

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 6, Issue 9, September 2017

Innovative Solutions of Unsolved Problems and Misconceptions in Physics

Salama Abdelhady*

Faculty of Energy Engineering, Aswan University, Egypt

Abstract: According to a previous review of thermodynamics of electromagnetism, the Maxwell's wave Equations were casted into an energy frame of reference by replacing the time in these Equations by entropy. Such transformation helps in redefining the energy quantum and realizes the representation of a postulated definition of the electric charge and magnetic flux as electromagnetic waves of electric or magnetic potentials. In this paper; it will be discussed experimental results that found the electric charge as electrified light and the magnetic flux as magnified light. Such definitions will be used here as a key to delete the duality confusion, to find a new photon's wave function and to discuss the need to the Schrodinger's particle-wave function. The introduced definitions will be used also to find innovative solutions of found unsolved problems in physics and to solve the inconsistency between classical physics, quantum mechanics and the special relativity. Finally it will be discussed how such approach succeeded in deleting redundancies in the SI system of units and clearing the ambiguities in defining the Tesla's dark energy, the MIT's resonance evanescent waves, and exceeding the PV efficiency limit as determined by Shockley and Queisser.

Keywords: Inconsistencies, Redundancies, Misconceptions, Problems in physics

I. INTRODUCTION

While the laws that characterize the flow of electric charge and magnetic flux are analogous to the laws that characterizes the flow of heat; both fluxes are not defined in literature as direct forms of energy which should have the same nature and possess similar units of energy, or Joule [1,2]. Such distortions were the source of finding many misconceptions related to electricity and magnetism and their units in physics-literature [3,4]. However, the traditional definitions of electric current as flow of electrons led to many unsolved problems in physics and the evolution of the duality confusion as introduced by Einstein to explain the photoelectric effect [5]. In a previous review of thermodynamics of electromagnetism; the author proved through an entropy approach that the flow of electric charge and magnetic flux is in the form of electromagnetic waves similar to the flow of heat, and is encountered by entropy generation. Accordingly; The flow of such fluxes was expressed, similar to the heat, as the entropy generated by such fluxes times the corresponding driving potentials as follows [6,7]:

$$\delta Q_{th}=T dS \quad (1)$$

$$\delta Q_{el}=E dS \quad (2)$$

$$Q_{mag}=H dS \quad (3)$$

Such approach led to cast Maxwell's wave Equations into an energy frame of reference by replacing the time in these Equations by entropy [6]:

$$\left(\nabla^2 - \frac{1}{c^2} \frac{\partial^2}{\partial S^2} \right) \mathbf{E} = 0 \quad (4)$$

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 6, Issue 9, September 2017

$$\left(\nabla^2 - \frac{1}{c^2} \frac{\partial^2}{\partial s^2} \right) H = 0 \quad (5)$$

By such transformation the Maxwell's Equations are transferred into an energy frame of reference that is independent on time and adopt the arrow of time in terms of the entropy as a system function which measures the ongoing energy dispersal [8].

Such Equations are represented graphically in Fig. 1 [6]. In this figure the flow of energy of the electromagnetic wave is represented directly by the swept areas by the flowing wave as can be expressed mathematically by the sum of the following integrals [6]:

$$h = \int_0^{2\pi} (|E dS_e| + |H dS_{mag.}|) \text{ Joule} \quad (6)$$

The first integral in Equation (6) represents the flow of electric energy and the second integral represents the flow of magnetic energy in an electromagnetic wave [6]. The sum of these energies in each wave represents the quantity of energy flow per wave or the energy quantum as an intermittent wave flow [6].

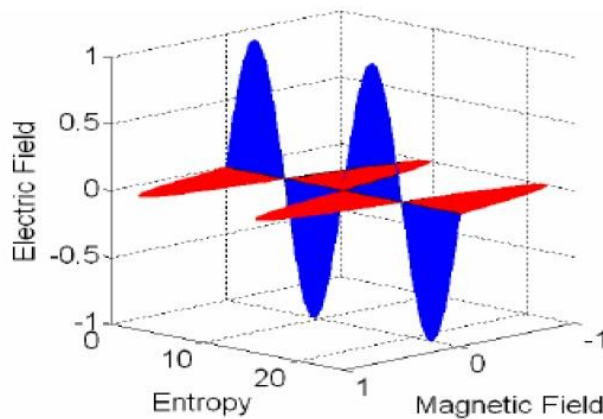


Fig. 1. Electromagnetic waves in E-s and H-s planes [6].

Success of casting the Maxwell's wave Equation in such energy coordinates which represents directly the flow of electric and magnetic energies led to represent the separate flow of such energies as electromagnetic waves which either have electric potential +/- ΔE, or magnetic potential, +/- ΔH, as seen in Figs. 2 and 3 [9].

