

# The Wavy Ray Model: A New Light Model

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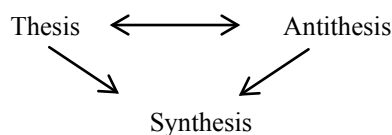
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**Abstract** Despite Planck was recognized as the originator of quantum physics, he struggled for it throughout his life until his death. He never accepted his  $h\nu$  as Einstein's photon. He believed that the origin of,  $h\nu$ , had not been discovered yet. In addition, the photon concept caused Einstein regret throughout his life. He wrote; "I spent all my life trying to understand what a photon is, and haven't understand it by now, so the quanta are a hopeless mess". Is it possible or can we resolve such problem, which the eminent physicists consider it as a hopeless mess. In this article, I'm trying to obtain the Planck quantization of radiation energy  $E = n h \nu$ , by a picture appealing to the imagination, I'm trying to introduce a new light mode called the wavy ray model.

**Keywords** Wave particle ray photon duality

## 1. Introduction

When Einstein faced the photoelectric results, he realized that the wave theory alone fails to account such results. In addition, he realized that the particle theory also fails because the energy of the emitted electrons is function of frequency and the frequency is a wave property. So what he supposed to do? What he supposed to do? Einstein did not think of constructing a new light model and restart interpretation over again. The particle and the wave models have captivated him, may be some one advice him to apply Hegel dialectic or Hegel triadic



in Philosophy to solve this scientific problem. Therefore, he borrowed the localization from the particle theory and he borrowed the frequency from the wave theory and affirmed them together in a single theoretical entity named the "Photon".

The question is "How the energy of localized packet depends on non-localized property as the frequency, no one could answer that question even Einstein himself.

In my own view, the word "photon" acquired its existence between us due to long usage and not due its actual existence. The logical positivism philosophers realized that, there are many of non-sense words which people get accustomed to

use it. The disaster is the thinking as long as there is a word in physics it must has a pear (analogous) in nature. The physicists exchange the word photon as they talk, so it must be digestible information. No, for me this word cannot constitute a picture at all because its falseness lies in its interior structure (Contrary descriptive structure).

## 2. New Light Model

I have a wish, to find out (to approach) the real form by which light do propagate. I collect the experimental results and I tried to give them a better understanding. I found myself more attached to construct a new light model (a new possibility for the transfer of energy) rather than to continue with the false wave-particle duality view. I reconsider the ray model which is long disregarded and I tried to unify all the three light models into one single picture (the wavy ray model). I hope to solve the whole light phenomena together. That is the difference between my way and the physicist way in which they think in each phenomenon alone, separated from the other phenomena as Heisenberg said. So that one should be always have the whole picture in his mind, before one tries to fix a theory in mathematical or other language.

### 2.1. The Wavy Ray Model

The suggested wavy ray model is based on the following postulates:

- (1) The monochromatic light point source emits energy in the form of wavyrays emerging in all directions (see figure (1)).
- (2) Each wavy ray consists of identical sections (wavy ray parts) of equal length,  $l$ . Each wavy ray section contains energy  $b = 6.6 \times 10^{-27}$  erg. The  $b$ 's dimensional formula is  $ML^2T^{-2}$ .

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- (3) The length of each separate wavy ray section,  $l$ , is different for different monochromatic sources.
- (4) The polychromatic source emits wavy rays which having different wavy ray section lengths (i.e mixture of different wavy rays)
- (5) The emerging wavy rays distributed discontinuously (separately) over a surface of a sphere.
- (6) The single wavy ray has a front area,  $W$ , moving in straight path with the speed of light,  $C$ , in vacuum.
- (7) The frequency of each wavy ray,  $\nu$ , is the number of full sections that pass a given point in space per unit time  $\nu = C/l$ . **It should be noted that; it is naturally to speak about the frequency of the wavy ray while it is meaningless to speak about the frequency of a point particle or photon.**
- (8) A wavy ray is an idealization, it meant to represent an infinitely narrow beams of energy. It can be assumed that; each single wavy ray interacts only with a single electron, i.e. the front area of the wavy ray is smaller than the electron dimensions.

Since, the mathematical equation is the simplest form to express the relation between the physical quantities and shows the physical meaning, one can write the energy radiated from the monochromatic source as:

$$E = N b \nu T \quad (1)$$

Where  $N$  is the number of emitted wavy rays from the source,  $b$  is the energy contained in each wavy ray section,  $\nu$ , is the frequency of the wavy ray and  $T$  is the illumination time.

The intensity of light incident upon unit area,  $a$ , per unit time can be written as:

$$I = N b \nu (a/4\pi r^2) \quad (2)$$

Where,  $r$ , is the distance from the source.

