 E_R^2} = \frac{m^2 V^2}{2h^2} \quad (10)
\]

From Eq (10) the following is derived

\[
V^2 = \frac{2h^2 B_{CMF}^2 c^6}{2 \left(4\pi \right)^2 q^2 E_R m^2} \quad (11)
\]

Since velocity is given in term of energy as

\[
V = \sqrt{\frac{2E}{m}} \quad \text{m/s} \quad (12)
\]

| The source (Realization as) | Strength Tesla |
|-----------------------------|----------------|
| Earth’s magnetic field      | 6.e-5          |
| A typical hand-held magnet  | 1.e-2          |
| Superconducting magnets in LHC | 8.3e+0        |
| Strongest steady magnetic field | 4.5e+1        |
| Surface field of neutron stars | ~1.e+8       |
| Critical magnetic field of electrons | 4.e+9         |
| Surface field of magnetars  | ~1.e+11        |
| Noncentral heavy-ion coll. at RHIC | ~1.e+13      |
| Noncentral heavy-ion coll. at LHC | ~1.e+14      |

Table 2: Comparison of magnitudes of several sources of Magnetic fields [38].
For $V_e$ the above value is

$$V_e = \frac{2^4 E^4}{m^4} \tag{13}$$

Substituting the left hand side of Eq.(11) with the right hand side of Eq.(13)

$$\frac{2^4 E^4}{m^4} = \frac{2^4 h^4 B_{CMF}^2 c^6}{2 (4^4) q^2 E_x m^4} \tag{14}$$

Re-arranging Eq.(14), the CMF ($B_{CMF}$) is given by

$$B_{CMF} = \sqrt{\frac{5.12e+2q^2 E^3}{h^4 m c^6}} \tag{15}$$

From Eq(15), the CMF ($B_{CMF}$) can be given by

$$B_{CMF} = \sqrt[4]{1.0267123723266052069501087332373e+77 E^3} \tag{16}$$

Therefore, from Eq(15) the EM-R energy is given by

$$E_x = \frac{B_{CMF}^2 h^4 m c^6}{5.12e+2q^2} \tag{17}$$

Since the CMF ($B_{CMF}$) is the only variable in Eq (15), therefore the EM-R energy in terms of the CMF ($B_{CMF}$) is given by

$$E_x = \frac{B_{CMF}^2}{1.0267123723266052069501087332373e+77} \tag{18}$$

Therefore, the energy of the EM-R entering the slit in Figure 2A, is contained in the CMF ($B_{CMF}$) as given by Eq(18), and its value can be derived using Eq(16).

**Young’s Experiment and Circular Magnetic Field (CMF)**

The electromagnetic wavelet entered and emerged from a small hole comparable to its wavelength is shown in Figure 2A; as explained above, this wavelet is the magnetic part of the radiation as given by Eq(15), and since a wavelet emerging from a slits in turn act as secondary wave or source of light according to Huygens' [40], but as shown in the polarization process it's a source of wave, but not light, therefore any such δ-CMF emerging from a small hole or slit, is suggested to restored to its CMF origin; therefore as shows in Figure 2B, the transformation of the Circular Magnetic Field-Electric Field (CMF-EF) into Electromagnetic Radiation (EM-R) through the Flip-Flop (F-F) mechanism [24], is opposite to re-transformation of the EM-R back into CMF through the polarization mechanism attained through the hole (aperture)/slit. The change of the magnetic wavelet with dimension is synonymous to the restoration of the field into the CMF, but without electric field, this is expressed by