Mathematically, the flow of electric current can be represented in the E-s and H-s frames as electromagnetic wave of positive or negative potential, i.e., of potential +/- ΔE as follows [9]:

$$E(r, t) = s(\varphi(r, s)) + / - \Delta E \quad (7)$$

$$B(r, t) = s(\varphi(r, s)) \quad (8)$$

In this case, the electric charge can be defined as flow of intermittent energy of negative or positive electric potential

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 6, Issue 9, September 2017

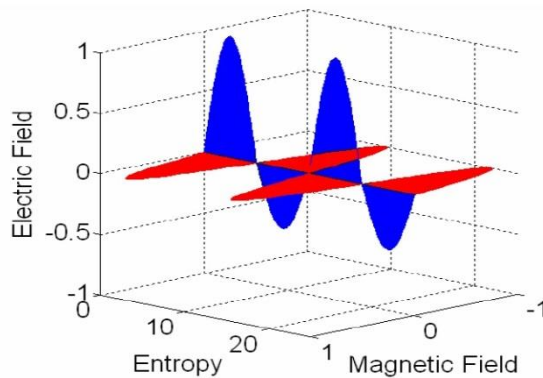


Fig. 2. Representation of a positive electric charge as electromagnetic wave, or energy, of positive electric potential in the E-s plane [9].

Similarly; the flow of magnetic flux can be expressed as an electromagnetic wave of positive or negative potential, i.e., $\pm \Delta H$, as follows [9].

$$H(r, t) = s(\varphi(r, s)) + / - \Delta H \quad (9)$$

$$E(r, t) = s(\varphi(r, s)) \quad (10)$$

So, the magnetic flux and electric charge can be defined also as flow of intermittent, or wavy, energy of negative or positive potential similar to the flow of thermal radiation as intermittent flow of energy of thermal potential [9]. Bascon et al. found the experimental evidence for the quantization of magnetic flux and its intermittent flow as a wave [10,11]. They related the magnetic-quanta to the Planck's constant " h " which indicate the similarity between the flow of energy and the flow of magnetic flux as electromagnetic waves. Similarly, the fact that all free electric charges are integral multiple of the electron's charge " e " is known as quantization of electric charge [2]. So, the photon, the electric charge, and the magnetic flux have similar properties of quantization. This conclusion represents the evidence that they have intermittent flow in the form of electromagnetic waves [9].

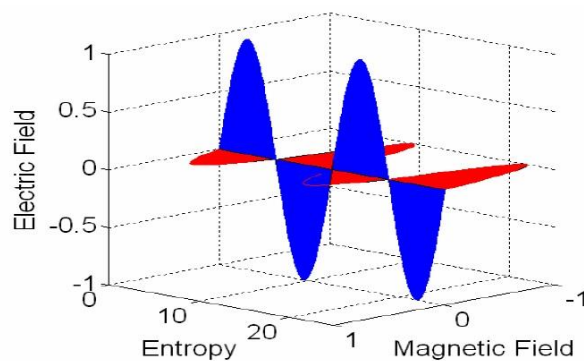


Fig. 3. Representation of the flow of magnetic flux as electromagnetic wave, or energy, of negative magnetic potential in H-s planes [9].

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 6, Issue 9, September 2017

Such definitions of electric charge and magnetic flux led to innovative understanding of the Photovoltaic and Magnetocaloric Effects that deletes ambiguities in these phenomena [12].

In this study; we will start by proving the truth of such definitions of electric charge and magnetic flux by results of Faraday's experiments and another simple experiment. Then such innovative definitions will be used to find solutions of unsolved problems in physics as the dark energy and evanescent waves, quantum gravity, misconceptions in electromagnetism, inconsistency between classical physics, quantum mechanics and the special relativity. The same approach will be applied also to correct found errors in laws of electromagnetism and quantum mechanics and to delete redundancies in the SI system of units.

II. FARADAY'S EXPERIMENTS

Faraday's experiment of magnetic induction, as seen in Fig. 4, may represent a proof that the electric current and magnetic flux should have the same origin or nature but of different potentials. The results of Faraday's experiment of magnetic induction can be interpreted as follows: the electric current in the primary coil is converted by induction into magnetic flux in the core; then the induced magnetic flux of the core is converted once more into an electric current in the secondary coil [13]. Such way of understanding showed that both fluxes, electric and magnetic, should have similar natures and that their conversion process is experienced by exchanging their potentials, electric or magnetic, in a direction in the primary coil then in an opposite direction in the secondary coil [12].

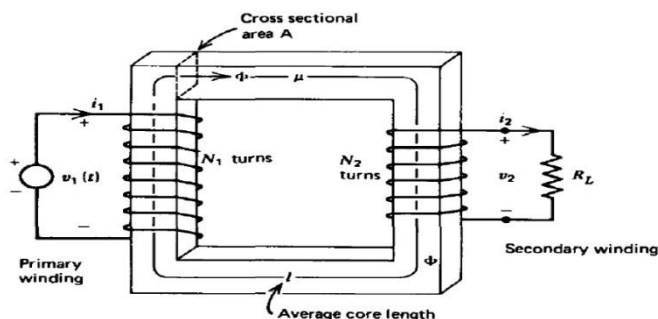


Fig. 4. Faraday's Experiment of Magnetic Induction.