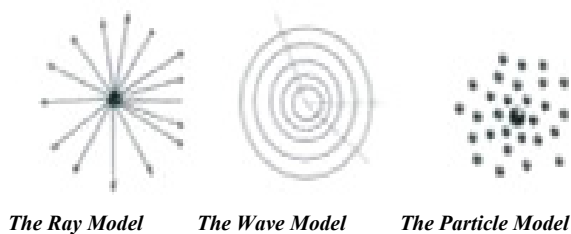


Figure 1a. Particle, ray and wave models



Figure 1b. Wavy ray model

It should be noted that: the wavy ray model reconcile (unify) the ray, the particle and the wave models:

- (1) The wavy rays move in straight lines as the ordinary rays of geometrical optics.
- (2) The wavy rays have the same frequency like the waves of physical optics.
- (3) The wavy rays produces spots or dots when they falls on a surface of a screen and their energy is quantized like the fictious photon of the quantum optics.

### 3. Interpretation of Photoelectric Effect

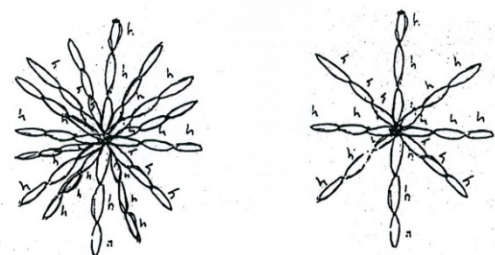
Equation (1) explains the quantization of radiation. Equation (2) can be used to explain the photo electric effect as follows:

The energy incident on unit area per unit time can be increased by two ways:

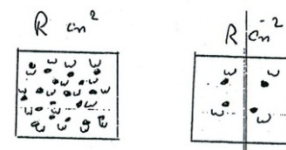
- a- By increasing  $N$ , the no of emitted wavy rays from the point source, which leads only to increase the number of emitted electrons, without increasing their kinetic energy.
- b- By increasing  $\nu$ , the frequency of each wavy ray, or the energy carried by each wavy ray per unit time which leads to an increase in the kinetic energy of the emitted electrons without increasing their numbers. This interprets the dilemma of the photo electric effect.

*Interpretation of Light phenomena using the wavy-ray model.*

*Interaction of light with matter photoelectric effect.*

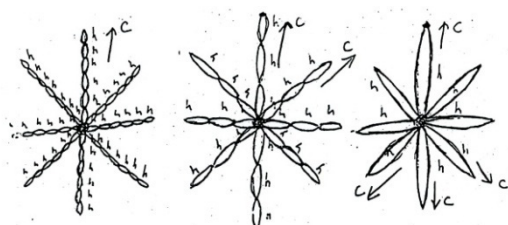


*Increasing the energy emitted from the source by increasing the number of emerging wavy-rays.*

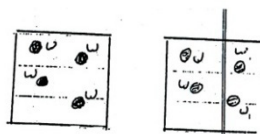


*Increasing the number of emerging way-rays leads to increasing the number of emitted electrons.*

Figure 2a



**Increasing the energy emitted from the source by increasing the frequency of the emitted wavy-rays.**



**Increasing the frequency of the emitted wavy-rays lead to increasing the (K.E.) of the emitted electrons without increasing their number.**

Figure 2b

### 3.1. Interpretation of Planck Constant

For the first time in the history of physics, in 1900, in his interpretation for the black body radiation, Planck introduces the idea of quantization of radiation. He introduced a new physical constant,  $h$ , known as Planck's constant  $h = 6.6 \times 10^{-34}$  j.s. It should be noted that; the unit, j.s, of the Planck's constant is a meaningless unit. Also its dimensional formula (energy multiplied by time) has not any physical significance.

I agree with Planck for discarding the idea that an oscillator could gain or lose energy continuously but by a discrete amount. The difference between me and Planck lies in that, Planck said that the discrete amounts is an integral multiple of  $(h\nu, 2h\nu, 3h\nu, \dots)$  I say this is true quantitatively. However; I only suggest to write the same discrete amount determined by Planck but by different way such that:  $1\nu bT, 2\nu bT, 3\nu bT$ , where  $b = 6.6 \times 10^{-34}$  J is the energy contained in each wavy ray section, its unit is joule, it is an energy and it has a physical meaning,  $\nu$  is the frequency and  $T$  is the illumination time.

I would like to clarify that the secret behind the successes of both the wave and the particle models so far is that because both models contain elements of the wavy ray model as follows:

- 1- The wave model has a wavelength as the wavy ray section length and both the wave model and the wavy ray model has the same frequency.
- 2- The particle model its energy is quantized and it produces spots (or dots) on the screen as the wavy ray model.

