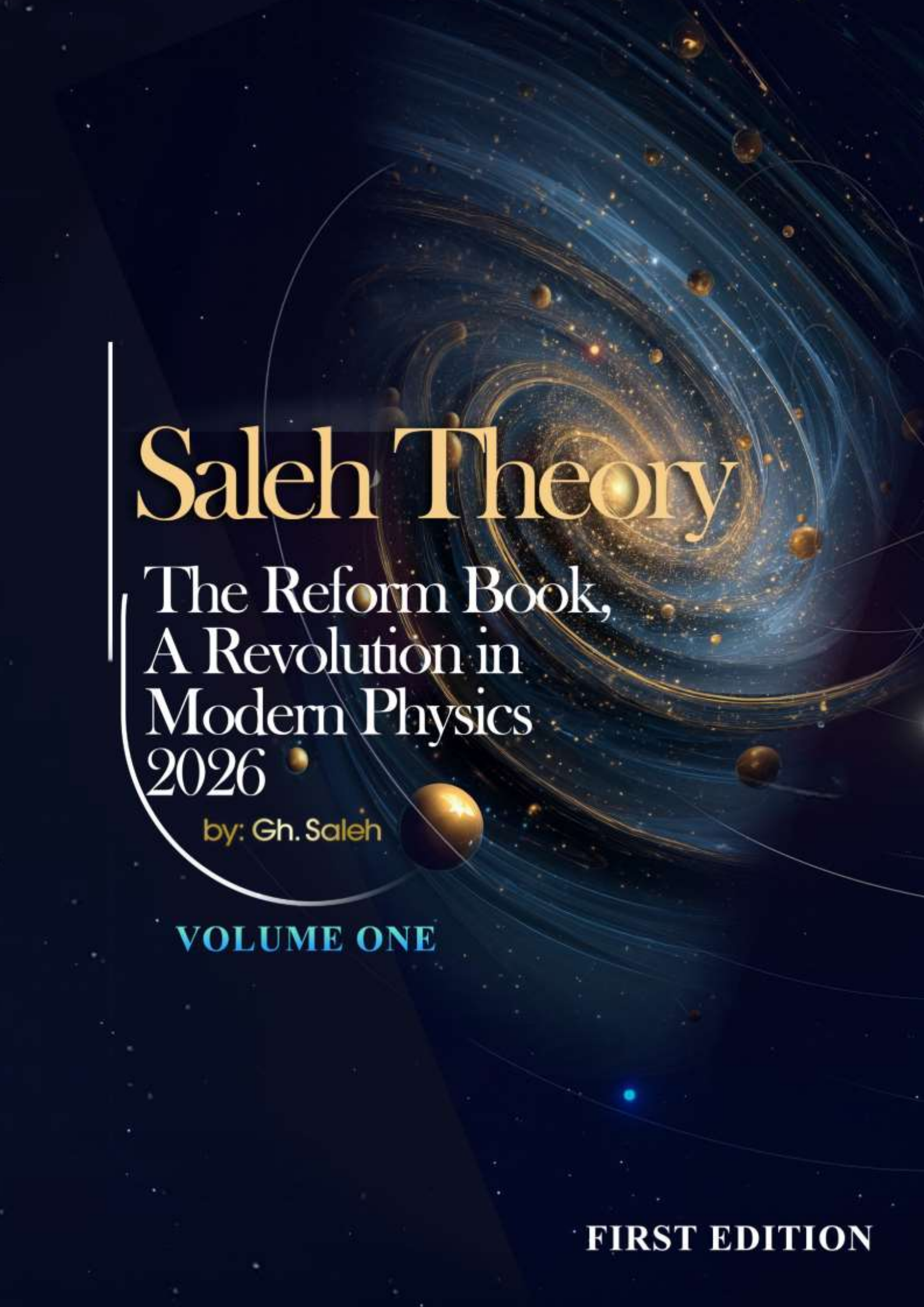


Saleh Theory

The Reform Book, A Revolution in Modern Physics 2026

by: Gh. Saleh

VOLUME ONE

FIRST EDITION

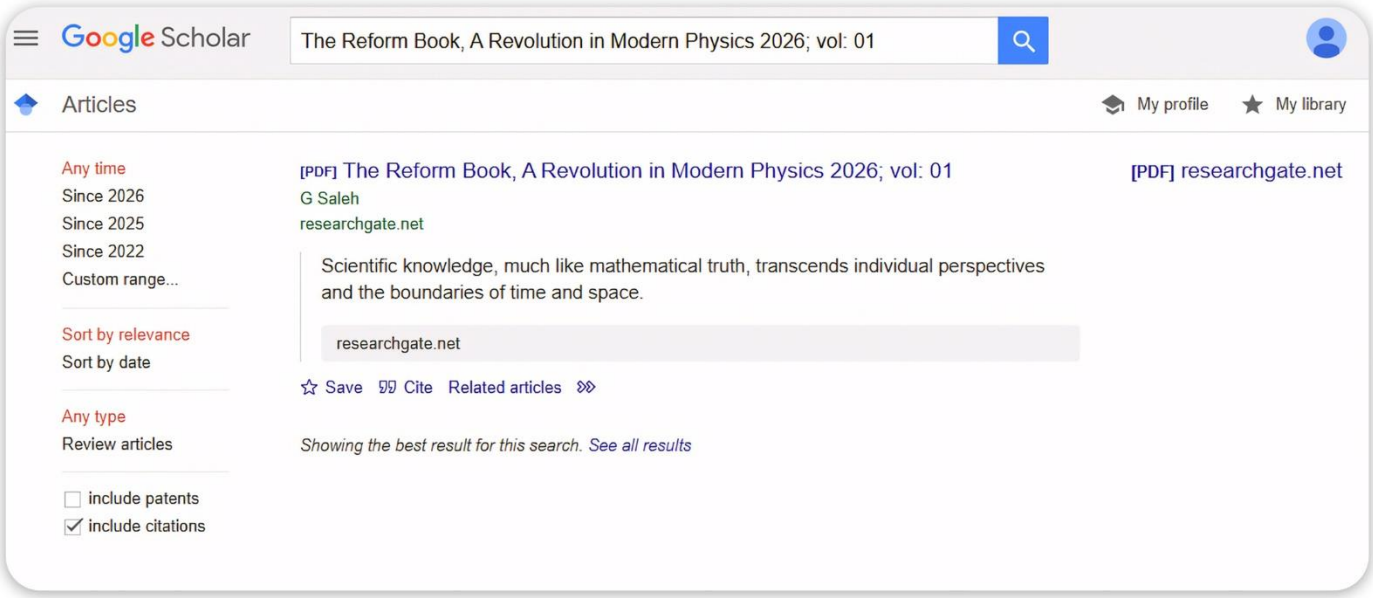
Gh. Saleh

The Book of Us

The Reform Book

A Revolution in Modern Physics 2026

VOLUME ONE



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ABOUT THE AUTHOR

"Gh. Saleh" is recognized as a theorist and the founder of the "Saleh Research Group" and serves as the principal theorist of the "Saleh Theory", a framework that provides a fresh perspective on the astonishing subatomic world. This innovative theory elucidates the secrets of photon behaviour and clarifies ambiguities and unresolved aspects of previous theories.

He has been actively engaged in scientific research since 2017. Over nearly a decade of continuous effort, he has become a member of several prestigious international scientific societies and has published more than 300 scientific articles in reputable international journals, presenting his findings at numerous scientific conferences. These memberships and activities have provided opportunities for knowledge exchange, scientific collaboration, and the advancement of fundamental research.

The primary objective of both the author and the institute under his leadership is to explore the mysteries of the universe and investigate ancient knowledge in order to provide clear and scientifically grounded explanations for historical riddles and questions. The institute's mission is to offer scientific insights from the past, present, and future in a clear and transparent manner, making complex and challenging concepts accessible and engaging for science enthusiasts, researchers, and students at various levels.

Throughout his research, scientific concepts have been presented with precise and robust reasoning while using clear, simple, and approachable language, enabling readers to independently follow the development of ideas and scientific arguments. The work also adopts a forward-looking perspective, illustrating the evolution of fundamental concepts and their applications in basic sciences, engineering, medicine, and other interdisciplinary fields.

The goal of this book goes beyond merely presenting research results. Readers are encouraged to engage in deeper analysis of phenomena, pose new questions, actively participate in the process of scientific discovery, and develop a clear and tangible understanding of the future of science and technology.

PREFACE

Scientific knowledge, much like mathematical truth, transcends individual perspectives and the boundaries of time and space.

Its value lies in its ability to reveal the fundamental principles of nature and to elucidate the hidden mechanisms that govern the universe.

Research in the basic sciences achieves its greatest significance when it goes beyond conventional analysis and penetrates the deeper layers of phenomena, where fundamental relationships, previously unknown behaviours, and scientific structures emerge, opening new pathways for understanding the world.

This book is the culmination of nearly a decade of continuous research conducted since 2017, undertaken to address fundamental questions and explore the underlying mechanisms of phenomena in the basic sciences, particularly in physics. Some of the results of this research have previously been published in scientific journals and presented at international conferences. In this work, these findings have been systematically compiled and reorganised, enabling the reader to gain a comprehensive understanding of the development of ideas, reasoning processes, and outcomes.

The primary objective of this book is to provide a clear framework for a clearer understanding of fundamental issues and for linking theoretical constructs with scientific analysis. In many specialised references, basic concepts are presented in highly technical language or complex mathematical expressions, making intuitive comprehension challenging. In this book, every effort has been made to maintain scientific rigour while presenting concepts in a way that is accessible to a broad range of students and researchers. Emphasis is placed on the development of ideas, the logic underpinning results, and the connection between observation, analysis, and interpretation.

The book begins with foundational concepts and behaviours, gradually progressing toward the analysis of more complex systems—from the smallest scales and fundamental mechanisms to the study of larger and more intricate structures. This approach allows the reader to appreciate the interconnections among different levels of scientific analysis and to understand the place of each theory or model within the broader framework of knowledge.

Certain sections of this book address topics that, in the existing literature, have often been challenging to understand or have required more precise interpretation. Here, an analytical and systematic approach is employed to offer clearer insights into these issues. These suggestions are not presented as definitive answers but rather as steps toward opening new avenues for thought and further research.

This work is not merely a compilation of research findings; it is also an invitation to approach scientific phenomena more deeply and to reconsider the ways in which they are analysed. It is hoped that this book will serve as a valuable and inspiring resource for students, researchers, and enthusiasts of the fundamental sciences—one that not only conveys existing knowledge but also motivates the formulation of new questions and the continued pursuit of scientific discovery.

ABOUT THIS BOOK

(a) The concepts, patterns, and analytical frameworks presented in this book are designed to actively engage the reader in the process of scientific reasoning, and to provide the opportunity to develop an independent understanding of fundamental principles.

(b) The topics covered span a continuous spectrum of knowledge—from basic and introductory concepts to advanced theories and analyses at the graduate and postdoctoral levels. This progression has been structured step by step to allow readers to deepen their understanding of complex ideas without encountering conceptual gaps.

(c) In addition to scientific accuracy and rigour, the material is presented in clear, fluent, and accessible language, enabling intuitive comprehension of the ideas for a broad audience, including students, researchers, and science enthusiasts.

(d) The book includes standard scientific theories and tools alongside the author's original perspectives and approaches, aimed at providing fresh insights into fundamental problems in physics, astrophysics, and the basic sciences.

(e) The structure of the book has been designed to reveal the connections between different levels of scientific analysis—from fundamental mechanisms at small scales to the study of large systems and structures—while highlighting shifts in perspective and the interdisciplinary applications of key concepts.

(f) A prominent feature of this book is the demonstration of the practical applications of fundamental concepts across diverse scientific and industrial fields, ranging from medicine and the basic sciences to engineering and emerging technologies. This connection between theory and application allows readers to appreciate the real-world impact of scientific concepts on everyday life, technological advancement, and the future of science.

(g) The book provides a forward-looking perspective, illustrating the pathways of progress for scientific concepts and their novel applications, enabling readers to gain a vision of the evolution of science, technology, and various industries in the coming decades.
(h) Analytical methods and conceptual frameworks are presented step by step, allowing readers to apply them independently in their studies, research, and practical projects.

(i) Where necessary, discussions are supplemented with diagrams, conceptual illustrations, and practical examples to facilitate understanding of abstract ideas and to clarify the links between theory, observation, and practical application.

(j) This book does more than convey existing knowledge; it encourages readers to think deeply, pose new questions, and actively participate in scientific and applied research, while providing a clear perspective on the future of science and technology.

CONTENTS

CHAPTER 1

Photon

1.1 INTRODUCTION

When we look at the night sky, we observe beautiful luminous points that occasionally flicker and alter their brightness. However, when viewed through a telescope, these points reveal themselves not merely as individual stars but as galaxies or even clusters of galaxies.

Just as a distant galaxy appears as a single luminous point from afar, photons remain imperceptible to the naked eye due to the vastly smaller scale of their universe. It seems that within the realm of thought and imagination, one can visualise the structure of a photon as being similar to that of a galaxy [1].

This chapter adopts a fundamental perspective on the structure of light and the nature of the photon to provide a novel illustration of the link between photons, energy, and matter. According to this viewpoint, the photon is not merely an energy carrier but possesses an organized structure whose behavior parallels larger cosmic structures. Within this framework, we first examine the characteristics of the photon and its motion under various conditions. We then demonstrate how a shift in the geometry of the motion path—from a straight line to a helical structure—leads to a new relationship between mass and energy.
Furthermore, theoretical findings regarding the connection between the photon and other concepts, such as wave-particle duality, are discussed. Finally, by analyzing the kinematic and dynamic results of this model, a foundation is established for a deeper understanding of the link between the photon and Quantum Theory, Superstring Theory, and the Theory of Everything, which may serve as a paradigm for describing fundamental particles.

1.2 WERE I A PHOTON, HOW WOULD I PERCEIVE THE WORLD AND HOW THE WORLD WOULD PERCEIVE ME?

It is known from the Earth that it traverses a distance of one meter in 2.15×10^{-3} seconds; or a second is the time that it takes to move 465 meters. Thus, the photon moves 3×10^{8} meters in a second. And if we define the unit of measure based on the photon's motion, in fact, a meter is the distance that the photon travels in 33.33×10^{-10} seconds. It can, therefore, advance thousands of meters in a hundredth of a second. Let us say that the photon is an object or a physical person who performs its tasks at such an incredible speed. How can he perceive this fast and cunning photon, the rest of the world?

The average human walking speed is 1.2 meters per second. This means that when you take a step, this beautiful photon, so fast and so clever, makes about 7.5 turns around the Earth! So, he sees in you only languidness and inertia. Thus, all existence is in inertia regarding the photon and every photonic second for others is conceived as hours. Actually, according to the photonic unit of measurement, time flows only through the photon's eyes. For a major comprehension, we could give the example of the short life of the human ovum or sperm, which is extendable by freezing, that let the speed of the internal interactions tend to zero and consequently, extend the duration of life for years.

Indeed, internal interactions occur more rapidly for the faster beings and vice versa. This fact causes the diminution of the lifetime of some plants or animals (like a fly that lives only 17 days), while some stones live billions of years because they have much slower internal interactions. The same for things done by human hands, such as high-function mobile phones, which are less resistant. So accordingly, the more rapid the interactions are, the shorter the lifetime is.

If I were a photon, my internal interactions would be measured by the photonic unit system. From my point of view, the others were all motionless and frozen like stones.

How Do Others Perceive the Photon?

Imagine yourself observing a photon that is back and forth on a line that measures thousand of meter; He crosses this long road in a hundredth of a second, but you, at each glance, you will find him motionless because of his extravagant speed. In fact, you cannot follow the photon's motion and you only see some images representing each phase of movement without being able to distinguish one from the other. You find the photon permanently still as he finds you.