$$\text{CMF} = (\text{CMF} + \text{EF}) - (\text{EE}) \tag{19}$$

Since the CMF ($B_{CMF}$) is the only variable in the radiation energy given by Eq(17), and the formula shows CMF ($B_{CMF}$) as the main energy in Electromagnetic Radiation (EM-R) shown in Figure 1C [24], and as diffraction pattern from a single slit is a central maximum with much fainter bands of half the width of the central maximum on each side, and diffraction pattern from a circular hole or aperture is, correspondingly, a central disc surrounded by much fainter rings
or haloes [40] shown in Figure 2C, therefore these characteristics imply on the resulted CMF showed in Figure 2A, and resulted in the diffraction pattern shown in Figure 2C [40], which is representation of the CMF (BMF) as it emerged from aperture of Figure 2A; while the Poisson’s or Arago spot shown as a white spot in each of Figure 3C circles, interpreted to the existence of diffracted point sources at phase in the central axis, so the waves will add up and create a bright spot at the center of the image [44], but as shown in the figure this spot is part of the resulted CMF emerged from EM-R after the removal of the electric field, and it is even existed in the CMF-EF shown in Figure 2B, before the polarization.

The Young’s double-slit experiment is basically, involves splitting a single beam of light into two beams in order to ensure that they are in phase, then allowed to overlap, and the two wave trains interfere, constructively in some places and destructively in others [22], the diffraction pattern is taken to be created by the interference of waves traversing two clearly separated paths [45], but as shown in Figure 2A, the emerged polarized wave lost its electric field, it represents the CMF shown in Figure 2B and 2C; therefore what really takes place in Young’s resulted CMF showed in Figure 2A, and resulted in the diffraction pattern shown in Figure 2C [40], which is representation of the CMF produced diffracted patches.

Electron’s Circular Magnetic Field (CMF) Diffraction

It is known that, the phase waves or matter waves, exhibit certain striking points of similarity with electromagnetic waves, particularly in their ability to produce the diffraction effects by which they were discovered [12], and Thomson realized his experiment showed the central spot and rings were deflected together, and they are due to cathode rays of significantly the same velocity [11], this represents simultaneous deflection characteristic, which is a hint for extraordinary conflicting situation; but not investigated, while G.P. Thomson questioned the nature of these waves? And relation it has with electron associated with it [22], these scientific concerns were not answered at time; our answer is given by Eq(1), in which any charged in motion produced Circular Magnetic Field (CMF), which is the phase waves, matter waves [12] or pilot waves [14]; hence in double slit experiment shown in Figure 3, twenty seven electrons were accelerated by an electron gun, successively towards the two slits; the figure is divided into three sections; first the plan showing the electron gun with the last electron-27 emerging from the gun; the second part is two dimensional perspective of three electrons-26-25-24 surrounded along its trajectory by layers of Circular Magnetic Fields (CMF or BMF) of varied magnitudes with each moving towards one of the two slits; the third part is a plan shows electron-23

Figure 2: In (A) Electromagnetic Radiation (EM-R) emerged from single slit as a polarized Circular Magnetic Field (CMF), (B) shows the Flip-Flop (F-F) transformation of both CMF-Electric Field (CMF-EF) forming EM-R [24] then back to the polarized CMF, (C) shows single diffracted CMF from three different holes sizes [40], while (D) shows two polarized CMF resulted from wavelets δ-CMF-1 and δ-CMF-2 of the EM-R, the geometrical structure of line x-x is on left of the slit line, interference of both CMF produced diffracted patches.
before entering slit-2 it’s CMF is marked with green color, electron-22 is in the middle of slit-1 surrounded by δ-B_{CMF-1}, while part of the CMF-22 or the δ-B_{CMF-2} (with lower magnitude ranging between 0.25% to 56.25% of main CMF) showed in middle of slit-2, then electrons-21 just exited from slit-2, while electron-20 before it and both impinged on the monitor, which showed resulted five bright fringes or patches resulted from previous nineteen interferences (19) x (2δ-B_{CMF-1}) of constructive waves that had emerged from both slits.