### 3.2. Comment on the Interpretation of Compton Effect

There is a great mistake which is considering Compton effect as a strong evidence for the particle nature of light. The physicists interpreted the reduction in the energy of the high

energetic X-ray radiation or gamma ray radiation when they scattered by free electrons as a collision between the photon and the free electrons. They ignore the fact that the proposed factious photon could not produce such collision for the following reasons:

- 1- According to the law of the relativistic addition of two velocities  $C+V=C$ ,  $C-V=C$  i.e the proposed photon has a fixed speed, its speed cannot exceed  $C$  or less than  $C$ . However, the inelastic collision essentially depends on the variations of the velocities of the collided masses before and after collision.
- 2- The proposed photon is a mass less entity, it has not a rest mass, what collision is that? Collision between what!!

Why the physicists are doing that? That is because they are sure there is no physical way based on wave mechanics could interpret the observed increased in the wavelength. As I think if one of the two pictures is failed, the physicists attribute the phenomena automatically to the second picture, because they could not confess that the two picture which they don't know any about them are failed to account for these phenomena.

## 4. Young Double Slit Experiment

My comment is divided into two parts; 1- showing that the double slit pattern is not an interference wave pattern. I want to warn against (or to notify of a fault), which is the title of this phenomenon. The physicists often called it wrongly (the interference experiment). I would like to say that they have confused the phenomenon itself with the interpretation model, Calling the resultant pattern of Young experiment as interference pattern this will cause us to confiscate any new different future interpretation for this experiment. So I prefer to call it double slit pattern.

Let us look a bit more closely at this experiment: according to the classical theory of electricity and magnetism, the pattern that formed when a coherent beam of light passes through the double slit apparatus arises from the superposition of two electromagnetic waves one diffracted from each slit. The detector in the Young experiment measures the light intensity. This quantity is proportional to the squared magnitude of the resultant electromagnetic field at the detector:

$$I = \epsilon_0 C |E(x)|^2 \quad (3)$$

I say yes the physicists enable us to calculate the light intensity at each point, however they never tell us one single word about how the redistribution of energy actually occurred or how physically the energy disappeared at the dot points and how the energy became double the sum of the two separate intensities at the cross points. In my own view, the resultant energy could not be greater or lesser than the sum of the two separate intensities.

According to the principle of superposition, when two coherent light waves of equal intensity  $I_0$  meet in space the result can be wave of intensity  $4I_0$  (constructive interference

at the cross point) and an intensity of zero (destructive interference at the dot point). The wave theory of light does not explain nor tell us one single word about how the redistribution of energy physically (actually) occurs, the physicist keep silent about this dilemma they are satisfied that the total energy is conserved.

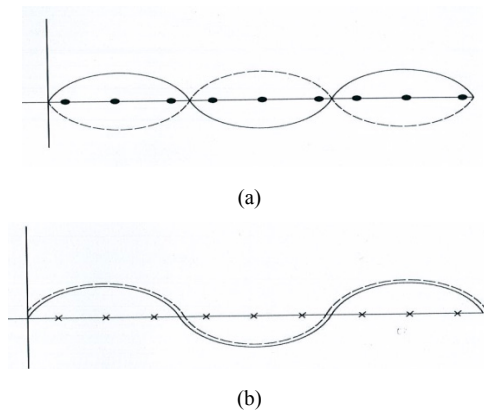


Figure 3

It is a known fact that; the law of conservation of energy at each point is not applied at this experiment. It should be noted that; the law of conservation of energy at each point is so far not contradicted by any laboratory experiment or observation of nature; only in the interpretation of Young phenomenon as waves interference, this law is violated.

In my own view; the double slit pattern is not an interference wave pattern because in an any interference pattern of any mechanical wave, the energy is conserved at each point, it just oscillate between potential energy and kinetic energy- It should be noted that not one physicist deny nor dispute the false of the Young interpretation. In contrary they confirm and pretend, (they spread abroad falsely that the young double slit experiment demonstrates the wave nature of light).

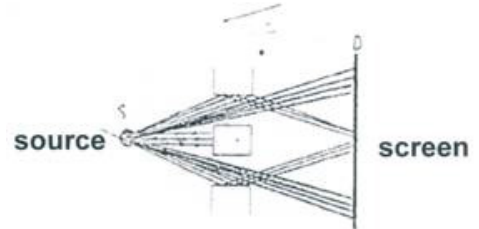
The question now is why the physicists are doing that, they doing that because they are sure that there is no conceivable way based on particle dynamics could produce such pattern. Yes they are sure that two particles could not cancel or reinforce each other when they came to the same point at the same time. In contrary, they collide according to the laws of conservation of energy and momentum. If they are sure that one of the two picture are failed they attribute the phenomenon automatically to the other picture because physicist could not confess that the two pictures which they don't know any but them are failed to account for this phenomenon. I say since the target of physics is to acquire accurate and reliable knowledge i.e to arrive a valid interpretation of a natural phenomenon, then we should immediately ask for a new different explanation.