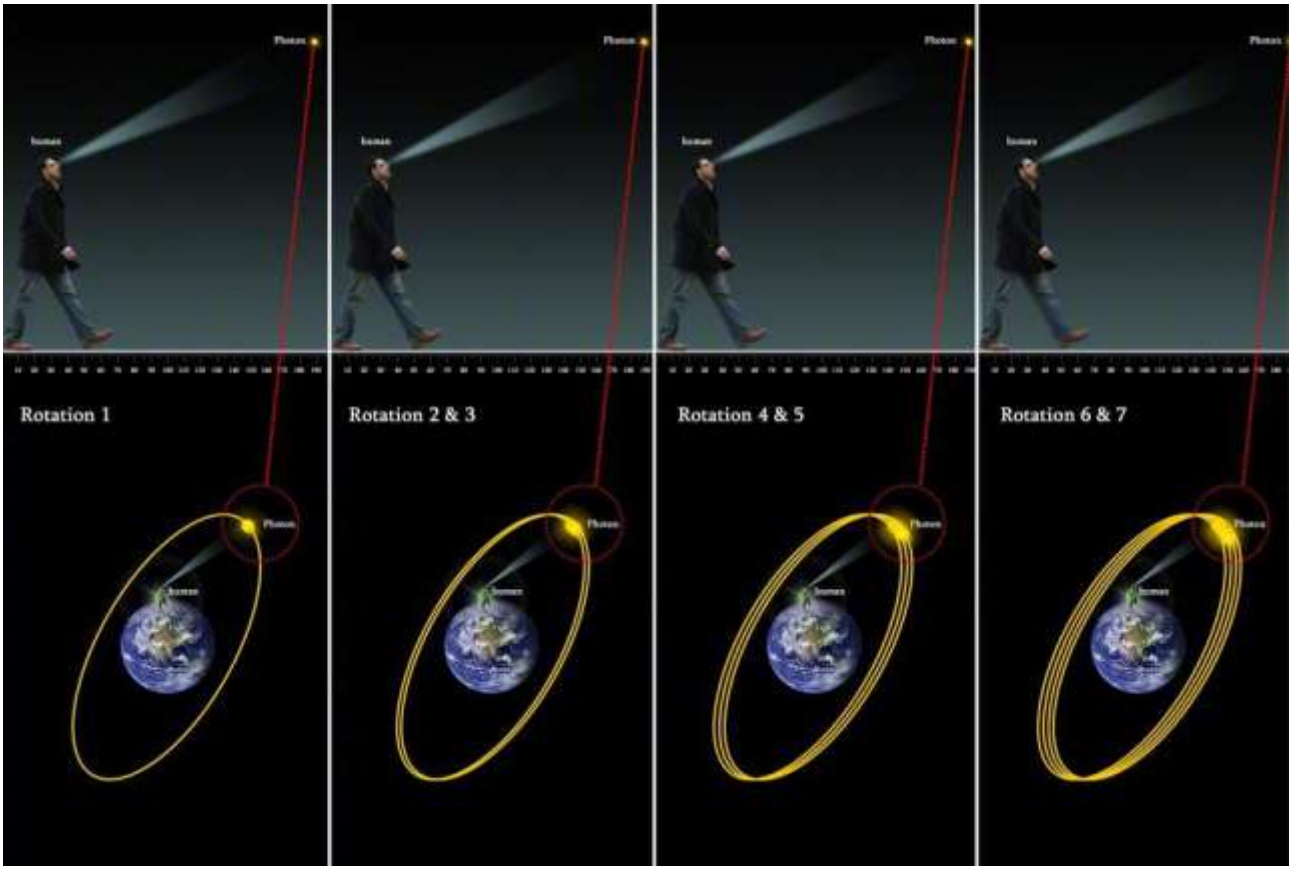


Fig. 1.1

***Were I a photon, the world would find me motionless as I would find it frozen* [2].**

1.3 PHOTON HAS A CONSTANT REST MASS!

Throughout the history of physical science, it can be seen that many theories are based on measurements carried out by an idealised observer; the theories are the bases of the laws. Indeed,

physicists, following the advice of Galilei, try to "Measure what is measurable, and make measurable what is not so" in order to explain mathematically the events of nature.

But it turns out that some measurements are false or inconsistent with other ones. If the theories evolve, it is because physicists have tried to correct and complete the measurements and observations made by their predecessors. Among the mistakes of the ancients, we know that many medieval cultures believed the stars and the planets rotated around a fixed Earth. Even though, as time went on, scientists found out the Sun is the centre of the Solar System, at that time, Galilei had been sentenced to death by fire. While today, even children know that it's the round Earth which is revolving around the Sun. One other mistake of the Ancients was about what they called the classical elements; they supposed that all matter consisted of earth, water, air and fire. But with the progress of science, we realised that these four elements themselves are composed of tiny particles, called molecules. So, it may well be imagined that some knowledge loses gradually their significance with more advancement in science [3].

From the past, the nature of light has been studied by many scientists. Some scientists believed that light had a wave nature, while others defended the particle nature of light. For the first time Rene Descartes represented the wave theory, which introduces light as a disturbance in the world substance. Although Pierre Gassendi was the first scientist who believed in the particle nature of light, when this theory was followed by Isaac Newton, it was developed. Robert Hooke and Christian Huygens are the next most famous scientists who believed in the wave theory of light. After about one century, the double-slit experiment of Thomas Young derived evidence that could be explained only if we know the light as a wave. One century later, Max Planck formulated his idea of the emission of light to solve the problem of thermal equilibrium of an absolutely black body. He found that the energy of light should be quanta and his experiments show the energy formula of each packet which called photon is $h\vartheta$ [4].

Max Planck: "I was ready to break all my previous beliefs about physics". In 1899, Max Planck calculated the energy of photon using the different wavelengths $E = h\vartheta$. But, sometime later, he and his colleagues put this experimental laboratory value equal to a theoretical equation $E = mc^2$. And this is the problem! So, they tried to consider the mass as a variable to make their equation work!

However, as we have before explained, the realistic equation to calculate the energy of photon, based on its three- dimensional motion, is Saleh Equation: In our equation the variables are the frequency and the gyroradius of photon.

$$\frac{1}{2} m (c^2 - r^2\omega^2) = h\vartheta$$

What is weird is that, according to the wave-particle duality concept, the mass of violet photon is twice the mass of red photon. But even by sight and by feeling the red light is heavier, stranger and warmer that the violet light [3].

The photoelectric effect proves that the light must consist of particles and on the other hand the wave nature of light was shown through the double-slit experiment of Thomas Young. In this experiment, we could observe the interference fringes that justify the light as a wave. But we know that the constant mass of the electron was proven and electron, like the photon, has interference fringes in the double-slit experiment. Therefore, there is at least one example that a particle with constant rest mass has interference fringes in the double-slit experiment and the removal of constant

rest mass, for photon, is not a good solution to answer the observance of interference fringes in the double-slit experiment. In other words, the photon is the smallest, lightest, and fastest with a constant rest mass particle in the universe [5].
If we consider electrons, it is evident that the mass of each electron is identical and constant. In the subsequent sections, we will demonstrate that the mass of each photon is likewise identical and constant. At this stage, however, we will present evidence indicating that the rest mass of the photon is always constant and non-zero.

1. Given that the method for calculating the energy of photons involves using Planck's ever-valid relation ($\boldsymbol{E = hf}$) – where $\boldsymbol{h}$ is a constant (Planck's constant) and $\boldsymbol{f}$ is the frequency, and changes in frequency (wavelength), radius of rotation and amplitude are the influential variables for calculating photon energy, with the mass parameter never affecting this equation – it can be concluded that the mass of a photon must be always constant.

2. The evanescent wave intensity is indeed mostly localized within 1 μm from the fiber surface. The penetration depth ***dp*** is a parameter represent the depth at which the electric field drops to 1/e of its initial value at the surface. The ***dp*** is a function which is depended to the refractive index as well as the wavelength of the propagating light, and the angle in which the incidence wave moves in the fiber. The penetration depth of the evanescent waves has a linear relativity with the wavelength. The wavelength dependence of depth can be estimated, as shown in figure 1.2.

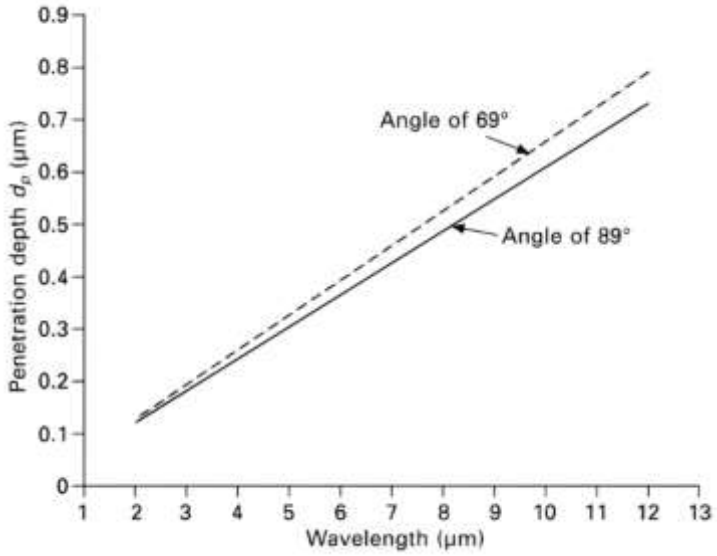


Fig. 1.2 The relationship between penetration depth and wavelength.

Also, data obtained in the other previous experimental study show a compilation plot (Figure 1.3). In this experiment the calculated penetration depth and detection threshold for a range of excitation wavelengths is measured for several types of polymer microspheres over the same range of wavelengths.

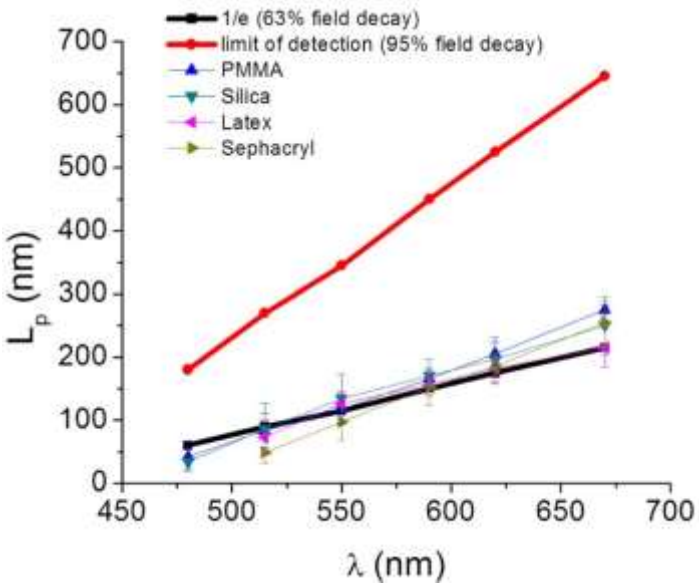


Fig. 1.3 The relationship between evanescence and wavelength.

These two shows that the spectrums with longer wavelength have longer penetration ***dp***. But the spectrum with longer wavelength has lower energy and the longer penetration ***dp*** needs higher energy, so the spectrum with lower energy could penetrate more in fiber optics or in polymer microsphere. It is also another contradiction.

3. Data obtained in previous studies indicated that the performance of solar cells is dependent to wavelengths of light. The investigation, about the performance of a solar photovoltaic module, shows that the wavelength of light is the most important factor. After analyzing the results, it was concluded that the wavelengths of light do affect the performance of solar cells. Light spectrum with longer wavelength (Red color) generates more electricity than shorter ones (Violet color). Although longer wavelengths of visible light have less photon energy but they are more efficient than shorter wavelengths in photovoltaic cells.

This analyses, demonstrate that the red spectrum with lower mass and lower energy could generate more electricity than violet one. And we know that more electricity means more energy. So, the red spectrum with lower mass and energy produces more electrical energy. That violates the Conservation of mass and energy and it is a big contradiction.

4. Here we explain the relationship between temperature of a cavity and the wavelength of the emitted spectrum of a solid-state laser. Previous studies have shown a linear relationship between the emitted wavelength and temperature of a laser diode. Here we explain the experiment about Resonantly Pumped W-OPIC Laser. In this experiment the Wavelength Spectrum of a Resonantly Pumped W-OPIC Laser depended on the Temperature of the cavity. When we increased the temperature of the sample in the laser, the wavelength emitted from the sample cavity increases.

On the other hand, regarding the second law of thermodynamics the energy which stored in a hot container (higher temperature) in comparison with the energy stored in a cold container (at

lower temperatures) has a higher ability to work.

This experiment shows that the spectrums with longer wavelength will emit from the higher temperature cavity. But regarding the Planck law the spectrum with longer wavelength has lower energy and the higher temperature cavity means higher energy, so the spectrum with lower energy will emit from cavity with higher energy and vice versa. It is a big contradiction.

5. Redshift and Blueshift are the important phenomenon in Astronomy. Here we speak about Redshift but Blueshift also is the same. When a source (star) which producing the blue spectrum moves away from us, we perceive it as red. So, in Redshift the wavelength will increase. Therefore, in Redshift (Blueshift) the star generates a wavelength, but we receive another wavelength. Regarding the change of wavelength is equivalent to a photon's mass and energy. It means in vacuum the energy we perceive has a lower amount than it emitted. Although somebody tried to solve the problem like this: "… redshifts, by increasing wavelengths, must reduce the energy in the quanta. Any plausible interpretation of redshifts must account for the loss of energy." but there is not logical and experimental enough to accept. And there is another contradiction.

6. Considering that each photon emits from an electron, and the mass of all electrons is identical and constant, so:

$$m_{e_1} = m_{e_2} = \cdots = m_{e_n}$$

Furthermore, the velocity of electrons is also constant. Consequently, if a photon emits from an electron, it will not differ from other photons, and therefore the mass of photons, as a physical parameter, will be equal [6]:

$$m_{p_1} = m_{p_2} = m_{p_3} = \cdots = m_{p_n} = 1.64 \times 10^{-36}\ \text{kg}$$

In the section concerning universal constants, we will establish that the theoretical mass of a photon is approximately this value.

Based on the explanations above, it could generally be stated that the photon is a stable part with a constant mass. So, according to Saleh Theory the mass of all different photons are the same.

1.4 ROTATIONAL MOTION OF PHOTON

The studies of scientists including Maxwell in the field of electromagnetism showed that visible light is just a tiny part of a larger radiant spectrum. Scientists have been studying hard to find out how the light travels from the light source to our eyes. Some believed that it would probably move in the form of a wave but the others thought that light was actually composed of particles that move in space. Isaac Newton, based on his experiments liked the second theory. But Newton's theory was rejected later. To his theory's rejection, one of the most famous experiments is the one performed by Thomas Young in 1801.
In the Thomas Young experiment, interference patterns are observed and to justify them, they are considered light as a wave. But an Electron whose rest-mass has been proven to be constant also

has an interference pattern in Young's double-slit experiment. Therefore, it seems that existence of interference patterns is related to the motion of particle not the nature of it.

In the second half of the nineteenth century, physicists studied why some materials absorb and emit electromagnetic radiation better than some other materials. In 1900, Max Planck proposed the theory of quantum energy that could justify one of the problems of physicists of that time. He explained the relationship between black body temperature and the amount of electromagnetic radiation [7].

It was true that the photoelectric effect experiment confirmed Planck's quantum theory but created a new problem in the wave theory of light. This experiment can only be justified by considering the light as a particle. A few years later, Einstein for explaining the photoelectric experiment, presented the concept of "wave-particle duality of light".

Einstein defined a pocket of energy with zero rest mass (photon) and explained the both double-slit experiment and the photoelectric effect. On the other hand, it seems, Einstein himself did not accept wave-particle duality and knew that as only a temporary way out. But because of the prestige of Einstein, only a few scientists have investigated the possibility of a non-zero rest mass of the photon with few results [4].

The observation of interference effects in the Double-slit experiment of Thomas Young definitively show the presence of overlapping waves and he represents the photon motion as a wave - and also by the Photoelectric effect in which the photon is considered as a particle. The photoelectric effect refers to what happens when a material which absorbed electromagnetic radiation emits electrons. However, Einstein himself writes: "It seems as though we must use sometimes the one theory and sometimes the other, while at times we may use either. We are faced with a new kind of difficulty" [8].

Consider a particle that is separated from a moving source. The motion of the particle is always affected by the movement of its source. Now notice how the electrons move in an atom. In this situation, the electron has two kinds of motion, moving around itself and around the nucleus of the atom. Like the Earth that rotates around itself and simultaneously orbits around the Sun.

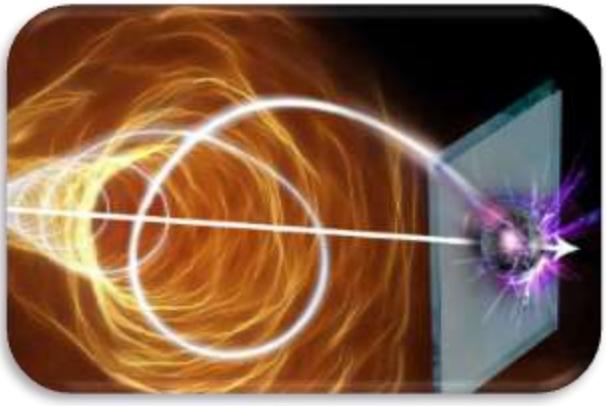


Fig. 1.4

When the electron is excited, it emits a photon the motion of the photon is affected by the motion of its source, Electron, and must include both types of motion of its source. In other words, since

the electron is the photon-generator and the electron is rotating around itself and around the nucleus, the emitted photon also has these rotating motions. So, the photon is a particle that always traverses on helical direction and has a three-dimensional motion.

In Saleh Theory, since the photon has a constant rest mass, so it is a particle and has a rotational motion and behaves wavelike. In other words, on the true nature of the photon, we can say:
*"**The photon at anytime, anywhere and in any case, is a particle that traverses like a wave**"*[4].

In this theory the wave-particle duality and all other properties of light could be explained easily [7].

In Saleh Theory, we believe on the helical photon motion, of which **r** is the gyroradius around an imaginary axis. This means that the photon has two simultaneous motions: rectilinear motion at constant speed (***C***) and rotary motion at constant angular velocity (***ω***) [9].