As electrons emerged from the electron gun, each produced CMF or B_{CMF} along its path, while surrounded by its Electric Field (E-F), shown in two dimension for electrons-26-25 and 24 with magenta color, moving to either slits, the cross sectional plan of electron-23 is shown with CMF and the E-F extended from its center to all sides while approaching slit-2, the CMF (B_{CMF}) intensity is proportional to the velocity as given by Eq(1), and to the acceleration potential as given by Eq(15), thus an electron entered the slit; as shown for electron-22 at the center of slit-1 together with its strongest δ-B_{CMF-1} this occurred concurrently with other less magnitude portion of its extension δ-B_{CMF-2} at the center of slit-2, their existence is similar to both δ-Wave entering both slits in Young’s double slit experiment shown in Figure 2D, since electron velocity is given in terms of energy by Eq(12), therefore substituting (Ve) from Eq(12) with Ve in Eq(1) then rearranging the equation, the CMF (B_{CMF}) entering slit-1 due to specific energy is given by

\[
\frac{B_{CMF-1}^2 r_{m}^2 c^2}{q^2} = \frac{2eE}{m}
\]  

(21)

Therefore, from Eq(21), the magnitude of the CMF-1 (B_{CMF-1}) entered a slit with an electron (electron-22 at slit-1 in Figure 3), is given by

\[
B_{CMF-1} = \sqrt{\frac{2eE}{m_{e} q^2 r_{m}^2 c^2}} T
\]  

(22)

Where, \(r_{m}\) is the magnetic radius for (B_{CMF-1}) measured from electron' center to edge of slit-1, the CMF-2 (B_{CMF-2}) entering a slit without an electron (slit-2 in Figure 3), is given by

\[
B_{CMF-2} = \sqrt{\frac{2eE}{m_{m} q^2 r_{m}^2 c^2}} T
\]  

(23)

Where, \(r_{m}\) is the magnetic radius for (B_{CMF-2}) measured from electron center to the center of slit-2, it is weaker (by \(r_{m} - r_{m}\)) than B_{CMF-1} entering slit-1, since a recent double slits experiment suggested that each electron somehow travels through both slits at the same time and interferes with itself, like a wave instead of a particle, resulted in interference pattern [46], therefore, the existence in Figure 3, of δ-CMF-1 (B_{CMF-1}) in the center of slit-1 and δ-CMF-2 (B_{CMF-2}) in the center of slit-2, is similar to the existence in Figure2D of δ-Wavelet-1 in the center of slit-1 and δ-Wavelet-2 in the center of slit-2, and since

![Figure 3: The diffraction of the Circular Magnetic Field (CMF), produced by an electron. Section 1 shows the last electron 27 emerging from electron gun, 2-two dimensions of three electrons moving towards the two slits surrounded by CMF and EF 3-plan of electrons 21-23, the two slits & waves](image-url)
\(\delta\)-Wavelet-1 and \(\delta\)-Wavelet-2 are part of the EM-R been transformed into CMF (B_CMF) through the polarization process given by Eq(19), after emerging from both slit-1 and slit-2 respectively, therefore the \(\delta\)-Wavelet-1 and \(\delta\)-Wavelet-2 in Figure 3 are the CMF (B_CMF), and both CMF represents the same electron producing them, but with slightly different magnitudes, hence both CMF (B_CMF) are wrongly perceived.

As both experiments shown in Figures 2 and 3, are characterized in common with \(\delta\)-B_CMF entering both slits, and since both having -B_CMF transformed into CMF (B_CMF) after emerging from the slit, therefore both CMF (B_CMF) formed successive trail of progressive enlarged waves, both caused interference, adding and cancelling each other to form the bright fringe or patches showing in Figure 3, similar to Young’s double slit experiment in Figure 2, but this has been perceived and interpreted as waves collapse back into a single particle on screen, which is the foundation problem of quantum mechanics [47], and as shown there is no magic in this process.

The magnitude of CMF (B_CMF) entering any slit in Figures 2 and 3 is given by Eq(9), and for electron-CMF and related CMF entering slit-1 and 2 in Figure 3, it is derived using Eqs (22 and 23) an examples of which is given in Table 3, while the equivalent frequency if transformed into EM-R, for both \(\delta\)-CMF-1 (B_CMF-1) and \(\delta\)-CMF-2 (B_CMF-2) at slit-1 and slit-2 in Figure 3, or both \(\delta\)-CMF-1 (B_CMF-1) and \(\delta\)-CMF-2 (B_CMF-2) in Figure 2, is derived from Eq(9), and given by B_CMF-1

\[v = \frac{B_{CMF}}{C_B} \text{ Hz} \]  \hspace{1cm} (24)