While the fuzzy logic approach was recently introduced by Zadeh [14], such approach was applied since more than a century by Faraday to find plausible explanations of the results of his experiments [15]. Faraday's opinion which accounts to his conviction that various forms under which the forces of matter have one common origin, is an example of following such approach in the past times [16]. He postulated that such forces, i.e., electric or magnetic force, are so directly related and mutually dependent, that they are convertible and possess equivalents of power in their actions [17]. Faraday wrote this statement as an introduction to the nineteenth series of his "Experimental Researches in Electricity," published in the Philosophical Transactions in 1846-1852 [18]. It is an eloquent and remarkable statement which has been written by a modern physicist working on the foundations of a grand unified theory of forces.

Faraday held many experiments whose results made him convinced that he had succeeded in magnetizing and electrifying a ray of light and in illuminating an electric or magnetic line of force [18]. However; he stated such conclusion as much as he could grasp to find plausible explanation of the results of his experiments in his time. He thought that there is a true direct relation and dependence between light and the magnetic and electric forces [19]. However, he didn't interpret such results, as done through a newly postulated approach, into definitions of the electric current and the magnetic flux as electromagnetic waves of electric and magnetic potentials. So, electrifying a ray should mean, as it is newly defined, that it is converted into electric current by gaining electric potential during an

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 6, Issue 9, September 2017

electrification process [20]. Similarly, magnifying the ray means converting it into magnetic flux by gaining magnetic potential during a magnification process [21].

According to results of his experiments, Faraday found that the magnetic field can indirectly influence the behavior of a light wave [22]. This influence or effect that Faraday observed is now known as Faraday’s rotation because his experiment illustrated the rotation of a ray of light by the action of magnetic field, whatever the magnet’s configurations are, as seen in Fig. 5 [22].



Fig. 5. Rotation of a ray by a magnetic field.

This was the first definitive evidence that light and electromagnetism are related, and paved the way for Maxwell’s brilliant theoretical demonstration of the existence of defining the light, or energy, as electromagnetic waves. The results were feeble, but still sufficient to show the perfect identity of action between electro-magnets and common magnets in their power over light [22].

Furthermore, Faraday employed a single magnetic pole, and evaluated how the effect depended on the relative orientation of components of his experiment (Fig. 6). Faraday’s illustration of this is shown below [23].

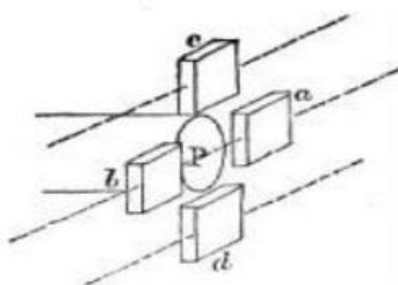


Fig. 6. Faraday’s experiment that shows how the rotation of the ray is effected by the relative position of the magnetic pole “P” and the trajectory of light from a to b or from c to d.

Accordingly; Faraday announced at a meeting of the council of the Royal Institution that this experiment proves that light, heat and electricity are merely modifications of one great universal principle [23]. However; as concluded in his article, we can read “Faraday’s effect of light propagating in magnetic field converts it into magnetic flux” [24].

Such conclusion is a sufficient experimental proof that magnetic flux has the same nature of light rays, as electromagnetic waves, but of a magnetic potential gained during propagation or magnetizing into a magnetic field. So, Faraday proved according to the results of his experiments that the heat radiation, the electric current and magnetic flux have a similar nature but the influence of the acting field as the source of their force, or potential, to act [25].

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 6, Issue 9, September 2017

III. SALAMA'S EXPERIMENT

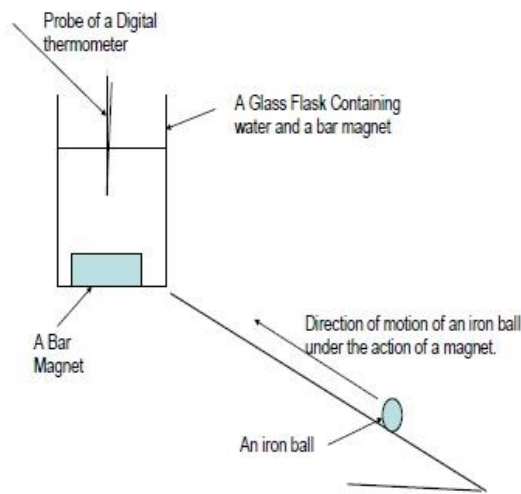


Fig. 7. Measurement of equivalence of magnetic and thermal energies [9].

Reviewing the results of a simple experiment, Fig. 7 that used a permanent magnet immersed in a water basin to attract iron balls along an inclined smooth glass plane; the heat lost from the water was found equivalent to the done magnetic work in attraction of the balls along the shown plate according to the following Equation [6]:

$$C_F \Delta T = n m_b g s \sin \phi \quad (11)$$

Such results may be considered as a proof that the magnet converted the thermal potential of the heat absorbed from water into magnetic potential to substitute the lost magnetic energy from the magnet. Similarly, it was possible to measure the equivalence of the heating rates, in magnetic fluids, to the subjected alternating magnetic power [26].