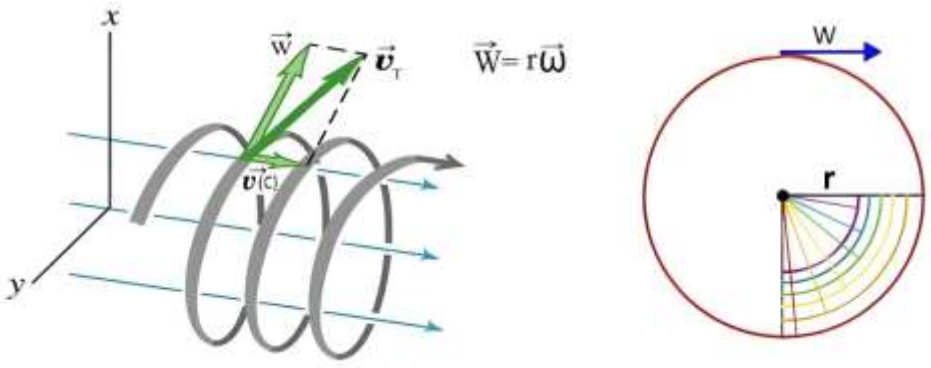


Fig. 1.5

1.4.1 Ten Great Reasons for the Rotational Motion of the Photon

1. Double Slit Experiment:

The reason for not accepting the constant rest-mass for photons and believing in its wave-like state was the famous experiment of Thomas Young. In this experiment, interference patterns are observed and to justify them, they are considered light as a wave. But the question is, why does an Electron whose rest-mass has been proven to be constant also has an interference pattern in Young's double-slit experiment? Therefore, it seems that existence of interference patterns is related to the motion of particle not the nature of it.

2. Correspondence Principle:

In the wave-particle duality theory, the wave motion pattern considered for the photon's motion is a sine wave. And as you know, a sine wave is equivalent to the shadow of a circular motion (helical motion) on a two-dimensional diagram. Therefore, Saleh theory has the Correspondence principle and in its two-dimensional state, it reaches the wave-particle theory. In other words, wave- particle theory is a special case or an incomplete two- dimensional view of the larger set of Saleh theory.

3. Existence of Sinusoidal Motion Only in Material Mediums (Environments):

In non-material mediums, there is no sinusoidal motion. The rotational motion around the central axis, simultaneously with the linear motion, is common in many phenomena, such as the real motion of the Earth around the Sun in galaxy or a bullet coming out of the barrel of a gun.

4. Red Light Is the Warm Light and Blue Is the Cold One:

According to the wave-particle duality theory, the mass of a blue photon is assumed to be about twice the mass of a red photon. On the other hand, the energy of blue light is estimated to be higher than the energy of red light due to its higher frequency. Whereas visually and sensually, the red light is heavier, stronger and warmer than the blue light. But in Saleh theory, the red light, due to having a larger gyroradius than blue one, has more rotational energy. Therefore, our eyes feel the red light warmer than the blue.

5. Head-On Perception of the Light:

The eyes of human perceive the light only when the ray of light enters the eye head-on. On the other hand, as you know according to the wave-particle duality theory, with changing the frequency the different colors are created. If we look at a light ray head-on, we will see a point in front of us moving up and down, and we will not be able to see any difference between the blue or red light with different wavelengths. But in Saleh Theory, the difference in colors of the light is due to their difference in the gyroradius of their photons. Therefore, the photons of red light and the blue one that come from the front side to our eye have different rotation radiuses, and our eyes perceive this difference in radius and perceive it as two different colors.

6. The Amount of Electrical Energy Production in Solar Cells:

Experiments show that amount of electrical energy production in solar cells, have a direct relation to the wavelength of the entered light. Thus, in the visible light spectrum, the red light has a higher output than the blue light. But as mentioned, according to the wave-particle theory, the red light is considered to have lower energy than blue one. However in Saleh theory, the red light photons, due to their larger gyroradius, have more rotational energy than the blue light photons. Therefore, it is natural for the red light photons to show better efficiency in solar cells.

7. Using Red Light as Hazard and Warning Lights:

Visibility of red light in longer distances has become a reason to use as hazard and warning lights in different places. However, in wave-particle theory the energy of the red-light photons are considered to be less than that of blue light. But in Saleh theory, the red-light photon has larger gyroradius and as a result has more rotational energy than blue light.

8. The Evanescent of Red Light Respective to the Blue Light:

The experiments have demonstrated that the evanescent of the red light is more than the blue light. However, according to the wave-particle duality theory, the red-light photons with less energy than blue light should have a lower Evanescent. But in Saleh theory, the red-light photons have larger radius of rotation than the blue light, and as a result they will have a greater penetrating to the clad of fiber.

9. Collision of Two Different Rays (e.g., Red and Green):

According to wave-particle theory, it is believed that when two different photons like red and green ones collide with each other, a new photon (yellow) will be created. The mass of which is not the sum of the two original masses but it's their average. And more interestingly, this new photon has average energy and not total energy.
Furthermore, without any loss or waste of energy, in less than a thousandth of a second, this newly created mass is converted back into exactly the same two original masses, namely the green and red light photons with their own energy. Aside from violating the conservation law of linear momentum, this event is technically impossible in physics. But in Saleh theory photons of red, green and yellow are all possessing mass and equal total energy, but different radiuses of rotation. Therefore, at the point of intersection, we will have two photons, which the mass of each is equal to the mass of the red and green photons, and there is no change in mass.

10. Possibility of Existence of Constant Mass for Photons:

According to Louis de Broglie's theory, all matters have dual nature, and this is not merely limited to the light. For example, Electrons that have constant mass have wave-like nature at the same time. Therefore, it is not impossible for a photon to have a fixed mass. And this is the point that is considered in Saleh theory [7].

1.5 TYPES OF PHOTON MOTION

If we consider the solar system, we will find out that the moon turns around the Earth, as the Earth rotates around the Sun and the Sun revolves around the centre of the Milky Way. The sun has two distinct motions, one around its own axis and the other around the centre of the Milky Way. The Earth also has 3 motions: spins around its own axis, rotates around the Sun and around the centre of the Milky Way concurrently. The Moon's rotation is more complex since it rotates around its own axis, around the Earth, with the Earth around the Sun and with the Earth and the Sun around the centre of the Milky Way galaxy. Wonderfully, whatever the object be smaller and more delicate, the numbers of its motions would be more and more, like a moving object on the moon. When an object starts moving, its motions will be added to the Moon's one. The photon also has different motions. The external motion or the projectile, which consists of two types: a forward motion with a velocity equal to ***C***, which is performed in 3Dimensions, and a rotational motion in two dimensional plate. So, the external part of photon motion could be explained in five dimensions.

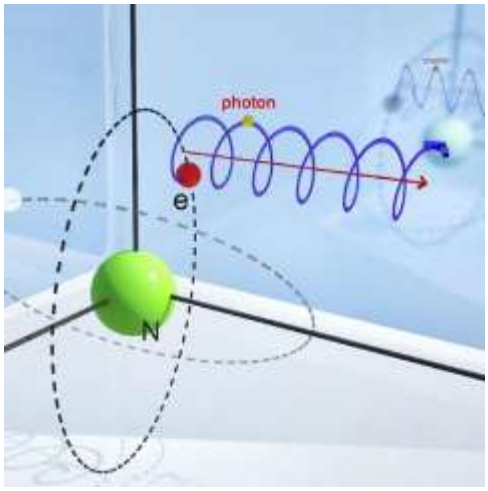


Fig. 1.6

Photon has an internal motion too. This motion also includes two parts: the first one is vibrational, which leads photons to have small movements in the space and adds three more dimensions. Since other than the vibrational motion, photon moves along an indirect, closed, and tiny path, it should be added three more dimensions and allocate six dimensions to internal part of photon motion, totally. This means that the photon is traversing a closed path in 3 dimensions while vibrating in the other 3 dimensions.

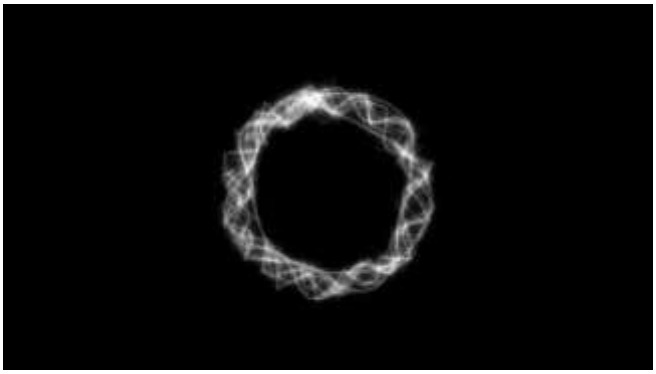


Fig. 1.7

Therefore, all photon motions could be defined at least in 11 dimensions **[10].**

1.6 VELOCITY OF PHOTON

Since a photon is emitted from an excited electron, and this electron has rotational motion around itself and the nucleus of an atom, the motion of the emitted photon must be a combination of linear projectile motion and the electron's rotational motions around itself and around the nucleus. The combination of linear motion and the rotation of electron around the nucleus creates a helical motion. When this is combined with the electron's self-rotation, a second helical motion is generated. Hence, a photon released from an electron has a nested helical motion. Initially, we

will calculate the speed of the photon in this nested helical path and then use this speed to calculate the classical energy of the photon and its relation to Planck's everlasting energy equation. To show the hundred-year-old lost relation between classical energy and Planck's energy, we first calculate the various speeds of the photon.

1.6.1 Calculating the Linear Velocity of Photon

Considering that the birthplace of a photon is an excited electron that rotates around a nucleus, and the excitation of an electron results in the emission of a photon, the photon will have linear motion. The linear speed of the photon (V_l) can be calculated using the following equations:

$$V_l = \frac{\lambda}{T} = \lambda f = C$$

$$A = r = \frac{\lambda}{4}$$

The above equations are linear equations in which λ represents the wavelength, T the period, f the frequency, and A the amplitude, which is equal to the radius of photon rotation in a helical motion (r). These equations express linear speed and are obtained by dividing the linear distance travelled (λ) by the time taken during one period (T). In fact, we have calculated the linear speed along the linear path.

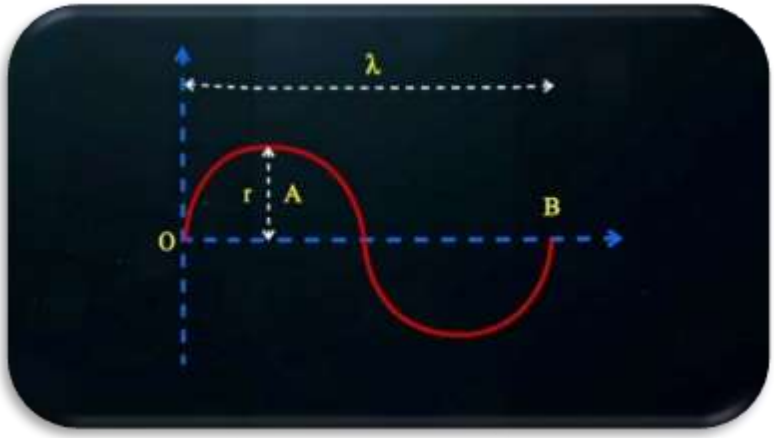


Fig. 1.8

1.6.2 Calculating the Wave-Like Velocity of Photon

However, a photon has a wave-like motion due to the rotational movement of electrons around the nucleus. To calculate the wave path or the curved path of electromagnetic waves, we proceed as follows:

$$l = 2\pi r = 2\pi\frac{\lambda}{4} = \frac{2\pi}{4}\lambda$$

$$V_{w_1} = \frac{l}{T} = \frac{2\pi}{4}\frac{\lambda}{T}$$

$$V_{w_1} = \frac{\pi}{2}C \simeq 1.57\ C$$

Where $\boldsymbol{l}$ is the travelled distance and $\boldsymbol{V_{w_1}}$ is the wave-like speed. The result of combining these two linear and rotational motions is the creation of a helical motion, as shown in the following figure:

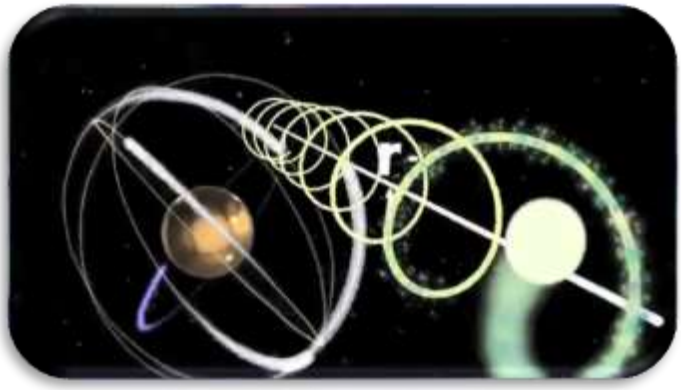


Fig. 1.9

1.6.3 Calculating the Real Velocity of Photon in the First Helix

If we pay attention, a photon has two different speeds. This difference exists both in terms of the appearance of equations and the ones of values obtained. In fact, these two speeds (linear and wave-like) can be considered as shades of the speed in helical motion. Where $\boldsymbol{C_{new1}}$ is the constant speed on the helical path, which is the resultant of these two perpendicular velocities. which can be calculated as follows:

Resultant Velocity = Linear Velocity + Wave-Like Velocity

$$\overrightarrow{C_{new\,1}} = \overrightarrow{V_l} + \overrightarrow{V_{w_1}}$$

$$C_{new\,1} = \sqrt{{V_l}^2 + {V_{w_1}}^2} = \sqrt{C^2 + (1.57C)^2} \Rightarrow$$

$$C_{new\,1} \simeq 1.86C \simeq 5.58 \times 10^8 \ {}^{\mathrm{m}}/_{\mathrm{s}}$$

Where the $\boldsymbol{C_{new1}}$ is the speed of the photon in the large helix (First Helix), which is the basic and fundamental speed of photon (electromagnetic waves).

1.6.4 Calculating the Velocity of Photon in the Second Helix

But an electron, in addition to its rotational motion around the central nucleus of the atom, also has rotational motion around itself, leading to the creation of another helical motion. This new helix (Second Helix) is smaller in comparison to the previous one. Therefore, when a photon is emitted from an electron, it will follow a path of a large helical motion (First Helix) and a path of a smaller helical motion (Second Helix).

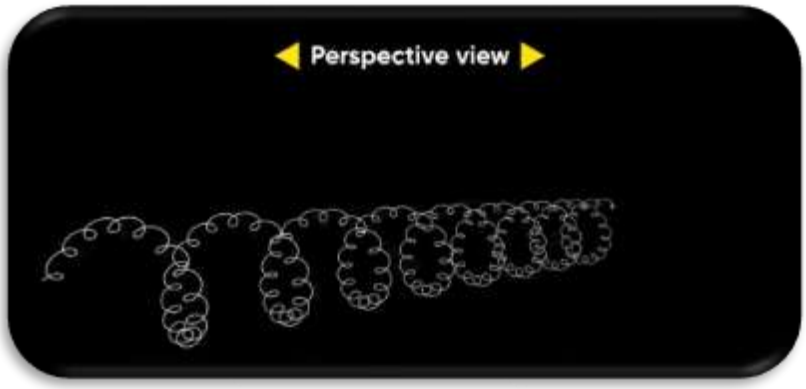


Fig. 1.10

Considering the above figure, the resultant velocity of the photon in the first helix and second helix motion paths can be calculated as follows:

$$l_2 = n(2\pi r_2)$$

$$n = \frac{2\pi r}{2\pi r_2} = \frac{r}{r_2}$$

$$l_2 = \frac{r}{r_2}(2\pi r_2) = 2\pi r$$

$$V_{w_2} = \frac{l_2}{T} = \frac{2\pi r}{T}$$

$$V_{w_2} = \frac{2\pi\lambda}{4T} = \frac{\pi}{2}\,C$$

$$V_{w_2} = V_{w_1} = \frac{\pi}{2}\,C$$

Where $\boldsymbol{l}_2$ is the travelled distance in small helix, $\boldsymbol{n}$ is the number of turns of the photon in the small helix in one period of big helix, $\boldsymbol{r}_2$ is the radius of the small helix and $\boldsymbol{V}_{\boldsymbol{w_2}}$ is the rotational speed in small helix. And two rotational velocities are parallel. So, we have:

$$\overrightarrow{V_{w_2}} = \overrightarrow{V_{w_1}}$$

Considering the figure, the resultant velocity of a photon $\boldsymbol{C}_{\boldsymbol{new2}}$ in two helical paths, the large helix (first) and the small helix (second), can be obtained from the following equations:

The Resultant Velocity = The Sum of the Velocities in the Two Helical Paths + The Linear Velocity

$$\overrightarrow{C_{new\,2}} = \overrightarrow{V_{w_2}} + \overrightarrow{V_{w_1}} + \overrightarrow{V_l}$$

$$\left|\overrightarrow{V_{w_2}} + \overrightarrow{V_{w_1}}\right| = \sqrt{{V_{w_2}}^2 + {V_{w_1}}^2 + 2V_{w_2}V_{w_1}\cos(0)} = \pi C$$

$$\left|\overrightarrow{C_{new\,2}}\right| = \sqrt{\left|\overrightarrow{V_{w_2}} + \overrightarrow{V_{w_1}}\right|^2 + \left|\overrightarrow{V_l}\right|^2 + 2\left|\overrightarrow{V_{w_2}} + \overrightarrow{V_{w_1}}\right|\left|\overrightarrow{V_l}\right|\cos\emptyset}$$

$$C_{new\,2} = \sqrt{(V_{w_2} + V_{w_1})^2 + {V_l}^2 + 2(V_{w_2} + V_{w_1})(V_l)\cos(90)}$$

$$C_{new\,2} = \left|\overrightarrow{C_{new\,2}}\right| = \sqrt{(\pi C)^2 + C^2} = \sqrt{\pi^2 + 1}C$$

$$C_{new\,2} \simeq \mathbf{3.3}\boldsymbol{C} \simeq \mathbf{9.9 \times 10^8}\ \mathbf{m/s}$$

1.6.5 Calculating the Real Velocity of Photon in the Third Helix

The photon itself also has a rotational motion around itself, which creates a third helix. Using the following equations, this speed can be calculated:

$$l_3 = n'(2\pi r_3)$$

$$n' = \frac{2\pi r}{2\pi r_3} = \frac{r}{r_3}$$

$$l_3 = \frac{r}{r_3}(2\pi r_3) = 2\pi r$$

$$V_{w_3} = \frac{l_3}{T} = \frac{2\pi r}{T}$$

$$V_{w_3} = \frac{2\pi\lambda}{4T} = \frac{\pi}{2}C$$

$$V_{w_3} = V_{w_2} = V_{w_1} = \frac{\pi}{2}C$$

$$\overrightarrow{V_{w_3}} = \overrightarrow{V_{w_2}} = \overrightarrow{V_{w_1}}$$

Where $\boldsymbol{l_3}$ is the travelled distance in the third helix, $\boldsymbol{n}$ is the number of turns of the photon in the third helix in one period of the big helix (first), $\boldsymbol{r_3}$ is the radius of the third helix and $\boldsymbol{V_{w_3}}$ is the rotational speed in the third helix.