2-I must, first ask for the reader forgiveness for my inability to formulate the mathematical equations required to represent this phenomenon quantitatively. All I can do is offer a qualitative description.

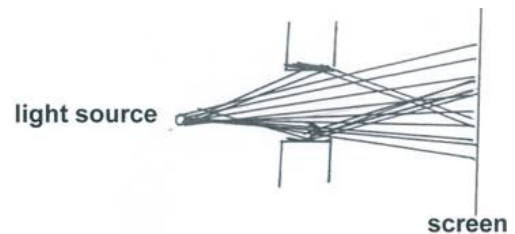
I introduce my personal view for the wavy ray interpretation of Young experiment. I take into account the

depth of the edges of the slit as in the figure, some of wavy rays are reflected by these edges and some wavy rays are transmitted.

It should be noted that, in my wavy ray interpretation for the double slit experiment, we found that the dark areas do not receive any energy at all and not two energies canceling each other as in the wave interference interpretation for that pattern.



(a) Qualitative explanation for young-double-slit phenomenon



(b) Qualitative explanation for single slit phenomenon

Figure 4

## 5. Single Slit Phenomena

It should be noted that; calling the single slit pattern as a diffraction pattern this confiscating any new future different interpretation for that pattern.

Physicists interpreted the single – slit pattern by combining Huygens secondary sources with the principle of superposition.

The physicists interpret the single – slit experiment by modifying their view for the single continuous wave front, they replace it by many separate sources (Huygens factious sources).

To explain the observed pattern physicists postulate unjustifiably the following:

- (1) Each point on the wave front is considered as a source of a secondary wave.
- (2) Postulate that these secondary wavelets produce an effect only on their forward direction.
- (3) The secondary waves interfere according to the principle of super position.

The only physicists dispute such wave interpretation Hugh David Young, in his "Optics and modern physics" he wrote;

- (1) The procedure prescribed by Huygens principle may not seem to make any physical sense at all, since it is clear that there are not any sources of radiation in the apertures. In fact this one place we can be certain, there are no sources.



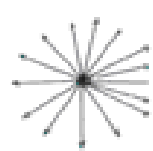
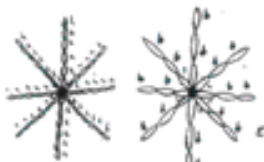
- (2) However, the assumption of uniform distribution of sources across the apparatus leads to the observed diffraction pattern".

Concerning the first part of his statement."

I'm in complete agreement with Prof. Hugh that there no meaning for assuming the existence of not existing sources.

- (1) The second part of Prof. Hugh statement I'm in complete disagreement with him. Because, these secondary waves interfere according to the principle of superposition; which means breaching the law of conservation of energy at each point as I clarified in the double – slit pattern.
- (2) In my own view since the target of physics is to acquire accurate and reliable knowledge, i.e. to arrive a valid interpretation for natural phenomena. Then, we should immediately search for a new different explanation for both "the double-slit, and the single-slit" experiments using a new different model.

### Different light models

	
<p><b>The Wave Model</b></p> <p><i>The energy is continuously distributed over an spherical surface moving with an increasing volume.</i></p>	<p><b>The Photon Model</b></p> <p><i>The energy consists of finit number of energy quanta (hv) localized in space, moving without being divided and which can be emitted or absorbed only as whole.w</i></p>
	
<p><b>The Ray Model</b></p> <p><i>Light rays emerges from each single point on an object, a small bundle of rays leaving one point is shown reaching a person eye.</i></p>	<p><math>E = n h \nu</math></p> <p><i>Wavy-rays emerging from point source in all direction.</i></p>

## 6. The Results

1. We obtained the quantization of light energy (the old  $E = nh\nu$ ) by picture appealing to the imagination. The picture I am offering is one that is open to discussion and experimental verification.

2. I clarified that neither the photoelectric effect nor the Compton Effect could be considered as a direct demonstration for the particle nature of light.
3. I clarified that neither the double – slit pattern is an wave interference pattern nor the single slit pattern is a wave diffraction pattern.

## 7. Conclusions

1. The mental image I am offering for the way light spreads is the result of my attempt to offer a one single model that explains the whole different light phenomena. I believe this model is experimentally verifiable.
2. Light has not wave nature
3. Light has not particle nature
4. Light has not dual wave-particle nature
5. The actual nature of light is still remained undiscovered yet.

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