Reviewing also the definition of the magnetocaloric effect in literature as applied in refrigeration; it is possible to deduce the same conclusion of similarity of the natures of heat and magnetic flux [11,27]. Consequently, it is possible to postulate the similarity of the natures of the magnetic flux and heat and their reversible interchangeability through exchanging their potentials [6,27].

IV. SOLUTIONS OF REDUNDENCIES IN SI SYSTEM

Missing clear definitions of the electric charges or magnetic flux, as electrified or magnetized electromagnetic waves, introduced confusing units in electromagnetism which do not belong directly to the energy units as the Coulomb, Ampere, Gauss, Tesla, Henry, and Farad, Table 1 [28,29].

However, defining the electric charge and magnetic flux as electromagnetic waves that can be measured by energy units led to propose a universal system of units that delete such discrepancies or fuzziness in the SI system of units as seen in Table 2 [30].

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 6, Issue 9, September 2017

Table 1. Electromagnetic non-analogous units in SI system of units [27].

Magnetic quantity	Electric quantity
Magneto-motive force Amp	Electromotive force Volt
Magnetic field strength Amp/m	Electric field strength Volt/m
Permeability kg m/sec ² /Amp ²	Conductivity Sec ³ Amp ² /kg/m ³
Magnetic Flux m ² kg/sec ² /Amp	Current density Amp/m ²
Reluctance Amp ² /m ² kg/ sec ²	Resistance m ² kg /sec ³ /Amp ²

Table 2. Electromagnetic Analogous Units in a Universal System [28].

Magnetic quantity	Electric quantity
Magneto-motive force Volt	Electromotive force Volt
Magnetic field strength Volt/m	Electric field strength Volt/m
Permeability W/m Volt	Conductivity W/m Volt
Magnetic Flux W/m ²	Current density W/m ²
Reluctance V/W or Ω	Resistance V/W or Ω

V. CORRECTIONS OF DIMENSIONAL ERRORS IN FARADAY’S LAW OF SELF-INDUCTION

Consider a coil consisting of N turns and carrying a current I in the conductor as shown in Fig. 8. If the current is steady, then the magnetic flux through the loop will remain constant. However, if the current changes with time, then according to Faraday’s law, an induced emf will arise to oppose the change [28]. The property of the loop in which its own magnetic field opposes any change in current is called “self-inductance,” and the emf generated is called the self-induced emf. Mathematically, the self-induced emf can be written as follows [28]:

$$\text{emf} = -\frac{d\phi}{dt} = \frac{d B.A}{dt} \quad (12)$$

The “emf” is a misnomer; it is not a force at all [29]. In literature we find numerous definitions of such emf, many of which are not completely consistent with each other [30]. The common definition is that the emf is the work done per unit charge to create potential difference (voltage) [31]. Both the emf and voltage have the same units of volt and the two terms are used synonymously. In electromagnetism literature; we find Equation (12) is written also as follows [32]:

$$V = -\frac{d B.A}{dt} \quad (13)$$

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 6, Issue 9, September 2017

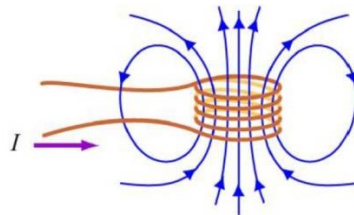


Fig. 8. Magnetic flux through the current loop.

Substituting the units of the terms in the LHS and the RHS of the previous Equation according to the SI system of units; we will get the following inequality that expresses the non-constancy of the units on the both sides of the Equation:

$$\text{volt} \neq \text{m}^2 \frac{\text{kg} / \text{sec}^2}{\text{Amb. sec}} \neq \frac{\text{m}^2 \cdot \text{kg}}{\text{Amb. sec}^3}$$

By introducing the units of the proposed universal system and using the theory of dimensional analysis to get consistency of dimensions of the both sides in Equation (13); the R.H.S of the Equation might be modified as follows [33]:

$$V = -R_m \cdot A \frac{dB}{dt} \tag{14}$$

The term “ R_m ” in Equation (14) represents the reluctance, or magnetic resistance, of the core of the coil in V/W. However; it is found that such modification of Faraday’s law may better fit the experimental results of his induction experiment [27,33].

It is possible also by following a similar procedure as that used in modifying Faraday’s law, by considering the unique nature of electric charges and magnetic flux as electromagnetic waves, to solve the inconsistency found in literature in the relations between electric and magnetic fields on the one hand and current density and magnetic flux on the other [34,35].