Similarly, the resultant velocity of a photon ($\boldsymbol{C_{new3}}$) is equal to the sum of its speed in helical paths and the linear speed. Therefore, we have [11]:

$$\overrightarrow{C_{new\,3}} = \overrightarrow{V_{w_3}} + \overrightarrow{V_{w_2}} + \overrightarrow{V_{w_1}} + \overrightarrow{V_l} = 3\overrightarrow{V_{w_1}} + \overrightarrow{V_l}$$

$$\left|\overrightarrow{C_{new\,3}}\right| = \sqrt{\left|3\overrightarrow{V_{w_1}}\right|^2 + \left|\overrightarrow{V_l}\right|^2 + 2\left|3\overrightarrow{V_{w_1}}\right|\left|\overrightarrow{V_l}\right|\cos(90)}$$

$$C_{new\,3} = \sqrt{(\frac{3\pi}{2}C)^2 + C^2} = C\sqrt{\frac{9\pi^2}{4} + 1}$$
$$C_{new\,3} \simeq 4.82C \simeq 1.446 \times 10^9 \ {}^{\mathrm{m}}/_{\mathrm{s}}$$

Although each of the velocities calculated in the previous sections is identical and constant for all photons, their specific applications depend on the dimensions, scales, and conditions of the measurement or calculation being performed.

1.7 CALCULATION OF THE CLASSICAL KINETIC ENERGY OF PHOTONS

In this part, we calculate the energy of photon considering its helical motion:

Initial Total Kinetic Energy = Linear Energy + Rotational Energy = Translational Energy + Rotational Energy

$$\boldsymbol{E_T = E_R + E_L}$$

Where $\boldsymbol{E_T}$ is the initial kinetic energy, which is always constant and equals half the mass of the photon $\boldsymbol{m_p}$ times the square of the nested helical speed $\boldsymbol{V_T}$:

$$\boldsymbol{E_T = \frac{1}{2}m_p{V_T}^2 = \frac{1}{2}m_p(3.3C)^2 \cong 5m_pC^2 \Rightarrow}$$
$$\boldsymbol{E_T = 5m_pC^2}$$

This energy consists of two parts: rotational energy of photon $\boldsymbol{E_R}$, which depends on the constant angular velocity and the variable rotational radius:

$$\boldsymbol{E_R = \frac{1}{2}m_pr^2\omega^2}$$

The second part is the translational (linear) energy, which equals the same energy measured by Planck in the laboratory, i.e., Planck's constant times the frequency:

$$\boldsymbol{E_L = \frac{1}{2}m_p{v_L}^2 = hf}$$

The sum of rotational and translational energy is always constant and equals the total energy, so the following equations can be written:

$$\boldsymbol{E_T = E_R + E_L = constant}$$
$$\boldsymbol{\frac{1}{2}m_p(3.3C)^2 = \frac{1}{2}m_pr^2\omega^2 + hf = constant}$$
$$\boldsymbol{\frac{1}{2}m_p(3.3C)^2 - \frac{1}{2}m_pr^2\omega^2 = hf}$$
$$\boldsymbol{5m_pC^2 - \frac{1}{2}m_pr^2\omega^2 = hf}$$

Now, we divide the first equation by the constant $\boldsymbol{E_T}$:

$$\frac{\boldsymbol{E_T}}{\boldsymbol{E_T}} = \frac{\boldsymbol{E_R}}{\boldsymbol{E_T}} + \frac{\boldsymbol{E_L}}{\boldsymbol{E_T}}$$

We define the two variable parameters as follows:

$$\boldsymbol{i_R} \equiv \frac{\boldsymbol{E_R}}{\boldsymbol{E_T}}$$

$$\boldsymbol{i_L} \equiv \frac{\boldsymbol{E_L}}{\boldsymbol{E_T}}$$

The following result can be derived from the above equations:

$$\boldsymbol{i_R + i_L = 1}$$

In other words, each of the translational energy $\boldsymbol{E_L}$ and rotational energy $\boldsymbol{E_R}$ be considered as a fraction of the total energy $\boldsymbol{E_T}$.

$$\boldsymbol{E_R = \frac{1}{2} m_p r^2 \omega^2 = i_R E_T}$$

$$\boldsymbol{E_L = hf = i_L E_T}$$

$$\boldsymbol{E_T = \frac{1}{2} m_p r^2 \omega^2 + hf = i_R E_T + i_L E_T}$$

Since the total energy $\boldsymbol{E_T}$ is always constant, it can be understood that as the rotational radius $\boldsymbol{r}$ increases, the rotational energy increases and the translational energy decreases, resulting in a decrease in frequency $\boldsymbol{f}$, and vice versa. As the rotational radius $\boldsymbol{r}$ decreases, the rotational energy decreases and the translational energy increases, increasing in frequency $\boldsymbol{f}$.

Thus, the following graphs of the variations in translational energy $\boldsymbol{E_L}$ and rotational energy $\boldsymbol{E_R}$ relative to the rotational radius $\boldsymbol{r}$ can be drawn:

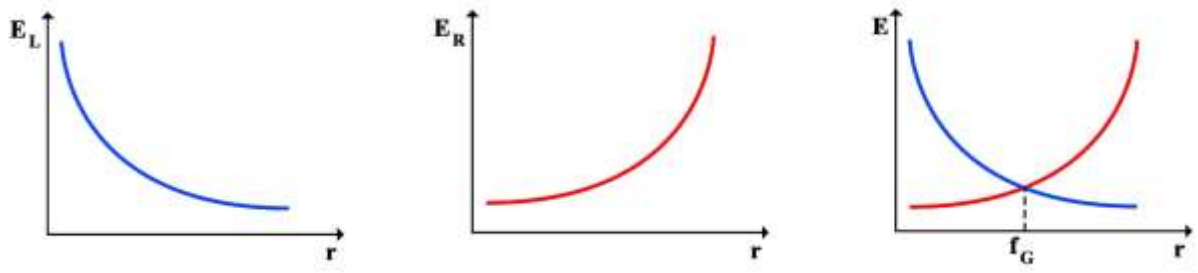


Fig. 1.11

1.7.1 Calculation of Frequency at the Point of Equality Between Translational and Rotational Energy

Now, we calculate the frequency at which the translational energy E_L and rotational energy E_R of the photon are equal:

$$E_R = E_L \Rightarrow i_R = i_L = \frac{1}{2}$$

$$E_T = 2E_R = 2E_L = 2hf \Rightarrow$$

$$\frac{1}{2}m_p(3.3C)^2 = 2hf \Rightarrow f = \frac{\frac{1}{2}m_p(3.3C)^2}{2h} \Rightarrow$$

$$f_G = \frac{\frac{1}{2}(1.64 \times 10^{-36})(3.3 \times 3 \times 10^8)^2}{2(6.62 \times 10^{-34})} \Rightarrow$$

$$f_G = 6 \times 10^{14}\ Hz = 600\ \text{THz}$$

This frequency f_G corresponds to green light in the visible spectrum. At this frequency, the rotational energy equals the translational energy, and $i_R = i_L = \frac{1}{2}$. Considering the frequency range of visible light, it can be said that in the frequency range of 300 THz to 900 THz, the range of i_R and i_L will be as follows:

$$300\ THz \leq f \leq 900\ \text{THz}$$

$$\frac{1}{4} \leq i_L \leq \frac{3}{4}$$

$$\frac{3}{4} \geq i_R \geq \frac{1}{4}$$

In fact, the relationship between i_L and f (Terahertz) can be written as follows:

$$i_L = \frac{f\ (\text{THz})}{1200}$$

1.7.2 Relationship Between Planck's Energy Equation and Classical Kinetic Energy (Planck-Saleh Energy Equation)

From the equivalence of translational energy with Planck's energy equation, we can write:

$$E_L = i_L E_T = hf \Rightarrow$$

$$i_L(\frac{1}{2}m_p(3.3C)^2) = hf$$

$$i_L\left[\frac{1}{2}\times 1.64\times 10^{-36}(3.3C)^2\right]=hf \Rightarrow i_L(8\times 10^{-19})=hf$$

We call the constant value the Saleh constant S and rewrite the above equation as follows:

$$S\equiv\frac{1}{2}m_p(3.3C)^2=8\times 10^{-19}\ \text{j}$$

$$Si=h\,f$$

This equation is called the Planck-Saleh equation, where S is the Saleh energy constant and i is a variable coefficient equal to i_L and indicates the variations in translational energy [12].

1.7.3 Experiments of Michigan University and MIT on Electromagnetic Waves Energy at Short Distances

According to the experiments conducted by the University of Michigan and MIT on the energy of electromagnetic waves at short distances and observing that the amount of energy calculated by Planck's law is not equal to the amount of energy obtained via their experiments. However, within Saleh Theory, this problem can be explained in a straightforward manner.

According to the Saleh equation:

$$\frac{1}{2}mv^2-\frac{1}{2}mr^2\omega^2=h\vartheta$$

But at time close to zero ($t=\varepsilon$) :

$$E_R=\frac{1}{2}m_pr^2\omega^2=0$$

Given that the final speed of the photon is 4.8C, by putting this speed in the photon kinetic energy equation, we have:

$$\xrightarrow{t=\varepsilon}\quad E_0=\frac{1}{2}mv^2=\frac{1}{2}m(C_{new\,3})^2$$

$$E_0=\frac{1}{2}(1.64\times 10^{-36})(4.82C)^2$$

$$E_0\simeq 1.71\times 10^{-18}\ \text{j}$$

The calculated energy amount is consistent with the results of the laboratories at MIT and Michigan Universities, and the reason for the difference with Planck's equation is that at short distances, energy has not yet been consumed in the photon's rotation, and the energy obtained is greater than Planck's energy.

1.7.4 Introducing Photon as the Basis and Foundation of Quantum

We can define a basic unit for energy. We can consider photons, because, as shown and proven in the previous articles, photons have a constant speed, a specific mass, and unique properties.

Properties of the Photon:

* Constant Mass ($m_p = 1.64 \times 10^{-36}\ kg$)

* Constant Total Speed ($V_T = 3.3C$)

If we consider the energy of a photon as the smallest unit of energy, we have:

$$E_q = E_p = \frac{1}{2} m_p {V_T}^2 = \frac{1}{2} m_p (3.3C)^2$$

$$E_q = S = 8 \times 10^{-19}\ \mathrm{J}$$

Given the constancy of this obtained value, it can be considered as the basic and fundamental energy for quantum [13].

1.7.5 A New Explanation for Different Forms of Energy in Terms of Photon Basis

If we consider a Solar System like our System and look at the relation between the Sun and the Earth, we see that the Earth always revolves around the Sun in a closed circular path. Due to this stable structure, the following relations can be considered:

The Kinetic Energy = Energy of Gravitational Wave or Gravitational Flux Energy

$$^1/_2\, mv^2 = nh\vartheta \Rightarrow E_K = E_G$$

Given that visible light is actually the same as radiant energy, we can write the following relationship with electromagnetic waves. So,

Radiant Energy = Electromagnetic Energy

$$^1/_2\, m_p(c^2 - r^2\omega^2) = h\vartheta \Rightarrow E_R = E_\vartheta$$

As the formula "$E_N = M c^2$" is valid in nuclear explosions and it means the total mass converts to photon particles, therefore we can assume that nuclear and radiation energy of photons is equal. So,

Nuclear Energy = Radiation Energy

$$N\, ^1/_2\, m_p(c^2 - r^2\omega^2) = Mc^2 \Rightarrow E_R = E_N$$

Where N is the number of photons in an object with mass M.

In fact, in light bulbs, electrical energy is converted into radiant energy. So,

Radiant Energy = Electrical Energy

$$n\,{}^{1}\!/_{2}\,m_p(c^2 - r^2\omega^2) = RI^2t \Rightarrow E_R = E_E$$

Where, n is the number of photons emitted from the lamp.
Due to the fact that in transformers, magnetic energy is always converted into electrical energy. So,

Electrical Energy = Magnetic Energy

$$q(\vec{V} \times \vec{B}) \cdot \vec{d} = RI^2t \Rightarrow E_B = E_E$$

Therefore, it can be said that all energies are equal, equivalent, and identical.

$$E_K = E_G = E_R = E_N = E_E = E_B = E_\vartheta = E_U = \cdots$$

So, we can write the following comprehensive relation, which we named:

***"Saleh Comprehensive Equation of Theory of Everything or the Equation of the Primary Energy Chart Since Big Bang Till Now* [5]"**

$$E_{et} = N\,{}^{1}\!/_{2}\,m_p(c^2 - r^2\omega^2) = N'h\vartheta$$

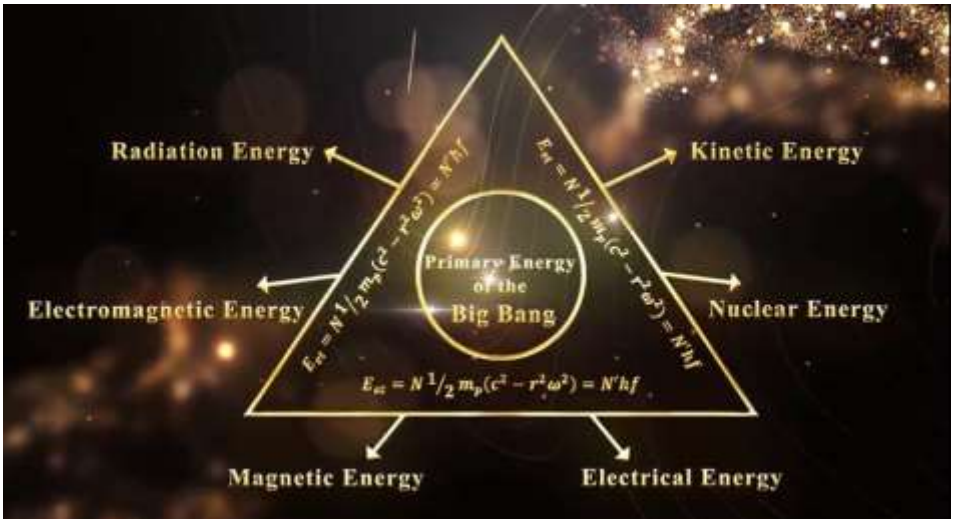


Fig. 1.12

1.8 COLOR VARIETY AND PHOTON

In Saleh Theory the distinction of spectrums is due to the gyroradius (***r***); and its changes induce colorfulness (light color). In fact, the increase and decrease of the gyroradius construct different spectrums. Therefore, in Saleh Theory the distinction of spectrums is due to the gyroradius; and its changes induce colorfulness.

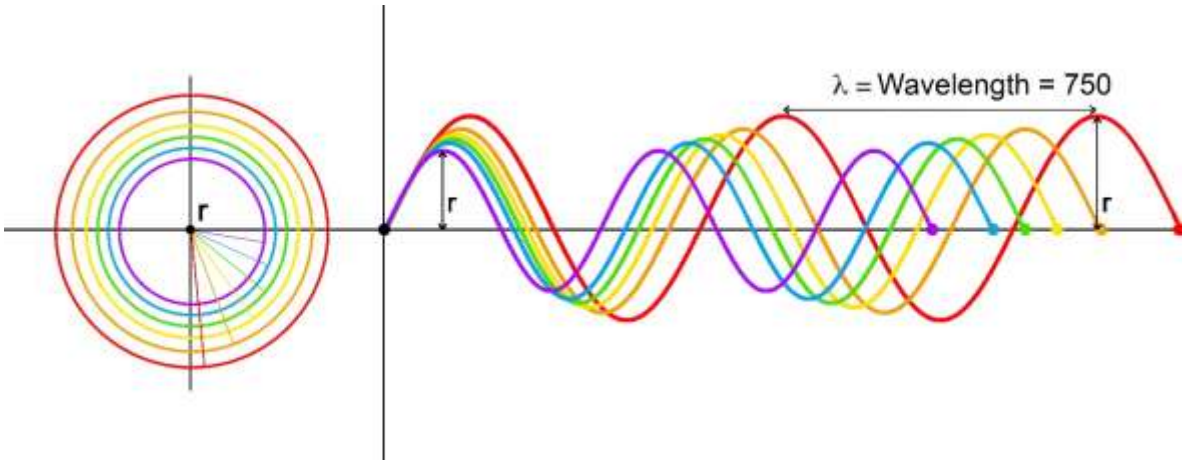


Fig. 1.13

Considering that we have various elements in nature, and the distance of electrons from the nucleus differs in diverse elements, and furthermore, the electrons in the outermost layer (valence layer) are capable of emitting photons, as a result, photons take on different radii of rotation when emitted. Consequently, they will have different amplitudes, and different frequencies, wavelengths and amplitudes will be created, and thus we have the various colors in electromagnetic waves [14].