The equivalent frequency given by Eq(24), showed that for a CMF wave accompanying an electron to produced intensity similar to EM-R, when detected at the monitoring in Figure 3, a minimum intensity is required (can be tested in Table 1), hence this is done by controlling electron velocity or the accelerator potential, the equivalence of BCMF in Eqs. (9 and 22) is given as

\[v = \frac{2Eq^2}{C_Bmr^4c^5} \]  \hspace{1cm} (25)

Substituting \(v\) with \(\frac{C}{A}\) in Eq(25), hence the wavelength is given by

\[\lambda = \frac{C_Bmr^4c^5}{2Eq^2} \text{ m} \]  \hspace{1cm} (26)

For simplicity Eq(28), is given by

\[\lambda = \sqrt{\frac{5.08825984e-23r}{m} \text{ m}} \]  \hspace{1cm} (27)

Since \(r_m = \frac{\lambda}{4}\), substituting this in Eq(26), hence when energy is given, the equivalent wavelength is given by

\[\lambda = \frac{C_Bmc^7}{4^2E} \text{ m} \]  \hspace{1cm} (28)

Or for simplicity as

\[\lambda = \frac{1.98782265e-25}{E} \text{ m} \]  \hspace{1cm} (29)

This equation can reproduce the wavelength versus particle energy for electrons given by Kittel [49], and since the wavelength equal four magnetic radius \(\lambda = 4r_m\) substituting this in Eq(28), the Radiation Energy \(E_{r}\) is given by

\[E_{r} = \frac{C_Bmc^7}{2048q^2r_m} \text{ J} \]  \hspace{1cm} (30)

For simplicity, the Radiation Energy \(E_{r}\) can also be given by

\[E_{r} = \frac{4.969556625e-26}{r_m} \text{ J} \]  \hspace{1cm} (31)

Substituting \(\lambda\) with \(\frac{C}{A}\) in Eq(28), when energy is known, then frequency is given by

\[v = \frac{2\left(4^5\right)E_{r}q^2}{C_Bmc^5} \text{ Hz} \]  \hspace{1cm} (32)

Combined fixed parameters with radiation constant \(C_r\), therefore Eq(32) can be written as

\[v = 1.509188961097711609232347343983e + 33E_{r} \text{ Hz} \]  \hspace{1cm} (33)

From Eq(33), knowing the frequency \(v\), the energy of any EM-R is given by

\[E_{r} = \frac{v}{1.509188961097711609232347343983e + 33} \text{ J} \]  \hspace{1cm} (34)

But the inverse of \(1.509188961097711609232347343983e + 33\) in Eq(34) is the Planck’ formula

\[E_{r} = 6.6260755e - 34v = hv \text{ J} \]  \hspace{1cm} (35)

Alternatively, replacing \(E_{r}\) in Eq (34) with Planck’ energy formula, the following is obtained

\[hv = \frac{v}{1.509188961097711609232347343983e + 33} \text{ J} \]  \hspace{1cm} (36)

Cancelling the frequency \(v\) from both sides of Eq(36), therefore, the given Planck constant [16], is also given by

\[h = \frac{1}{1.509188961097711609232347343983e + 33} \text{ Js} \]  \hspace{1cm} (37)

Therefore the inverse of Eq(37), is the Planck’ constant

\[h = 6.6260755e - 34Js \]  \hspace{1cm} (38)

But from Eq(8), the Planck constant is given by

\[h = \frac{B_{CMF}mr^5c^6}{2\left(4^5\right)q^2v^5} \text{ Js} \]  \hspace{1cm} (39)

During energy production, the frequency is not the main factor, rather it is the time \(t_{f}\) [24], and since \(t_{f} = \frac{1}{v}\), hence Eq (39) becomes

\[h = \frac{B_{CMF}t_{f}mr^5c^6}{2\left(4^5\right)q^2v^5} \text{ Js} \]  \hspace{1cm} (40)