The introduced definitions based on the modified Maxwell’s wave Equation can be used also to simplify the derivation of governing Equations in the electromagnetism. As an example; we may apply such definitions on derivation the Equation the consider mutual induction between two coils, Fig. 4 [36]. In absence of losses; we may consider the rate of flow of electric charge in the primary coil is equal to the rate of generated magnetic flux flowing between the primary and the secondary coil and equal to the induced electric current in the secondary coil as all have the same nature and units [33]; i.e.:

$$I_{\text{primary}} = \dot{B} = I_{\text{sec}} \tag{15}$$

So, expressing such rates in terms of the electric or magnetic potentials times the rate of the corresponding entropy generation or flow; we get [37]:

$$E_{\text{pr}} \dot{S}_{\text{e.pr}} = H \dot{S}_{\text{mag}} = E_{\text{sec}} \dot{S}_{\text{e.sec}} \tag{16}$$

Accordingly

$$\frac{E_{\text{pr}}}{E_{\text{sec}}} = \frac{\dot{S}_{\text{e.sec}}}{\dot{S}_{\text{e.pr}}}$$

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 6, Issue 9, September 2017

The the rate of flow of entropy in the coils measures the energy dispersal in such coils [37]. As such dispersal is suppressed physically by increasing the numbers of turns of such coils, it is possible to express mathematically such dependence as follows [37]:

$$\dot{S}_{e,sec} \propto 1 / n_{coil} \quad (17)$$

Then, the relation between entropy flow in the primary and the secondary coils can be written as follows:

$$\frac{\dot{S}_{e,sec}}{\dot{S}_{e,pr}} = \frac{n_{pr}}{n_{sec}} \quad (18)$$

Substituting in Equation (16)

$$\frac{E_{pr}}{E_{sec}} = \frac{\dot{S}_{e,sec}}{\dot{S}_{e,pr}} = \frac{n_{pr}}{n_{sec}} \quad (19)$$

Accordingly

$$\frac{E_{pr}}{E_{sec}} = \frac{n_{pr}}{n_{sec}} \quad (20)$$

This Equation, as concluded from the followed entropy approach, is identical with the found experimental results and the Equation found in physics literature [36].

VI. CLEARING THE DUALITY CONFUSION

The source of the duality confusion was initiated by the Einstein's explanation of photovoltaic effect that assumes the ejection of the electrons by a light wave [38]. Such explanation was proved as a misconception according to the principles of conservation of momentum where the relativistic momentum of a photon is negligible with respect to the actual momentum of an electron [39]. Additionally, as the flow of electric charge is defined as a flow of electromagnetic waves, the photovoltaic effect can be explained as electrifying the incident electromagnetic waves when crossing the cell's junction, that converts the incident light into electric charges as happened in Faraday's experiment of electrifying the light [18,40]. Discarding the definition of electric current as flow of electrons deletes the idea of any interaction between the light waves and particles and clarify the duality confusion too [12]. Such conclusion deletes the need to depend on solutions of the Schrodinger's Equation that assume the flow of particles as waves and represent a source of conflict between classical physics and quantum mechanics [41].

VII. INVESTIGATING WHAT IS REALLY REAL IN QUANTUM MECHANICS

This question is generally asked by physicists when discussing the quantum mechanics [42]. As previously discussed; clearing the duality confusion should drop the need to imagine the flow of waves as particles or the flow of particles as a wave [43]. Considering the photon as a quantum of light energy was firstly introduced by Max Planck in the year 1900 in order to explain the spectral distribution of electromagnetic waves emitted by a blackbody [44]. Looking at the original interpretation of energy quantization according to Planck, he stated that the flow of electromagnetic waves should be considered as a continuous flow of wave-packets and he found that the energy of such packets equals to $h=6.626176 \times 10^{-34}$, when $\nu = 1$ [44] According to this original statement of Planck, "h" expresses the energy per wave or the sum of the swept areas in the E-s and H-s planes in Fig. 1. Such energy packet is expressed mathematically, as previously introduced, by Equation (6), as follows [45]:

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 6, Issue 9, September 2017

$$h = \int_0^{2\pi} (|E dS_e| + |H dS_{mag.}|) \text{ Joule / wave} \quad (21)$$

Such definition of energy packet per wave contradicts the traditionally considered energy of a photon in quantum mechanics that equals to h Joule. Such statement is illogic because the product of any constant, as h , times the frequency, gives a rate of flow of energy and cannot represent an energy quanta as defined in quantum literature but it indicates the high rate of energy flow [45]. Such statement represents a source of misconceptions in quantum mechanics as is incorrect from the dimensional point of view which turns the rate of energy flow which should be in Watt into a quantity of energy in Joules [46]. Looking at the original statement of Planck's law for spectral irradiance [46].

$$B_\lambda(\lambda, T) = \frac{c_1}{\pi \lambda^5} \frac{1}{e^{\frac{c_2}{\lambda T}} - 1} \quad (22)$$

In this Equation c_1 is called constant of radiation and is equal to $3.74177153 \times 10^{-16} \text{ W. m}^2$

Such Equation did not involve the Planck's constant. However, the stated Planck's law for spectral irradiance in literature is written as follows [47]:

$$B_\nu(T) = \frac{2 h \nu^3}{c^2} \frac{1}{e^{\frac{c_2}{\lambda T}} - 1} \text{ W / m}^2 \text{sr}^{-1} \text{Hz}^{-1} \quad (23)$$