An electron that revolves and here is a photon born with all its beauty, its speed and its incredible brilliance, an angel. We believe that the color variety of photon is due to a change in the value of its gyroradius, and a different value of the rotational radius is due to electron motion with different distances around the nucleus in atoms. So, Violet have the shortest gyroradius and Red spectrum has the longest gyroradius in visible light. Therefore, the colorfulness is the effect of the rotation of the photon with different gyroradius. As mentioned before, the photon has a three-dimensional motion, including a wave-like movement and a rotating motion. So, its energy is consist of these two types of movement.

$$E_{Total} = h\vartheta + {}^{1}/_{2}\, mr^2\omega^2$$

The important and interesting point in this new formula for the energy of photon is that, the variables of this equation are homogeneous. As you know, for a wave with constant velocity, the frequency is directly related to the inverse value of wavelength. Therefore, the variations of both variables, the rotational radius and the frequency, are same kind of the length. However, in the equality of ($h\vartheta = mc^2$) the variables are frequency and mass, that these variables are completely heterogeneous.

What is weird is that, according to the wave-particle duality concept, the mass of violet photon is twice the mass of red photon. But even by sight and by feeling the red light is heavier, stranger and warmer that the violet light.

Saleh Theory explain the nature of red light taking into account its higher internal energy. In fact, the wide-range of frequency is interpreted as the changes in the value of the gyroradius and so the color variety of photon. When the frequency decrease, the wavelength increase, which cause the

growth of gyroradius and, consequently, the internal energy of photon grows up. But the mass is always constant [15].

1.8.1 Black Light

"I see black light." Victor Hugo in the last moment

Know that the photon has a short life but also a long life you'd think that it has seen the whole Universe. If you look at the corners of the Universe, you see flashing lights that come to you and carry the secrets of 13 billion years ago. The photon, as a messenger, revives the past moments; as a little angel illustrates the whole universe; without it, the darkness would dominate the universe. darkness, grief, one over another. This courageous minuscule has brought us with him the lighting of life, the existence, the heat.

The domain of electromagnetic spectrum is very large and a small region of it is called the Visible Region. It contains packets of elemental energy, from red to violet. Apart from this, there is also the partially visible region that is clearly perceptible for two observer groups. The lower region called Infrared and the upper one called Ultraviolet. If a witness or observer has an attentive eye or possesses a high-sensitivity device, he can see the partially visible area - that contains colored packets of energy too - as clear as the visible region. On the upper region, of frequency, the lights have a particular brightness and are of different colors. We have known that the color of the photon (of the spectrum) is designated by its gyroradius. The photon exhibits properties of both wave and particle. As a particle, it is an obvious entity that has its effect, a concrete effect with its own energy and power. The photon therefore can have the same influence as a bullet, that can transmit its energy, imposes itself on the target and changes its form; Just about the photon we could take the example of the discoloration of clothes or the dimensional distortion of a plastic object when overexposed to the light. Then we can consider the photon as a tiny but effective bullet.

In the upper partially visible region, there are different spectrums with a various colors including the black spectrum. You just need to have an attentive eye or a high-sensitivity device to perceive the particle aspect of these lights. As a result, the Black Light exists in the Nature and has its special particle state and its particular effect [16].

1.8.2 Calculating the Rotational Radius and Angular Velocity of the Photon

In previous sections, we calculated the rotational and translational energy of photons using the speed of photons in a nested helical path ($\boldsymbol{V_T = 3.3C}$) and we examined its relationship with Planck's energy equation. We now proceed to calculate the constant angular velocity ($\boldsymbol{\omega}$) by equating the translational and rotational energy at a frequency of 600 THz. Subsequently, considering the constancy of the angular velocity across all frequencies, we derive a formula to calculate the radius of the rotation of photons ($\boldsymbol{r}$) in terms of the variable coefficient of rotational energy ($\boldsymbol{i_R}$). Finally, we calculate the rotational radius for several frequencies within the range of visible light.

$$\boldsymbol{if\ \ f = 600\,THz \Rightarrow\ E_R = E_L \Rightarrow}$$

$$\frac{1}{2}m_p{v_R}^2 = \frac{1}{2}m_p{v_L}^2 \Rightarrow {v_R}^2 = {v_L}^2 \Rightarrow$$
$$v_R = v_L \Rightarrow \frac{a_R}{T} = \frac{a_L}{T} \Rightarrow$$
$$a_R = a_L = a$$

Where a_R is the amplitude of rotational motion and a_L is the amplitude in linear motion. The rotational radius is the vector sum of these two perpendicular quantities. Therefore, we have:

$$r = \sqrt{{a_R}^2 + {a_L}^2} = \sqrt{a^2 + a^2} = \sqrt{2}a$$

At a frequency of 600 THz, the linear amplitude is one-quarter of the wavelength, so we have:

$$\lambda_G = 5 \times 10^{-7}\ \text{m}$$
$$a = \frac{\lambda}{4} = \frac{5 \times 10^{-7}}{4} \Rightarrow a = 1.25 \times 10^{-7}\ \text{m}$$
$$r_G = \sqrt{2}\,a = 1.76 \times 10^{-7}\ \text{m}$$

Now, with the rotational radius for green light at a frequency of 600 THz, we calculate the constant angular velocity of photons:

$$if\ \ f = 600\ \text{THz} \Rightarrow\ E_R = E_L \Rightarrow$$
$$\frac{1}{2}m_p r^2\omega^2 = hf \Rightarrow \omega = \sqrt{\frac{hf_G}{\frac{1}{2}m_p{r_G}^2}} \Rightarrow$$
$$\omega = \sqrt{\frac{6.62 \times 10^{-34} \times 6 \times 10^{14}}{\frac{1}{2} \times 1.64 \times 10^{-36} \times (1.76 \times 10^{-7})^2}} \Rightarrow$$
$$\omega \cong 4 \times 10^{15}\ \text{rad/s}$$

Using the obtained angular velocity, for the rotational radius of photons, we have:

$$E_R = \frac{1}{2}m_p r^2\omega^2 = Si_R \Rightarrow r^2 = \frac{2Si_R}{m_p\omega^2} \Rightarrow r = \frac{3.3C\sqrt{i_R}}{\omega} \Rightarrow$$
$$r = 2.475 \times 10^{-7}\sqrt{i_R}\ \text{m}$$

Now, by substituting different values, we obtain the rotational radius of several visible light spectra [17].

Frequency	f	9.00E+14	8.00E+14	7.00E+14	6.50E+14	6.00E+14	5.50E+14	5.00E+14	4.50E+14	4.00E+14	3.00E+14
Wavelength	λ	3.33E-07	3.75E-07	4.29E-07	4.62E-07	5.00E-07	5.45E-07	6.00E-07	6.67E-07	7.50E-07	1.00E-06
Translational Coefficient	i_L	0.75	0.67	0.58	0.54	0.50	0.46	0.42	0.38	0.33	0.25
Rotational Coefficient	i_R	0.25	0.33	0.42	0.46	0.50	0.54	0.58	0.63	0.67	0.75
Rotational Radius	r	1.24E-07	1.43E-07	1.60E-07	1.68E-07	1.75E-07	1.82E-07	1.89E-07	1.96E-07	2.02E-07	2.14E-07
Transmission Speed	V_R	4.95E+08	5.72E+08	6.39E+08	6.70E+08	7.00E+08	7.29E+08	7.56E+08	7.83E+08	8.08E+08	8.57E+08
Rotational Speed	V_L	8.52E+08	8.04E+08	7.52E+08	7.24E+08	6.96E+08	6.66E+08	6.35E+08	6.03E+08	5.68E+08	4.92E+08
Planck Energy	h f	5.96E-19	5.30E-19	4.63E-19	4.30E-19	3.97E-19	3.64E-19	3.31E-19	2.98E-19	2.65E-19	1.99E-19
Translational Energy	S i_L	6.00E-19	5.33E-19	4.67E-19	4.33E-19	4.00E-19	3.67E-19	3.33E-19	3.00E-19	2.67E-19	2.00E-19
Rotational Energy	S i_R	2.00E-19	2.67E-19	3.33E-19	3.67E-19	4.00E-19	4.33E-19	4.67E-19	5.00E-19	5.33E-19	6.00E-19
Total Energy	S	8.00E-19	8.00E-19	8.00E-19	8.00E-19	8.00E-19	8.00E-19	8.00E-19	8.00E-19	8.00E-19	8.00E-19

Fig. 1.14

1.9 PHOTON, THE BUILDING BLOCK OF ELECTRON, PROTON AND NEUTRON

The ancient believed that all matter was made up of four elements: Fire, Air, Water and Earth. Over time, with the progress of science, scientists have discovered that all matter is made up of tiny particles called molecules. So, if we think well, we will see that some knowledge gradually loses its meaning [18].

1.9.1 Structure of Electron, Proton and Neutron, Based on Saleh Theory

a) Structure of Electron

Given that an electron is the birthplace or even the genetrix of the photon, one could say that the structure of an electron consists of the photons gathered together. But how they are positioned? Indeed, the photons turn not just around themselves, but also on the surface of the imaginary sphere of electrons on a spiral trajectory. They cover all the surface and get emitted very easily. There is no difference between electrons. Therefore, their structure must be an array of photons that rotate on the surface of an imaginary sphere without any central core.

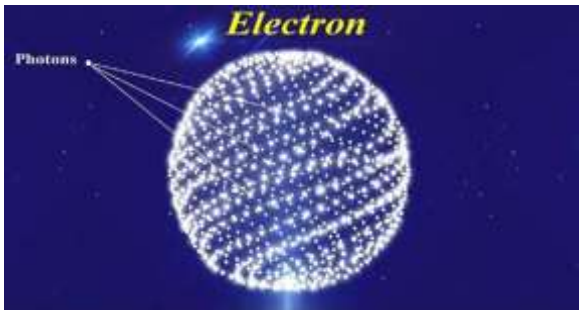


Fig. 1.15

b) Structure of Proton

Physicists consider a continuous texture for the proton. Therefore, their structure must be a dense compact globe filled up of photons with a radius three times smaller than that of an electron. But it is not the only point. The structure of a proton is similar to a cherry with two layers; the core and the mantle.

The Core: This region is almost spherical and its radius is about one-third of the entire proton's radius, but its density is about 15 times more than the mantle.

The Mantle: This area is a brawny layer, which includes about $^{2}/_{3}$ of the total radius, and completely encircles the core by a much lower density than it.

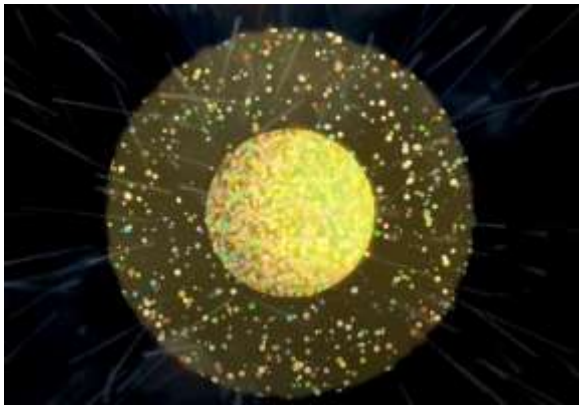


Fig. 1.16

c) Structure of Neutron

Neutron is a sphere with the proton core, electron shell, and an empty space about twice as much as the proton's radius. By this identification, we could easily explain a lot of problems in physics like decay, strong interaction, weak interaction, etc [5].

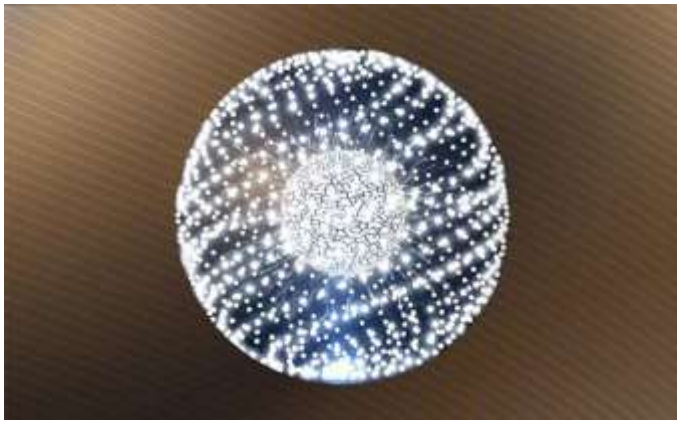


Fig. 1.17

Accordingly, the smallest unit of Electrons, Protons and Neutrons, and in other words the entire universe, is Photon. On the other hand, based on the present theory, the smallest quantity of an element that retains the unique properties of that element is an atom or it can be said that the atom is the smallest unit in which matter is divided into. According to the definition of the atom, and the true meaning of the word "Άτομο" in the Greek language, which means uncuttable, and the description of the structure of Proton, Electron and Neutron, we can conclude that the atom which

forming the structure of the whole universe is the photon.

Therefore, Saleh Theory believes that the "photon", in the true sense of the word, could be called the new atom, which is the primary building block of all material in the universe [19].

1.9.2 Remarkable Similarities Between Photons and H_2O Molecules in the Universe

Let's consider a drop of water. Its building blocks are two hydrogen atoms and one oxygen atom, which combine to form the H_2O molecule.

$$\mathbf{2H + O \rightarrow H_2O}$$

Interestingly, this molecule is inherently made of two gases, and their chemical combination should also be a gas. However, because it's a polar molecule, water can also exist in a liquid state, forming seas and oceans. If you have an ocean of water, you effectively have n molecules of H_2O. In terms of chemical or physical properties, an ocean of water is identical to a single drop. Water is abundant in the universe in many forms: vapour, clouds, ice, crystals, hail, liquid, and so on. In essence, all these are different physical states of water droplets, which appear in various forms depending on heat, cold, and environmental pressure.

Photons are much the same. Under great pressure, they can compress together to form a solid sphere called a proton (like ice). Or they can gather on a hypothetical hollow spherical shell to form an electron. In other conditions, a bunch of photons scatter, creating radiation rays. If these rays are aligned (in phase), they produce a laser beam. Depending on the physical conditions, photons can also be observed as visible light, radio waves, microwaves, and other types of waves in nature.

Interestingly, if photons are joined together in a continuous chain (due to high pressure and heat), they can form a long chain of photons that we call magnetic waves or gravitational waves. This structure is found in abundance in nature.

Conclusion:

Just as H_2O has different names in various environments, Photon also has different names in nature depending on its structure within the electromagnetic spectrum. But they are all made from the same fundamental particle—***"Angel Photon"*** [20].

1.9.3 My New Simple Experiment

Consider a simple lamp in an electric circuit, electrons flow through the wires, and as they pass through an element, gas, crystal, or any other object in their path, they produce a beautiful emission. In this phenomenon, electrons generate photons.

In our previous papers, we have shown that photon generation in a lamp corresponds to explosion of electron, where during this process the electron's photons are released and dispersed into the environment. As a simple mathematical relationship where set A is a subset of set B and set B is a

subset of set A, we can conclude that A equals B.

In the example above, and in similar cases, it is straightforward to show that electrons can release photons. Thus, it suffices to demonstrate that photons can also generate electrons. This leads us to the conclusion that electrons are made of photons.

Consider a wireless device that charges electronic devices' batteries using electromagnetic waves. For instance, when you place your phone on a wireless charger, the device can charge your phone without direct contact. During battery consumption in a mobile phone, some electrons are released as photons via the phone's LCD, while others are converted into electromagnetic and radio waves, and some manifest as heat in the device. It is observed that during each charge and discharge cycle, approximately 10% to 50% of the charged electrons are consumed.

During wireless charging, electrons are returned to the system. Electromagnetic waves from the wireless charger are converted back into electrons, which recharge the battery. Thus, it leads to the conclusion that just as electrons can convert into photons, electromagnetic waves—composed of photons—can convert into electrons.

And we can say that electrons (furthermore all subatomic particles) are composed of photons [21].

1.9.4 Several Reasons to Prove That Electrons and All Subatomic Particles Are Composed of Photons

1. Photon Emissions from Light Bulbs

Wherever we go these days, we undoubtedly encounter numerous light bulbs emitting photons due to electron motion in wires and filaments. Simply put, photon emission occurs whenever an electron follows a specific trajectory. So, the electrons serve as the mother and generator of photons in nature.

2. Electron Generation via Wireless Charging for Mobile Phones, Watches, etc.

Observing a typical wireless charger—widely available today—reveals that mobile phones can recharge without a direct wired connection to transfer and store electrons. Instead, they recover lost electrons consumed by the display and other functions through electromagnetic waves transmitted between the phone and the wireless charging device. These waves effectively convert into electrons, which are then stored in the phone's battery.