Where, \(t_{f}\) is Flipping time in second, but electron mass (m), charge (q) and speed of light (c) in Eq (40) has fixed quantity, the only variables are the CMF (B_CMF) and the Flipping Time (t_f), and variation of both quantities (B_CMF and v) in Eq(40) as given in Table 1, is in a manner to keep the Planck’ constant at fixed magnitude, the products of both the CMF (B_CMF) and time (t_f) in Eq(40) is given by

\[B_{CMF}t_{f} = \frac{h}{5.0527252584917691102101768251341e + 55} \text{ Js} \]  \hspace{1cm} (41)

Where, \(5.0527252584917691102101768251341e + 55\) is the Fixed constant \(C_{e}\), From Eq(41), the magnitude of this product is given by

\[B_{CMF}t_{f} = 1.311386461962088469140986280354e - 89 = \left(C_{e}\right) \]  \hspace{1cm} (42)
Radiation (EM-R) entering and emerging from small hole or slits:

Energy (ER) is given by

\[ \text{ER} = \frac{R \times v}{5.0527252584917691102101768251341e+55} + 55 \text{ J} \]  

Therefore, the Planck constant can also be expressed by

\[ h = C_R \times C^v \text{ J} \text{s} \]  

Results and Discussion

Suggestions are made regarding relation between Electromagnetic Radiation (EM-R) entering and emerging from small hole or slits:

- When entering and emerging from slits/hole, the EM-R lost the electric field due to polarization effect.
- The wavelet which entered and emerged from slits is the magnetic part of the EM-R.
- When emerged from the hole or slit this magnetic wave becomes circular in shape.

| Slit | Magnetic Radius | CMF (B_CMF) 10 kV (1.60217733e-15 J) SEM | Equivalent Wavelength | CMF (B_CMF) 200 kV (3.20435664-14 J) TEM | Equivalent Wavelength |
|------|------------------|------------------------------------------|---------------------|-------------------------------------|---------------------|
| 1    |                  | 1.2669519319231816 623917695036969e-9 | 1.81784733151684939 676848362971976-6 | 5.663174582670403756 543851017898e-9 | 9.88507676079415185 2337453012636-7 |
| 2    |                  | 1.99701535215883031748674 87002653e-5 | 1.41654388657170941385 962754475e-11 | 1.09692113512913534 84712182019e-6 |
|      |                  | 5.6310897475121405057453 11274079e-16 |                     |                     |                     |
| 3    |                  | 1.027912309110779095826 8312056868e-14 | 1.50629284771427743381 29513810871e-4 | 9.06857961352920700248 70161826837e-14 | 8.27379945851579593634 45732167507e-5 |
|      |                  | 5.315829744766431041375 9267844116e-4 | 2.185299882520019451352 822674622e-15 |                     |                     |
|      |                  | 1.2524345990085656220298 124509632e-13 | 5.749186772864557523416 4724489184e-5 | 1.007139857012880700544 1120968948e-12 | 3.157914872332170551 894633992008e-5 |
|      |                  | 1.26995131923181623917 695036668e-13 | 7.2369805764845387033970 165095896e-9 | 5.66167457820700437655 43851017898e-13 | 3.97515065999239177 570347206222e-5 |

Table 3: The relative magnitudes of Circular Magnetic Field One (B_CMF-1) and Two (B_CMF-2) entering slit-1 and slit-2, respectively in Figure 3, using Eqs. (22) and (23) and acceleration potentials of 10 kV and 200 kV respectively, in (1) \( r_m=5 \times 10^{-6} \) and \( r_m=1 \times 10^{-4} \) [48], while (2 and 3) are mixture of \( r_m=5 \times 10^{-6} \) mm [40].