Equation (23) is wrong from the dimensional point of view as the term " $h\nu$ " should not have the unit of energy, i.e., Joule, but it should have the units of energy per wave, i.e., the Joule/wave. In this case, by multiplying $B_\nu(T)$ by the frequency the number of the flowing packets of energy buckets per second, i.e., $d\nu$, then the units of the term $B_\nu(T) \cdot d\nu$ will be in Watt/m^2 [6]. So, replacing $h\nu$ {J} in the previous Equation by \hbar {J/wave}, the statement of Planck's law can be dimensionally modified as follows [6]:

$$B_\nu(T) = \frac{2 h \nu^2}{c^2} \frac{1}{e^{\frac{\hbar}{k_B T}} - 1} \text{ Joule / wave. sr}^{-1} \text{m}^2 \quad (24)$$

In this case, the rate of radiation of energy whose frequency is in the range from ν to $\nu+d\nu$ will equal to:

$$B_\nu(T) = \frac{2 h \nu^2}{c^2} \frac{1}{e^{\frac{\hbar}{k_B T}} - 1} \cdot d\nu \text{ W/m}^2 \quad (25)$$

Writing the original Planck's law as stated in Equation (24) represents the intermittent flow of energy per wave, or the photons, as introduced by Planck and Einstein [48]. While the conversion of the original Planck's law into the form cited in literature keeps the dimensions of $B_\nu(T)$ in J/m^2 but it hasn't the required physical meaning that shows the relation between the photons and the frequency of its flow as a wave [49].

So, replacing the time in the Maxwell's Equation by entropy approves the flow of energy into lumps each has the quantity " \hbar ." It yields also solutions that are independent on time similar to photon's wave function developed by solving Schrodinger's Equation [50].

However, Gibbs considered the entropy as a function of the probability according to the following Equation [51]:

$$S = k \ln \Omega \quad (26)$$

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 6, Issue 9, September 2017

Where " Ω ." represents of the accessible energy microstates that tells how the internal energy, U of a system is distributed amongst the various energy levels of such system [50]. Accordingly; the solutions found by the modified Maxwell's Equations, i.e., Equations (4) and (5), have similar probabilistic concept as that found by solving the Schrodinger's Equation [51].

Accordingly, the concept of the photon as an energy quantum, as introduced by Schrodinger's Equation, had been originated by Planck's and the Maxwell's Equations [52]. Similarly, the photon's wave function as introduced by Schrodinger as a tool to find a time independent frame for the flow of such photons is verified also by the Maxwell's Equations when replacing the time by entropy in these Equations as previously explained [6,53].

According to the innovative description of the photovoltaic effect, there is no need to assume any interaction between the incident light waves and electrons or to accept the particle wave function as a solution of Schrodinger Equation [12]. Accordingly, it is possible to consider the quantum description of gravity and the particle's wave function, as a misconception. This conclusion solves the conflict between the quantum mechanics, the classical physics and Einstein's relativity theory [54]. In other words, the particles wave function, as introduced by Schrodinger, may be considered as a source of difficulties in quantum mechanics [55].

VIII. CLEARING TESLA'S DARK ENERGY, MIT'S EVANESCENT WAVES AND PV EFFICIENCY LIMIT

The success of the Tesla in transferring the electric power wirelessly at Wardenclyffe was contradicting the classical definition of electric energy as flow of particles, or electrons, into the atmosphere [56]. This experiment was based on abrupt discharge of electromagnetic waves of extremely high electric potential, according to the innovative definition of electric charges, through atmosphere similar to the discharge of electric energy from clouds to the earth during lightning [57]. While the Tesla's power was defined as radiant dark energy because it was not seen, such nomination represented a misunderstanding of the normal nature of electric current as electromagnetic waves of electric potential [58].

Similar to Tesla's experiment in Wardenclyffe, researchers in the MIT succeeded in transferring magnetic flux by resonance between two coils. They discovered the natures of the transferred energy as waves whose amplitude diminishes exponentially by the distance between the two coils and called the emitted magnetic energy from the primary coil as evanescent waves [59,60]. However, such energy is, according to the innovated definition of magnetic flux, should be considered as normal magnetic flux that is transferred as electromagnetic waves of magnetic potential that is naturally decayed by the crossed magnetic resistance of atmosphere [6].

Depending on Einstein's explanation of the photovoltaic effect; Shockley and Queisser derived a limit that cannot be exceeded by the photovoltaic cells [61]. However; such limit was actually exceeded by modern photovoltaic cell that represents a violation of a theoretically derived limit [62]. Following an approach that depends on the introduced definition of the electric current, it was possible to prove that the photovoltaic effect is driven mainly by the thermal potential of the incident waves and depends on the Seebeck effect of the materials of the cell's junction [63]. Such approach solves also the conflict between the found measurement and the non-understanding of the nature of the electric charges.