3. Nuclear Explosion of Heavy Atoms Such as Uranium

If we consider a nuclear explosion, a few grams of uranium release an immense amount of energy in a fraction of a second, accompanied by intense light emission. This process occurs due to the release of nuclear energy stored in uranium, producing a tremendous amount of thermal and luminous energy. This abundant emitted light results from the breakdown of protons and neutrons of the nucleus, which are rapidly released, generating extraordinary numbers of photons.

4. Stellar Radiation in the Universe

Observing a burning star, it can be seeing continuous photon emission, which sustains the surrounding cosmic environment. If a star loses 10% of its mass, it reaches the threshold of collapse. However, assuming it continues burning indefinitely, over billions of years, it gradually diminishes

in size. Actually, this indicates that a significant portion of the star's mass is converted into photons. Consequently, elements such as hydrogen and helium, as they deplete, transform into free photons.

Considering the electromagnetic spectrum range, which encompasses infrared, visible light, ultraviolet, and other waves, alongside the uncomplicated experiment and observations presented in this study, it is evident that both electrons and protons can generate photons. Additionally, electromagnetic waves possess the capability to produce electrons, etc. Thus, it can be concluded that the atom of fundamental particles, such as electrons and protons, are essentially the same Angel Photon, which serve as the primary source of light, heat, photosynthesis, and, ultimately, life in the universe [22].

1.10 PHOTON OR THE SUPERSTRING

Given that the genetrix of photon is the electron and the photons emit from the electrons and continue on their trajectory, in fact, the trajectory of each photon depends on the type of motion of the electron in which is transferred to photon. Electrons usually have two main motions; the first one is around the nucleus and the other one is around themselves. On the other hand, the photon also has a rotational motion around itself. When a photon emits from an electron, its motion is the resultant of these three types of motions. Photon obtains its wavelength from the motion of electron around the nucleus. The combination of the rotational motion of electron around itself and the rotational motion of photon around itself creates a zigzag-like motion in a closed ring, which can be called the internal motion of the photon. As a result, the motion of photon when leaving the electron can be divided into three motions:

I. Rotational Motion Around Itself (With 1 Degree of Freedom)

II. Zigzag or Internal Motion (With 5 Degrees of Freedom)

III. External Motion of the Photon (With 5 Degrees of Freedom)

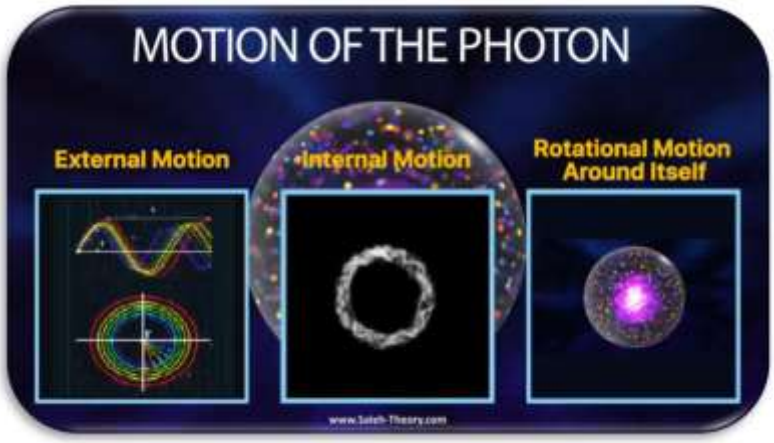


Fig. 1.18

In total, each photon can have a motion with 5 + 5 + 1 degrees of freedom, which in fact can be said that the photon is the super string as we mean [23].

1.11 SUB-PHOTON AND ITS COMPONENTS

The ancients believed that the world is made up of four elements: fire, air, water and earth. Over time, with the progress of science, scientists discovered that every material is composed of tiny particles called molecules which, themselves, are constituted of atoms. Similarly, atoms have a nucleus and electrons.

If we look at the sky, we see the moon that revolves around the Earth; together, they turn around the Sun. And if you lift your head a little higher, you could see the planets of the Solar System which also turn around the Sun which, in turn, has its rotation in the galaxy; as well as galaxies have their own axis to turn around. Thus, observing from the sky to the atom, we see an identical structure that is about a rotation around a central axis; a structure similar to that of the atom which has a nucleus and electrons rotating around.

Saleh Theory explains that, like the atom, the photon also has a central part around which particles are rotating and, indeed, the photon is a small atom with a similar constitution.

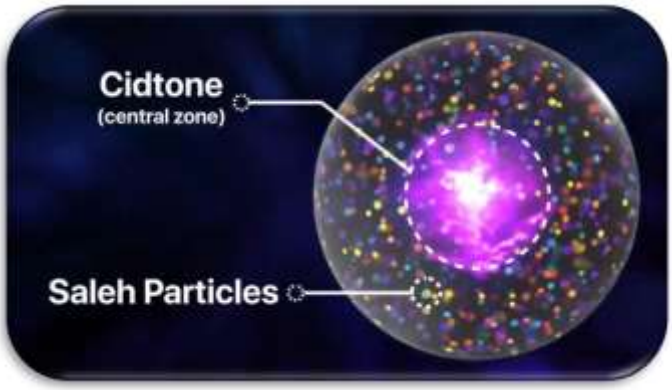


Fig. 1.19

As we see in the image, Saleh Theory based on the same scheme, believes that:

The photon has a central part around which the rotating particles move in an irregular manner. The central part called ***"Cidtone"*** and the particles around are the ***"Saleh Particles"*** [24].

According to the proposed figure for the photon, the internal structure of the photon can be considered in such a way that the Cidtone is like a sun and the Saleh particles (colored particles) are like planets orbiting the sun [25].

1.12 EXTERNAL AND INTERNAL ENERGY OF PHOTON

According to the final speed of photon which is about **4.8 C**, the external energy of photon is obtained from the following equation:

$$E_k = \frac{1}{2} m_p V^2 = \frac{1}{2} m_p (4.82C)^2 \simeq \frac{1}{2} m_p (5C)^2 = 12.5 M_p C^2 = 2 \times 10^{-18}\ \text{J}$$

According to the articles from Saleh Research Group, the photon is composed of smaller particles called Cidtonium, and when a photon decays, the speed of these particles is equal to the final speed of the photon.
So, the internal energy equals:

$$E_{in} = \sum_{i=1}^{n} \frac{1}{2} M_{cid} (V_{cid})^2 = \sum_{i=1}^{10^9} \frac{1}{2} \times 10^{-9} M_p (4.82C)^2 = \frac{23.6}{2} \times M_p C^2 \simeq 2 \times 10^{-18}\ \text{J}$$

Just as a photon has various types of velocity (linear, wave-like, rotational, etc.), Cidtonium can also assume different velocities, and according to the internal structure of photons, different energies can be considered for it [13].

It should be noted that when a photon is fissioned, transfers its final speed to a Cidtonium (**4.82*C***).

1.12.1 Method of a Photon Fission

If we have several artificial gravitational fields, assuming a number ***n*** as shown in the figure below:

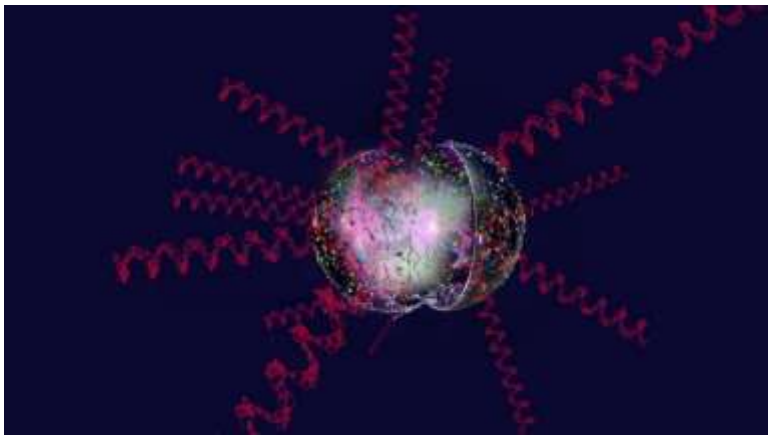


Fig. 1.20

And gravitational fluxes pass through a specific point as shown in the figure above, just as strings entering a section have heat and shear (friction), gravitational fluxes also pass through ***m*** number at one point and can certainly create considerable energy at that point, causing photon fission, and by this action, energy will release [26].

1.13 DENSITY OF PHOTONS CAN BE CONSTANT

As stated previously, all photons have the same and constant mass. On the other hand, since they all have the same radius, the density of all photons can therefore be constant and identical. The density of a photon can be calculated as follows [11]:

$$m_p = 1.64 \times 10^{-36}\ \text{kg}$$

$$r_p = 1.2 \times 10^{-17}\ \text{m}$$

$$v_p = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(1.2 \times 10^{-17})^3 = 7.23 \times 10^{-51}\ \text{m}^3$$

$$\rho_p = \frac{1.64 \times 10^{-36}}{7.23 \times 10^{-51}} = 2.26 \times 10^{14}\ \frac{\text{kg}}{\text{m}^3}$$

1.14 EVERYTHING ABOUT PHOTONS (THE ATOM OF SUB-ATOMIC PARTICLES, SUPERSTRING, BASIC OF QUANTUM, ETC.) IN THE UNIVERSE

The photon is described as the lightest, fastest, and most agile particle known in the cosmos. However, it is not directly visible; it is the primary agent responsible for the visibility of all objects. From the perspective of Saleh Theory, photon is not only the building block for particles like electrons, protons, and neutrons but also forms the foundation of electromagnetic waves and even the very nature of forces and energies.

According to Saleh Theory, photon has a constant rest mass. All particles that constitute an atom—namely electrons, protons, and neutrons—are made of photons. In other words, the photon is the building block of all particles in the universe. This photon is said to have 11 dimensions of motion or degrees of freedom, which are explained in detail by Saleh Theory. Therefore, photon, in its internal motion, behaves like strings that form the particles. However, if we calculate the velocity of a photon, we find that it has a three-layered helical motion:

1.4.1 Three-Layered Helical Motion of Photon

First Helix: The large helical path created by the combination of the linear motion and the rotational motion of the electron (which generates the photon) around the nucleus.

Second Helix: This results from the combination of the first motion and the rotation of the electron about its own axis.

Third Helix: This is the result of combining the first and second motions with the photon's own rotation about its central axis.

In each layer, the total velocity of the photon is a combination of its linear and rotational components. The total speed of the photon in this model is approximately 4.8 times the speed of light (**4.8*C***).

Calculations of the photon energy at the laboratories of MIT and the University of Michigan have reportedly matched experimental results. The discrepancy with the Planck equation at short distances is attributed to the absence of rotational energy dissipation on this scale.

Using the relationship between translational and rotational energy, the radius of the photon's helix

is determined as follows:

$$\frac{1}{2}mv^2 - \frac{1}{2}mr^2\omega^2 = h\vartheta$$

where m is the mass of photon, v is the velocity of photon, r is the radius of the photon's rotation in its helical motion, ω is the constant angular velocity of photon, h is Planck's constant, and ϑ is the frequency.

From an energy perspective, the total energy of a photon is the sum of its linear and rotational energies:

$$E_T = E_L + E_R$$

In which at a frequency of 600 THz, these two energies are equal.

The relation between Planck's energy and the energy introduced in Saleh Theory is as follows, which introduces a new energy constant called ***"Saleh constant" (S)***:

$$Si = h\vartheta$$

The value of S is the same minimum amount of energy or the quantum of energy, which is equal to one-half the mass multiplied by the photon's velocity squared. The term i represents the percentage of linear energy, which varies at different frequencies. This structure allows the photon to be defined as the smallest unit of quantum energy.

In this view, photon is made up of more fundamental particles called ***"Cidtonium"***, which, upon the photon's decay, move at the same final velocity as the photon.

Conclusion

The equations proposed by the Saleh Theory Group offer a new and complex view of photon in which helical motion, internal energies, and rotational dynamics play a fundamental role. This perspective could create a new link between quantum and relativistic theories and open up new horizons in theoretical physics [27].

1.15 APPLICATIONS

In this section, we present 2 practical applications for the use of light:

1.15.1 Use of Light in the Child's Development

The white spectrum encompasses all visible spectrums and a wide range of frequencies or wavelengths of electromagnetic radiation. It is indeed a fusion of spectrums from different colors and therefore if it is colored, it is not in vain. Our experience proves that each color has its characteristic and its mood. For example, the red spectrum represents the vivacity and the blue one refers to a heavenly tranquility.

Saleh Theory believes that by a better employment of colors in different places, we could

benefit from the particularities of each spectrum to acquire tranquility, feeling lively, overcome anguish. Thus, by using thoughtfully the specific colors in the environment of people of different gender and age, we can perfect the talents. Following research conducted on individuals of various ages and genders, we have concluded that the use of specific lights at different ages (tailored to gender) promotes the flourishing of talent and enhances personal development [28].

In this paper we explain the results of this research:

Boys Under 5 Years Old: The optimal light for nurturing talent in this age group is blue and white.

Girls Under 5 Years Old: The optimal light for nurturing talent in this age group is pink and white.

Boys Aged 5 to 10: The optimal light for nurturing talent in this age group is blue and green.

Girls Aged 5 to 10: The optimal light for nurturing talent in this age group is violet and yellow.

Finally, it should be noted that Saleh Theory considers an identical value of the invariant mass for all the photons and it is the change of gyroradius which defines its diversity of color; This also explains the different values of the internal energy of the photons $(\frac{1}{2} m r^2 \omega^2)$. But on the contrary for the mass of the different photons, we cannot attribute varied values and if for example the red spectrum has more impact and energy than that of blue, it is because of the magnitude of its gyroradius [28].

1.15.2 Visible Light Applications in Agriculture

Plants need a steady energy source for growth, primarily obtained from light. Light plays a vital role in shaping plants' physiological, morphological, and biochemical traits through its three main aspects: intensity, quality, and duration. Although light is not the only factor in photosynthesis, it acts as an essential signal regulating various stages of plant growth, from germination to flowering.

Plants respond differently to light depending on the types of pigments involved, especially photosynthetic and accessory pigments that respond to different light spectra. In modern greenhouse farming, grow lights are commonly used to optimise plant development conditions. Among these, light-emitting diodes (LEDs) have gained notable attention because of their benefits, including longer lifespan, ability to produce specific wavelengths, low energy use, and flexibility to adjust both light intensity and spectrum according to plant needs.

This study, conducted by the Saleh Research Group, aimed to assess the effects of various light treatments on different plant growth processes. The findings showed that white fluorescent light is especially effective in promoting flowering, while a combination of yellow, white, and red light improves fruit production in greenhouse settings. Yellow light

was particularly effective for vegetative growth, enhancing leaf and stem development. Similarly, yellow light was beneficial for ornamental plant growth. For root crops, a mixture of yellow and white light produced positive outcomes, and for breeding and cultivating beans, yellow light was deemed the most appropriate. Below are 12 ways light can be utilised in agriculture:

1. Increased Plant Growth

Light directly affects cell elongation and division, promoting overall biomass accumulation.

Proper light quality and intensity accelerate the plant's ability to grow taller, stronger, and healthier.

2. Aiding Photosynthesis

Light is the primary energy source for photosynthesis, the process through which plants convert light energy into chemical energy. Tailored light spectra can enhance the efficiency of this process, boosting plant productivity.

3. Controlling Flowering Time

By manipulating photoperiods and light wavelengths, growers can trigger early or delayed flowering. This control is essential in synchronising blooming cycles for commercial production.

4. Improved Crop Quality

Different light spectrums influence pigmentation, sugar content, and texture. Targeted lighting can result in better flavour, appearance, and nutritional value in crops.

5. Stimulating Seed Germination

Light quality and duration can significantly impact germination rates and seedling vigour.

Specific wavelengths help break seed dormancy and initiate sprouting.

6. Pest and Disease Control

Certain wavelengths deter insect pests or inhibit the development of pathogens. UV and blue light, for instance, have been found to reduce fungal growth and insect activity.

7. Optimising Greenhouse Conditions

LED grow lights enable precise control over light cycles and intensity. This ensures plants receive consistent lighting regardless of seasonal or weather conditions.

8. Producing Plants in Enclosed Environments

Vertical farms and plant factories rely entirely on artificial lighting. LEDs allow crop production in environments with no natural sunlight, such as urban or underground spaces.

9. Regulating Plant Circadian Rhythms

Plants have internal clocks influenced by light cycles. Proper light scheduling maintains their natural rhythms, optimising functions like nutrient uptake and hormone regulation.

10. Increased Secondary Metabolite Production

Light manipulation can boost the production of compounds like antioxidants, flavonoids, and essential oils. These are important for plant defence and enhance the commercial value of crops.

11. Use of Artificial Lighting in the Arctic and Antarctic Regions

In polar regions like the Arctic and Antarctic, extended periods of darkness during winter months make natural sunlight unavailable for plant growth. To overcome this challenge, artificial lighting—particularly LED grow lights—is used in controlled environments such as research stations and indoor farms. These lights provide specific wavelengths that mimic natural sunlight, enabling year-round cultivation of vegetables, herbs, and other crops even in extreme conditions.

12. Ideal Temperature Ranges for Different Plant Species

Each plant species has a specific temperature range in which it thrives. Maintaining optimal temperature is essential for photosynthesis, nutrient uptake, and overall development [29].

1.16 CONCLUSION

This chapter endeavours to provide a comprehensive description of the structure, motions, and properties of the photon—the cornerstone of the universe. It is demonstrated through various lines of reasoning that the photon possesses a constant mass.