- The resulted Circular Magnetic Field (CMF), lost characteristics of EM-R radiation, particularly the speed of light, as electric field is lost.
- The shape of a diffracted wave on screen due to a single slit/hole is representation of the emerged CMF, while waves from two slits interfere constructively or destructively.
- The double-slit experiment, or the electron diffraction, it is described as the entry of CMF from one electron into two slits, with varied magnitudes, of CMF accompanied by the electron through a slit having greater magnitude.
- The ceased of interference pattern when detector is put near one of the slits to determine which slit(s) an electron is passing through, at which electrons create two straight lines, like classical particles [46], as shown in Figure 3, such detection interfere with the electrons CMF and passing through both slits gives the lines.
- As showed by Eq(1), the CMF produced by such electron is the main energy of electromagnetic radiation wave, therefore the so-called phase waves or matter waves or plot wave which exhibit certain striking points of similarity with electromagnetic waves, particularly in their ability to produce the diffraction effects by which they were discovered [12], is just a CMF.
- It is clear G.P. Thomson was correct right from the beginning in realizing de Broglie's theory as a theory of light and electronic orbits, not as a theory of electron diffraction [23].
- Planck constant is related to the double slit experiment by the energetic CMF and relation with energy production.
- As shown in Eq(43) Planck constant consists of two constants, the fixed (m, q and c) parameters of the energy formula designated as Fixed Constant (C_R) and the two variables the CMF (B_CMF) and the Flipping time \( t_f \) designated as Radiation Constant (C_v).
- The multiplication of Eq.(47) by \( t_f \) gives the radiation energy, while multiplication of the same equation be \( t_f \) gives the Planck constant, as in Eq(44).
- Therefore, Planck constant is the variation of Radiation Constant \( C_v \), which contains both the CMF (B_CMF) and the Flipping time \( t_f \), the multiplication of which gives a constant value for each radiation, and it's multiplication by the Fixed Constant parameters \( C_R \) produced the Planck constant \( h \).
It is clear from Eq(44), that Planck in expressing that his constant is merely a mathematical trick to obtain the right description (formula) of the black body radiation spectral intensity profile [50].

Conclusion

The disclosed knowledge of the Magnetic Force (Fm) [19], Spinning Magnetic Field (SMF), and the produced Spinning Magnetic Force (SMFc) [20], allowed the Flip-Flop (F-F) mechanism for Electromagnetic Radiation (EM-R) [24], and reproduced the Radiation Force (SMFc) [20], showed the Spinning Magnetic Field (SMF), with the existence of Electromagnetic Radiation Force (FEMR), showed Compton effect and parameters for the speed of light was derived [25], in removing electron from atom in Photoelectric Effect [16], the F-F passage of light through single hole/slit resulted in rings on the monitor, while the interference of two such CMF in double slits experiment, produced constructive or destructive interference, shown as patches on the screen. Thus electron diffraction in double slit experiment is interpreted as the entrance and emerged of CMF in and out of both slits/holes in addition to the electron producing them, thus both CMF produced constructive or destructive interference; the origin of the Planck constant (h) is finally derived, and showed to form relationship between two constants, the Radiation constant (Cγ), composed of both the CMF (B γ ) and the Flipping time (tγ), and the Fixed constant (C0), the Planck constant resulted from the multiplication of both constants.

Finally, G.P. Thomson found it impossible to explain his results "except by the assumption of some kind of diffraction" [11,23], simply because he faced what Compton faced before [5], contrary to Compton, Davisson and Germer and Thomson, who followed Einstein quanta (photon) line [5,9,11], we realized Raman understood the problem by early stating that "the classical wave-principles are not easily reconcilable with Compton effect because they have not been correctly interpreted," [51]; the simplistic explanation of billiard-ball of quanta, allowed the emergence of such complicated ideas and alleged predication by Quantum Mechanics (QM) that any detector capable of determining the path taken by a particle through one or the other of a two-slit plate will destroy the interference pattern [52], such line of thoughts empowered some to think QM represents the super knowledge, even an attempt has been made to establish relation between it and higher brain functions [53], leading some to imagine QM as a steppingstone between ourselves and the Universe, between what we want and making it actually happen in the natural [54]; hence what QM succeeded to attained was to get rid of common sense because as it claimed common sense makes a lot of mistaken assumptions [13], but as seen two great historical lessons could be draw from this experience that, the collection of lots of data without being able to find any basic underlying principles is not science [26], and science is an open field any individual can explore for the benefit and progress of humankind.

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