IX. CONCLUSION

Realizing the nature of electric current and magnetic flux as electromagnetic waves of electric or magnetic potentials, according to their innovative definitions, represents a key to solve many unsolved problems in physics and to find logical proofs of some laws in electromagnetism. Such definitions are based on robust experimental results and mathematical foundation derived by casting the Maxwell's wave function into an energy frame of reference. Following this approach, it was possible to clear the duality confusion, to discard the need to the Schrodinger's particle's wave

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 6, Issue 9, September 2017

function and to delete the inconsistency between classical physics, quantum mechanics and the special relativity. Additionally, it was possible to correct errors in defining the Tesla's dark wave, The MIT's evanescent waves and the photon's energy that originated from misunderstanding the common nature of electric energy and magnetic flux as electromagnetic waves of different potential similar to the heat as electromagnetic waves of thermal potential. Finally; it was possible to introduce a universal system of units that deletes redundancies in the existing SI system of units and correct dimensional errors in laws of physics.

REFERENCES

- [1] RA. Serway, JW.Serway, "Physics for scientists and engineers with modern physics", Eighth edition, Brooks Cole, USA, 2010.
- [2] M. Fujimtu, "Physics of classical electromagnetism", Springer, 2007.
- [3] J. Hansson, "The 10 biggest unsolved problems in physics," International Journal of Modern Physics and Applications, Vol. 1, No. 1, 2015, pp.12 -16.
- [4] V. Smarandache, F. Smarandache, "Thirty unsolved problems in the physics of elementary particles," Progress in Physics, Vol 4, 2009.
- [5] J. Hendery, "The development of attitudes to the wave-particle duality of light and quantum theory", , Analas of Science, vol. 37 no.1980, pp. 59-79, 1900-1920.
- [6] S. Abdelhady, "An advanced review of thermodynamics of electromagnetism", Int J Res Stud Sci Eng Technol vol. 3 no.6, pp.10, 2015.
- [7] S. Abdelhady, "Thermodynamics: fundamentals and its application in sciences", 2017.
- [8] WC. Myrvold, "Statistical mechanics and thermodynamics", A Maxwellian View, Studies in History and Philosophy of Modern Physics, vol. 42, pp. 237-243, 2011.
- [9] S. Abdelhady, "A fundamental Equation of thermodynamics that embraces electrical and magnetic potentials", J Electromagnetic Analysis & Applications, pp. 162, 2010.
- [10] BS. Deaver, WM. Fairvank, "Experimental evidence for quantized flux in superconducting cylinders," Physical Review Letters, Vol 7, 2, 1961
- [11] S. Abdelhady, MS. Abdelhady, "An entropy approach to the natures of the electric charge and magnetic flux", Journal of Electromagnetic Analysis & Applications, vol.7, 2015.
- [12] S. Abdelhady, "Innovative Understanding of the duality confusion, the photovoltaic and magnetocaloric effects", Ain Shams Engineering Journal, 2017.
- [13] RF. Harrington, "Introduction to electromagnetic engineering". Mineola, NY: Dover Publications, 2003.
- [14] LA. Zadah, "Fuzzy algorithms", Inf Control vol. 22 no.94, 1968.
- [15] B. Jones, "Life Lett Faraday", vol. no.2, 1870.
- [16] G. Ross, "Grand unified theories," Westview Press; 1984.
- [17] DT. Ryan, "Toward a cognitive-historical understanding of Michael Faraday's research: editor's introduction," Perspect Sci, vol.14, pp.1-6, 2006.
- [18] Faraday, "Exp. Res. Electricity", vol .3, 1855.
- [19] B. Sherwood, PJ Scanlon, RN. Henriksen, JR. Allen, "Approaches to electromagnetic induction", Am J Phys vol.377 no.698, 1969.
- [20] S. Abdelhady, "A thermodynamic analysis of energy flow in optical fiber communication systems", Appl Phys Res vol. 4 no.22, 2012.
- [21] S. Abdelhady, "An entropy approach to wireless power transmission by magnetic resonance", Appl Phys, 2013.
- [22] DT. Ryan, "Toward a cognitive-historical understanding of Michael Faraday's research: editor's introduction", Perspect Sci, vol.14, pp.1-6m, 2006.
- [23] B. Jones, "Life Lett Faraday", 2, 1870.
- [24] G. Ross, "Grand unified theories", Westview Press, 1984.
- [25] P. Penfield, HA. Haus, "Electrodynamics of Moving Media", MIT Press, Cambridge, Massachusetts, 1967.
- [26] MH Phan, SC Yu, "Review of the magnetocaloric effect in manganite materials", J Magn Magn Mater, vol. 308 no.2, pp.325, 2007.
- [27] GV Brown, "Magnetic heat pumping near room temperature", J Appl Phys, vol. 47 no.3674, 1976.
- [28] GM. Trunov, "Correctness of the international system of units in the area of electromagnetism," Journal of Measurement Techniques, Vol. 26, No. 1 , pp. 9-10, 1983.
- [29] GD. Yarnold, "Notes on electric and magnetic dimensions", Proceedings of the Physical Society, pp. 189-193, 1942.
- [30] S. Abdelhady, "An approach to a universal system of units," Journal of Electromagnetic Analysis & Applications, vol. 2, pp. 549-556, 2010.
- [31] PAM Dirac, "Development of the Physicist's Conception of Nature", The Physicist's Conception of Nature, pp. 1-14, 1973.
- [32] B. Thide, "Electromagnetic Field Theory", Upsilon Books, Uppsala, Sweden, 2004.
- [33] S. Abdelhady, "Comments concerning measurements and Equations in electromagnetism", J. Electromagnetic Analysis & Applications, vol.2 pp. 677- 678, 2010.
- [34] S. Hughes, "Displacement current and maxwell's Equations", MIT, 2005.
- [35] HA. Lorentz, "Problems of modern physics", H Bateman, London, 1927.
- [36] JD. Jackson, "Classical electrodynamics", Wiley, New York, 1975.
- [37] WC. Myrvold, "Statistical mechanics and thermodynamics, a maxwellian view, studies in history and philosophy of modern physics", vol 42, pp.237-243, 2011.
- [38] W. Ketterle, "When atoms behave as waves; bose-einstein condensation and the atom laser," Reviews of Modern Physics, Vol. 74, No. 10, pp. 1131-1151, 2002.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 6, Issue 9, September 2017