Subsequently, the motions of the photon are addressed, with its various types of motion discussed and analysed, and the underlying causes provided.

Furthermore, the different energy states of the photon are examined, and the 'Saleh Constant' is introduced. The experiments conducted by MIT and the University of Michigan regarding the energy of electromagnetic waves at short distances are then reviewed, yielding compelling results. This is followed by an articulation of the diversity of colours, the radius of gyration, and the angular velocity of the photon. Finally, the discussion extends to additional topics, such as the photon as a 'superstring', the concept of the 'sub-photon', and other related subjects.

CHAPTER 2

Fundamental Particles (Electron, Proton and Neutron)

2.1 INTRODUCTION

Throughout the history of science, numerous scientists have endeavoured to understand the constituents of matter. It was once believed that all matter was composed of four primary elements: water, air, earth, and fire. However, over time and through the dedicated efforts of many researchers, it was concluded that matter must consist of smaller structures, which were termed molecules.

Subsequently, science progressed to an even finer structure known as the atom. Later, through the work of scientists such as Rutherford, it was established that the atom comprises a nucleus and particles that surround it. In due course, the internal structure of the nucleus was also discovered, revealing that it consists of charged particles called protons and neutral particles known as neutrons. These, together with the particles orbiting the nucleus (electrons), were designated as fundamental particles.

Nevertheless, the true structure of these particles has remained a mystery. Despite extensive efforts and various scientific propositions, existing theories fail to capture the existential reality and the actual architecture of these particles, as significant flaws persist within these models. In this chapter, by employing the Saleh theory, the structure of these particles is articulated with precision and in full detail. This makes it easier for future studies to be more accurate.

2.2 THE ACTUAL AND REALISTIC STRUCTURE OF ELECTRON

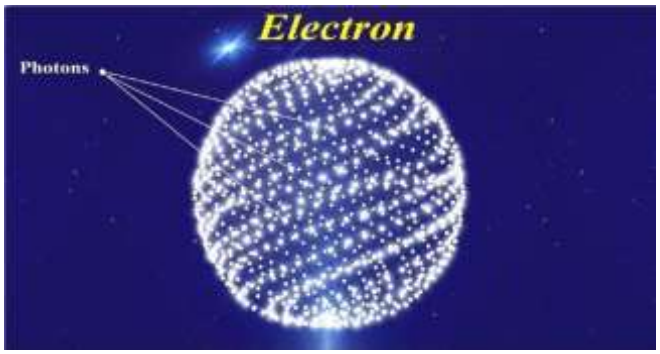
Everything in the Universe has its own structure; every structure is in harmony with the others; solar system, Milky Way, Black holes, other systems of star around, etc. Also Electron is no exception. We could find electron in two different states: ground or exited and regardless of how it gets excited, we realize that it wants to return to the ground state by the emission of a photon. Indeed, the excited electron is the birthplace of photon.
The electron and the photon are very close together and they influence each other. For example, the photovoltaic type of photoelectric cell, when exposed to light, can generate and support an electric current without being attached to any external voltage source and on the other hand, the electric current into a filament make shine the lamp and generate the photons. In fact, photon and electron are like a family with a fluid interaction; electron's motion makes see the photon that could, in turn, make move the electron. So they are in a kind of harmony. Given that electron is the birthplace or even the genetrix of photon, one could say that the electron's structure consists of the photons gathered together:

$$\text{Electron} = \Sigma\text{photon}$$

2.2.1 How Photons Are Positioned?

Indeed, the photons turn not just around themselves but also on the surface of the imaginary sphere of electron on spiral trajectory. They cover all the surface and get emitted very easily. In our previous article we explained that there is no difference between the photons and the

variety of the color of spectrums is because of the different value of the gyroradius of photon. It therefore follows that there is no any difference between electrons of different atoms.



$e_1 = e_2 = e_3 = \cdots$ »»»»» $Y_1 = Y_2 = Y_3 = \cdots$

Fig. 2.1

2.2.2 How the Photon Moves on Electron's Sphere?

After having thrown a glance at the solar system, we could see that the Earth's axial tilt is about 23.4° but the rotational and orbital axes of Uranus are nearly aligned because it has an obliquity of 82°. Saleh Theory believes that the photon had always two types of motion: firstly, a rotation likes the Uranus's one around its own axis and secondly a spiral movement on the electron's sphere [30].

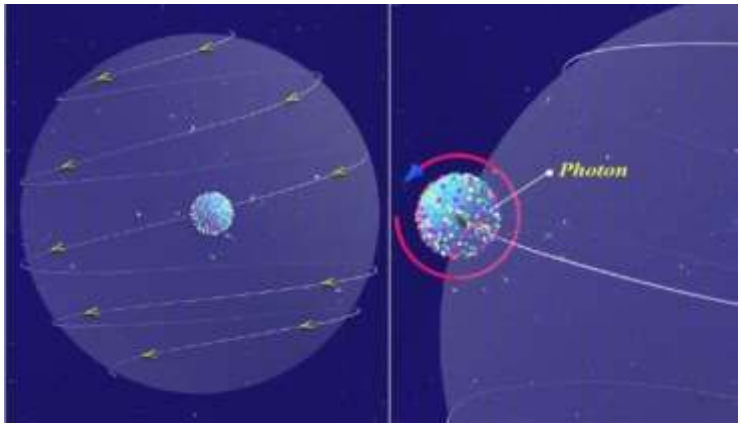


Fig. 2.2

2.3 STRUCTURE OF PROTON

When a perfect and skillful mason builds a fortress by placing the similar blocks on each other, one by one, and completing the wall, the ceiling and finally the room, or when the ancient buildings in all their splendor are made up of the adobes, all the Universe is also built of separate adobes.

In the material world too, similar to the stone blocks of the pyramids of Egyptian necropolis, the elements and atoms that are the basis of all matter, themselves are made up of the hydrogen atom. Indeed, it is this noble element which is the sole basis and block of all other elements. As well as 75% of the Universe is made up of hydrogen.

If one looks at the periodic table of elements, one could consider that the helium is made of two hydrogens; together they make the lithium and it is the same for the rest of the elements. So all are just an array of hydrogen or the hydrogen is the as the primary building block.
The hydrogen atom in its different isotopes always has only one electron and one proton. Electron itself is only an array of "Angel-Photon" gathered on an imaginary sphere, one next to the other. So photon is like the primary building block of electron.

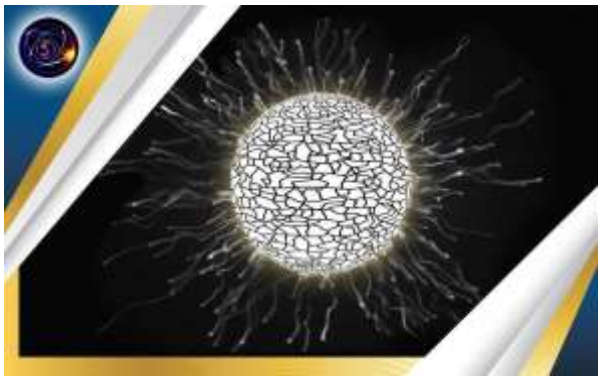


Fig. 2.3

Saleh Theory believes that if photons are also at the origin of the proton constitution. In fact, united and compressed, they form a nucleus called proton like a filled globe. Although the number of photons constituting a proton is much more than that of an electron, the value of its radius is much lower than that of electron. Indeed, if we observe the proton well, we see a sun that is made up of millions of photon, compacted and compressed:

$$\text{Proton} = \Sigma\text{Photon}$$

And finally, when these innumerable photons come together and compress in a sphere, they form the proton. But the important question is how these photons are placed together, or what is the final structure of the proton [30]?

2.4 ULTIMATE STRUCTURE OF PROTON

The interior structure of the Earth is layered in spherical shells: an outer crust, a mantle and a core. But to tell the truth, the Earth is composed of 4 layers, if we consider the atmosphere as 4th, which is moreover the essential part for life on this planet. The Sun has six regions - the core, the radiative zone, and the convective zone in the interior; the photosphere; the chromosphere; and the outermost region, the corona. The core contains 34% of the Sun's mass, but only 0.8 % of its volume. The core also preserves the gas above it and prevents the sun from disintegrating.

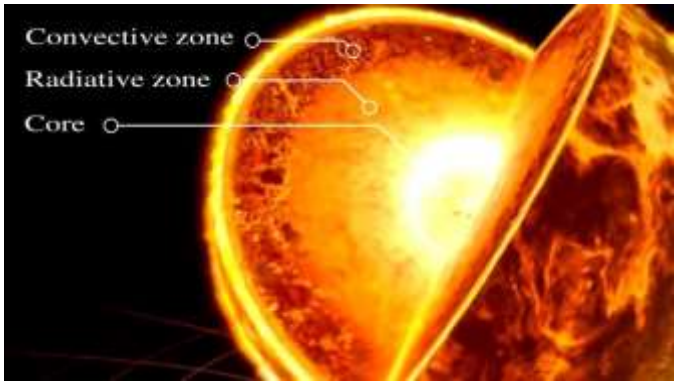


Fig. 2.4

If we take a look at the proton, we see a sun which is made of a large collection of photons, with the same density and compression. Therefore, the proton is a collection of compact photons. The structure of the proton is similar to a cherry or to the sun with two layers; the Core and the mantle.

The Core:

This region is almost spherical and its radius is about one third of the entire protons radius, but its density is about 15 times more than the mantle.

The Mantle:

This area is a brawny layer, which includes about $^{2}/_{3}$ of the total radius, and completely encircles the core by a much lower density than it.

Remember that the core and the mantle are both made of photons and the only difference is their density. Actually, the photons vibrate between the core and the mantle, and that's not how they don't have anything to do with each other.

Scientific achievements show that the proton contains two up quarks and a down quark. But how Saleh Theory explains it?

Up to the present day, to understand the proton's structure, scientists send a beam of isolated protons speeding clockwise, while a second beam of protons is sent counterclockwise to collide the first one. Then a particle detector is waiting to measure all the subatomic particles that erupt from the collisions.

This method is similar to that of a certain researcher who does not know what an airplane is made of, but tries to understand its structure by observing the different parts of two collided airplanes. So he is going to say that an airplane is made of two wings, fuselage and some small parts; this interpretation is correct but it is at the same time partial.

But what really happens when two protons collide? Indeed due to the severity of the collision, the mantle part splits into two large fragments and some tiny particles but the smash is not enough to split the dense core. So the heavy dense particle which is called down quark is not anything other than the proton's core, the two parts of the mantle that are larger, lighter and less dense than core, are not something other than the up quarks, and the other small parts are photons and rays.

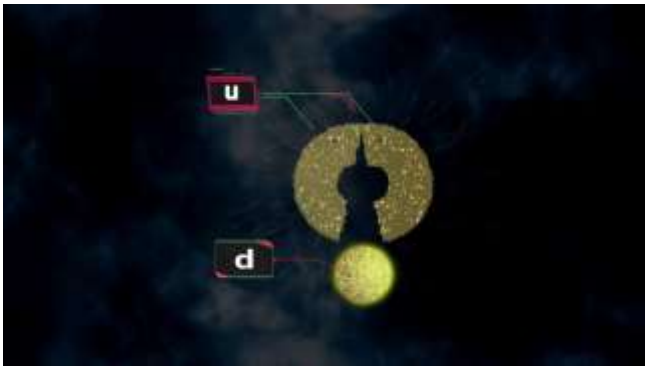


Fig. 2.5

That being said, Saleh theory believes that protons are made of photons and have two layers with different densities: the almost spherical core with a high density (Down quark) and the less dense mantle, which completely encircles the core (Up quarks) [31].

2.5 NEUTRON, SMALL ATOM, SMALL SYSTEM

In our previous sections we described the Electron and the Proton's structure; the Electron as an array of Photons that rotate on the surface of an imaginary sphere without any central nucleus and the Proton as a dense compact globe filled up of Photons with a radius three times smaller than that of an Electron. In this article we are going to explain the structure of the Neutron; this last component of subatomic world which is composed of the Electron with a Proton in the center.

Indeed, the Neutron is only a hollow sphere with the Photons on the surface and the Proton is at its core. Therefore, Neutron is a sphere with the Proton core, Electron shell and an empty space twice as much as Proton's radius. Consequently, a negative-charge Electron neutralizes a positive-charge Proton and form Neutron with no net electric charge.

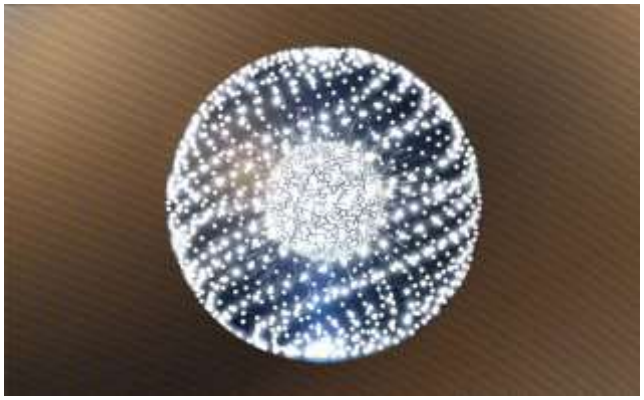


Fig. 2.6

The Neutron has its own figure and characteristics. In fact, it is a minimized Solar System where the Sun is the Proton and planets are the Photons rotating on the surface of electron around this tiny "Sun". The Proton at the center of the Neutron is not immovable and is beating like a heart, thus the distance to the surface of Electron's sphere could change imperceptible. This pulsation is due to the attraction and the repulsion of Proton and Electron; the Proton core

and Electron shell absorb each other due to opposite electric charges, but their integrated structure force them to return to their original states. As the number of Photons present in the Proton is about 1836 times greater than the Electron, the oscillating radius of Proton is bigger. Saleh Theory expresses that the Neutron's system is like the Solar System or an Atom whereby the Sun or its nucleus is the Proton and the planets are the Photons which form the Electron. Just like the Electron and Proton, the Neutron is also formed by Photons.
In conclusion, we describe the different Photon states:
This active and accelerated Photon provides the ray of "Light" and also the "Laser Beam" when it is aligned behind the other Photons in a line. When they are rotating on a surface, they form the "Electron". A group of compressed and compacted Photons in a volume created the "Proton" and finally a combination of these two structures makes the little Solar System which is called the "Neutron".

Saleh Theory believes, consequently, that the primary building block of the Universe is the "Angel Photon" [32]

For better understanding, let's give a clear example. The universe around us consists of a collection of galaxies. Each galaxy is composed of other systems with numerous components. However, all of these galaxies have a common characteristic.
The lighter objects orbit around the heavier ones. The solar system also follows the same rule. But as we get closer to one of the most important celestial objects in the solar system, the Earth, we find out that the Earth consists of different materials and the materials made up of different Molecules too. The Molecule is nothing more than a collection of Atoms. But different atoms are composed of the same Electrons, Protons, and Neutrons, and the difference between atoms is in the number of their Electrons, Protons and Neutrons.
Saleh Theory believes that Electrons, Protons, and Neutrons are composed of the same Photons, and their difference is in the number and positioning of them. The Electron is a hollow sphere with fewer numbers of Photons and bigger than the other ones, Proton is a compacted sphere with more number of Photons and smaller than the Electron, and Neutrons are the result of a Proton placement in the hollow center of the Electron's sphere [33].

2.6 WHY THE ELECTRON IS NEGATIVELY CHARGED AND THE PROTON POSITIVELY?

Like the two poles of a magnet, S and N, the negative or positive charge is just an appellation by convention. But each of them has also its own characteristic, repulsion and attraction. This is also valid for cathode and anode electrodes taking into account their uses.
The lightning, regardless of whether it comes from the cloud down or from the ground up, shows the interactions between them which is more essential than the convention which define the negative or positive charge. Another example; the motions of in the outer core, make of the Earth a huge magnet; once again, we call the two poles N and S just of iron-rich liquid according to convention.

Fig. 2.7

These examples are to say that all the signs and all the appellations are merely intended as a convention and the essential is the interactions between the two elements. What is even more important is the origins of these interactions [34].
We all know that the movement of electrons is what causes electric current. For example, the production of electrical energy in solar cells is due to the movement of electrons and their accumulation, or it is the electrons that are attracted to the anode in the photoelectric effect experiment due to the radiation of photons.

The spiral motions of the constructive photons of electron give it a unique characteristic that cause certain lightness and keep it in a state of emission. But the proton has some attraction that keep absorbing the electrons and which should be explained by the compaction of the photons that form it. In other words, the type of motion and the positioning of photons on the surface of electron make it a transferable particle while the proton could be described as a recipient because of the compaction in the its globe.

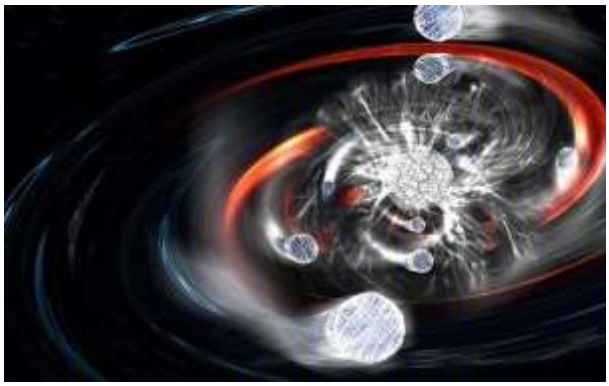


Fig. 2.8

Saleh theory believes that the type of motion and the positioning of constructive photons of electron give it a certain lightness and keep it in a state of emission and the compaction of proton's photons make of it an attractive particle; the discovery that could rewrite the story of electric charges [34].