- [39] S. Abdelhady, "Comments on Einstein's explanation of electrons, photons, and the photo-electric effect", Appl Phys Res, vol.3, pp.230, 2011.
- [40] S. Abdelhady, "An entropy approach to Tesla's discovery of wireless powertransmission", J Electromagnetic Analysis & Applications, vol. 5, pp. 157-161, 2013.
- [41] GA. Gearhart, "Planck: the quantum and the historian", Phys Prospect, vol. 4 no.170, 2002.
- [42] Z. Merali, "Quantum Physics, What is really real?" Nature, Vol. 521 no. 7552, 2015.
- [43] V. Singh, "Einstein and the Quantum", Quantum Physics, pp. 5-39, 2005.
- [44] O. Passon, JG. Ellis, "Planck's radiation law, the light quantum, and the prehistory of indistinguishability in the teaching of quantum mechanics", European Journal of Physics vol. 38, 2017.
- [45] S. Abdelhady, "An entropy approach to a practical limit of the efficiency of developed and multijunction solar cells", J Electromagn Anal Appl vol. 6 no. 383, 2014.
- [46] M.Badino, "The bumpy road, max planck from radiation theory to the quantum 1896–1906", Springer, Berlin, Germany, 2015.
- [47] J. Agassi, "Radiation theory and the quantum revolution", Birkhauser: Basel, Switzerland, 1993.
- [48] G. Ludwig, "Foundations of quantum mechanics", Springer-Verlag, 1983.
- [49] N. Chandrasekar, "Quantum mechanics of photons", Adv Studies Theor Phys, Vol. 6 no. 8, pp.391–397, 2012.
- [50] IB. Birula, "The photon wave function, coherence and quantum optics VII", New York, p. 313, 1996.
- [51] NM. Laurendeau, "Statistical thermodynamics", Cambridge university press, 2005.
- [52] RH. Niven, M Grendar, "Generalized classical, quantum and intermediate statistics and the Polya urn model", Phys Lett A, vol. 373, pp. 621–626, 2009.
- [53] O. Darrigol, "Statistical and combinatorics in early quantum theory", II: Early Symptoma of Indistinguishability and Holism, University of California Press: Berkeley, CA, USA, 1991.
- [54] G. Boardman, "Addressing the conflict between relativity and quantum theory: models, measurement and the markov property, cosmos and history", The Journal of Natural and Social Philosophy, vol. 9 no. 2, 2013.
- [55] B. Modir, JD. Thompson, "Framing difficulties in quantum mechanics", PhysRev-PER, 2017.
- [56] A. Waser, "Nikola Tesla's Wireless Systems, 2000.
- [57] A. Gosline, "Thunderbolts from Space", New Scientist, Vol. 186 no. 2498, pp. 30-34, 2005.
- [58] N. Tesla, "The effect of static on wireless transmission," Electrical Experimenter, pp. 627-658, 1919.
- [59] A. Kurs, "Power transfer through strongly coupled resonances", 2007.
- [60] B. Cannon,J. Hoburg, D. Stancil, S. Goldstein, "Magnetic resonant coupling as a potential means for wireless power transfer to multiple small receivers. Power Electronics", IEEE Transaction, vol. 24 no.7, 2009.
- [61] W. Shockley, HJ Queisser, "Detailed balance limit of efficiency of p-n junction solar cells", Journal of Applied Physics, 32, 510-519, 1961.
- [62] F. Dimroth, S. Hannappel, K. Schwarzburg, "Wafer bonded four-junction GaInP/GaAs/GaInAsP/GaInAs concentrator solar cells with 44.7% efficiency", Progress in Photovoltaics: Research and Applications, vol. 22, pp. 277-282, 2014.
- [63] S.Abelhady, "An entropy approach to a practical limit of the efficiency of developed and multijunction solar cells", J Electromagn Anal Appl, vol. 6 no. 383, 2014.