2.7 A NEW EXPLANATION FOR THE FORMATION AND STRUCTURE OF ORBITALS($1s^2$)

It is commonly understood that electrons revolve around their nucleus at speeds nearing the speed of light. As a result of this movement, an "electron cloud" could be formed around the nuclei. The region where electrons can exist is referred to as the orbital.

One of the simplest models to describe orbitals is the solar system model. It means the electron moves in a simple and closed orbit around its central nucleus. However, it is important to note that the simple orbital motion of electrons around the nucleus cannot generate an "electron cloud" around it.

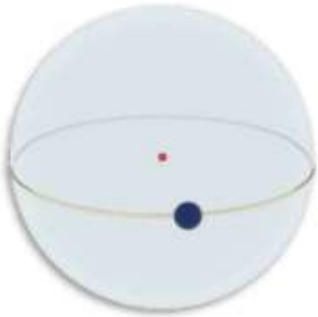


Fig. 2.9

However, in previous chapter, it was mentioned that after emitting from the electron, a photon traverses a helical path. This movement can also be considered for the electron. In such a manner, an electron also possesses a helical motion around the nucleus, the creation of electron clouds results from this type of m5otion. (The lightnings observed in nature vividly indicate the helical motion of electrons).

In other words, considering an atom composed of a central nucleus and electrons orbiting around it at speeds close to the speed of light in a closed rotational motion, we explain the concepts of "Orbitals" and "electron clouds".

However, the electron also revolves around itself at a very high speed. Therefore, the trajectory of its motion becomes a closed simple curve. Which represents the trajectory of a closed curve with wavelike motion [35].

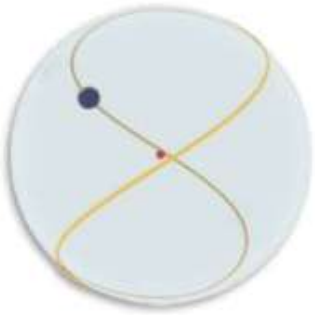


Fig. 2.10

It is quite clear that the Moon orbits around itself and around the Earth, which is itself rotating around its axis and around the Sun. The Sun, in turn, orbits around itself and around the central black hole of the Milky Way galaxy. The black hole is also in a state of rotation. Additionally, electrons orbit around themselves and around the nuclei of atoms. The nuclei, too, rotate around themselves at the speed of light [36].

Although more will be discussed in later chapters about the rotation of the nucleus around itself, but as a result of this rotation, the surrounding electrons also move in closed circular paths. The combination of these three types of motion can consistently indicate the presence of electrons within their orbitals. The outcome of combining their trajectories and high speeds demonstrates a state where the electron appears to be continuously moving in a path on a sphere around its nucleus's surface, exhibiting a constant presence at every point along that sphere.

Fig. 2.11

Notice:

The $1s^2$ orbital contains two electrons, and the two electrons are consistently positioned facing each other. However, in some depictions, the two electrons may be observed positioned alongside, the reality is that at all moments, they are positioned directly facing each other. This is due to the best balance and equilibrium that exist in the resultant forces in this model [35].
So in general we can say the electron's movement around the nucleus is a combination of several types of motions:

2.7.1 Electron's Movement Around the Nucleus (Combination of Several Types of Motions)

I. Planet-Like Motion: The electron orbits around the nucleus like a planet. This is a simple motion, and Newtonian laws govern it.

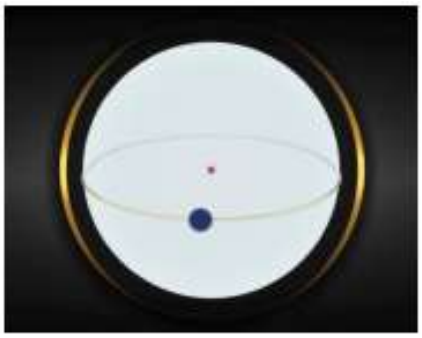


Fig. 2.12

II. Closed Helical Path Motion: As previously stated, "each electron revolves around itself at a speed close to the speed of light." This motion causes curvature in the path of the solar motion of the electron, transforming its path around the nucleus into a closed helix. Note that this motion is a back-and-forth movement.

Fig. 2.13

III. Spherical Motion Around the Nucleus: Atomic nuclei carry a positive charge, while electrons carry a negative charge. It can be said that atomic nuclei affect electrons. On the other hand, atomic nuclei rotate around themselves at a speed close to the speed of light. This rotation causes an additional rotational motion to be added to the helical path of electron motion. Consequently, the electron is rotating around the nucleus and sweeping the entire surface of a sphere with an atomic radius.

2.7.2 Calculating the Frequency of Electron of Hydrogen Atom

Given the helical path of electron motion around the nucleus, the frequency of its motion can be determined using the following equations and a straightforward method:

$$Speed = \frac{Distance}{Time} = Distance \times Frequency$$

So, in general, it can be said:

$$Frequency = \frac{Linear\ Speed}{Linear\ Distance} = \frac{Wave-Like\ Speed}{Wave-Like\ Distance} = \frac{Helical\ Speed}{Helical\ Distance}$$

Therefore, the frequency of a single electron in a hydrogen atom can be calculated as follows:

$$\left.\begin{matrix} f_{e(H)} = \dfrac{C}{\lambda} \\ \lambda = 4r \end{matrix}\right\} \Rightarrow f_{e(H)} = \frac{C}{4r_H} = \frac{3 \times 10^8}{4 \times 1.1 \times 10^{-10}} \Rightarrow f_{e(H)} = 6.8 \times 10^{17}\ \text{Hz}$$

In this context, $\boldsymbol{\lambda}$ represents the wavelength, $\boldsymbol{C}$ is the speed of light, and $\boldsymbol{f_{e(H)}}$ denotes the frequency of the electron in the hydrogen atom. The parameter $\boldsymbol{r_H}$, equivalent to the radius, corresponds to the atomic radius of hydrogen. As another illustrative example, let's calculate the electron frequency for the outermost layer of a Gold atom:

$$f_{e(AU)} = \frac{C}{4r_{AU}} = \frac{3 \times 10^8}{4 \times 1.66 \times 10^{-10}}$$

$$\Rightarrow f_{e(AU)} = 4.52 \times 10^{17}\ Hz$$

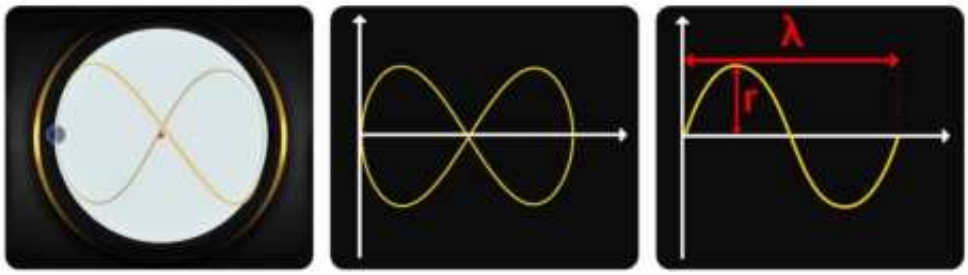


Fig. 2.14

2.7.3 Calculating of the Frequency of Proton of Hydrogen Atom

The nuclei, too, rotate around themselves at the speed of light. Therefore, one can write a repeatable sinusoidal equation for the rotation of a proton around itself:

$$f_{p(H)} = \frac{C}{d} \Rightarrow f_{p(H)} = \frac{C}{2\pi r} = \frac{3 \times 10^8}{2\pi \times 1.20 \times 10^{-15}}$$

$$\Rightarrow f_{p(H)} = 3.98 \times 10^{22}\ \text{Hz}$$

In which r is the radius, and $f_{p(H)}$ is the frequency of proton of the hydrogen atom. Now, let's proceed to calculate the frequency of the atomic nucleus of Gold $(f_{p(AU)})$ [36]:

$$f_{p(AU)} = \frac{C}{d} \Rightarrow f_{p(AU)} = \frac{C}{2\pi r} = \frac{3 \times 10^8}{2\pi \times 6.49 \times 10^{-15}}$$

$$\Rightarrow f_{p(AU)} = 7.36 \times 10^{21}\ \text{Hz}$$

Fig. 2.15

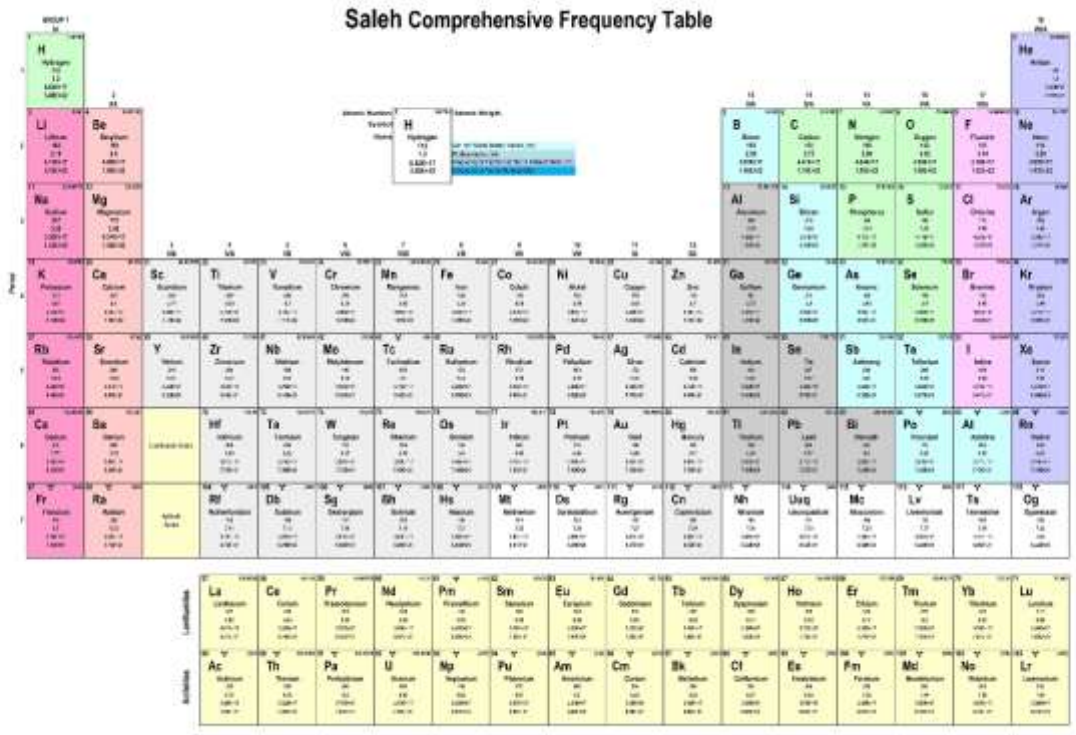


Fig. 2.16

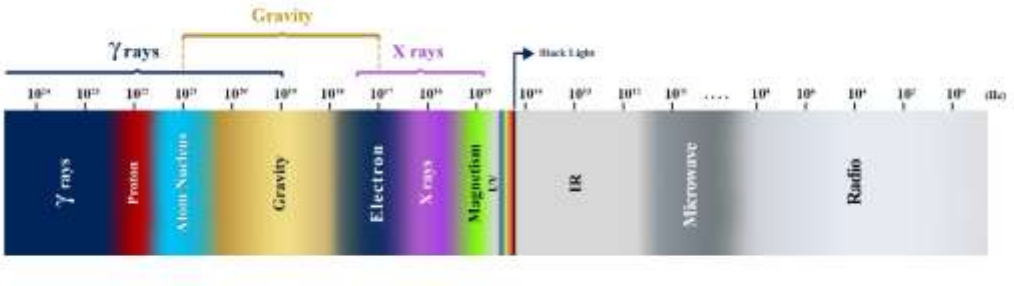


Fig. 2.17

2.8 NEW DISCOVERY ABOUT THE HELICAL MOTION OF ELECTRONS IN THE UNIVERSE

As explained in previous section, an Electron's orbital structure within an atom is a result of the combination of three possible types of motion paths.

I. Planet-Like Motion

II. Closed Helical Path Motion

III. Spherical Motion Around the Nucleus

According to the combination of the first and second paths, it becomes evident that the electron follows a helical path in its orbit. This helical path begins on one side of a spherical orbit with a radius equal to the atomic radius, moves towards the opposite side of the sphere, and then symmetrically continues back to the starting point.
In fact, each electron has a helical returning path in its possible motion paths. However, it can be said that the resultant effect of various forces and movements causes the electrons to have a closed helical motion around the nuclei. However, concerning the emitted electrons from their atoms, it should be noted that they traverse their helical paths with different frequencies [37].

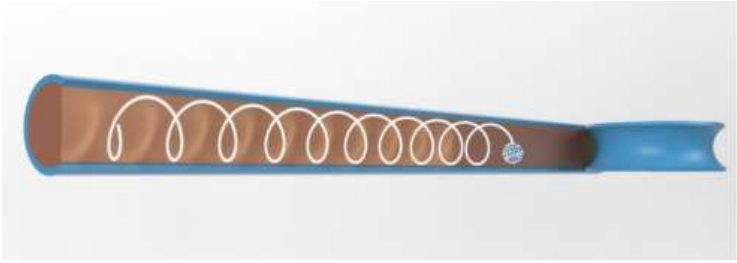


Fig. 2.18

2.9 NEW AND INNOVATIVE EQUATIONS FOR ELECTRON ENERGY IN ATOMS

We present a novel approach to calculating the intrinsic frequency of an electron orbiting the nucleus, grounded in the Saleh Theory framework. Considering the electron's helical

trajectory, we derive its frequency based on the general relationship between speed, distance, and time. The methodology incorporates a wave-like interpretation of the electron's motion, where the effective wavelength is defined as four times the atomic radius:

$$f_{e(atom)} = \frac{C}{4r_{atom}}$$

Where C is the speed of light and r is the radius of atom.

By treating the electron as a rotating helical wave and using the precise frequency from the Saleh Theory, we determined the electron's energy in the atom. This approach provides an alternative, wave-frequency-based interpretation of atomic energy levels, emphasising dynamic geometry and light-speed helical motion :

$$E_{e(atom)} = hf_{e(atom)}$$

2.9.1. Proton Spin Frequency

Rotational motion is a fundamental and pervasive phenomenon. The Moon rotates around itself and orbits the Earth, which in turn rotates around its axis and revolves around the Sun. The Sun orbits both itself and the supermassive black hole at the centre of the Milky Way galaxy, which itself is in rotation. Similarly, electrons rotate around themselves and orbit atomic nuclei, and nuclei themselves rotate around their own axes—at a speed near the speed of light. Based on this analogy, the rotational frequency of a proton in the hydrogen atom can be calculated using a sinusoidal relation. The general expression is:

$$f_p = \frac{C}{2\pi r}$$

Where C is the speed of light and r is the radius of proton.

2.9.2 The Frequency of Rotation of the Atomic Nucleus

Just as electrons rotate around themselves and orbit the nuclei, and protons rotate at the speed of light around their own axes, atomic nuclei also possess intrinsic rotational motion. According to Saleh Theory, this rotation occurs at the speed of light and can be described by a simple sinusoidal relationship. The rotational frequency of an atomic nucleus is given by:

$$f_N = \frac{C}{2\pi R}$$

Here, C is the speed of light in a vacuum, and R is the radius of the atomic nucleus. This approach generalises the concept of rotational frequency beyond sub-nuclear particles to entire nuclei.

2.9.3 Rotational Energy of the Nucleus of Atom

By applying the rotational frequency model of Saleh Theory, the energy of a nucleus is:

$$E_N = hf_N$$

This framework suggests that nuclear energy arises from fundamental wave dynamics at the speed of light, providing a unified interpretation of mass–energy from a frequency-based origin [38].

2.10 NEW APPLICATIONS OF FUNDAMENTAL PARTICLE FREQUENCIES(PROTONS, ELECTRONS, ETC.)

According to what has been said, all fundamental particles possess frequency, and these frequencies can be utilized in various applications.

2.10.1 Design and Manufacture of Gravitational and Electron Lasers to Bombard Atoms

Consider the frequency of a specific electron or nucleus of a specific atom to be F_1, if we design a laser with the same frequency F_1 and emit to that atom, the resonance phenomenon will occur, resulting in fission. According to equations ($C = \lambda F$ or $C = \lambda/T$) the same frequencies mean having the same wavelength and equality of the rotational radius of the photons of the laser and the electron or nucleus of the atom.
If the laser has the same frequency as a specific electron in an atom (meaning it has the same wavelength or rotational radius R_{mom}), they could collide at a specific point. If the frequencies differ, the probability of collision decreases, and it may not occur at all. This is because a photon traverses in a helical path similar to a spring. When these photons are shaped into a laser, it is like an array of photons with a specific and defined radius traversing along a helical path, essentially creating a cylindrical shell.
If the radius of the inner cavity of this cylindrical shell does not match the rotational radius of the electron or nucleus of the atom, either no collision will occur or the probability of collision will be extremely low. The bombarded particles will pass through the central empty space or tunnel without collision. In reality, the optimal laser effect is achieved when the particular laser particles and the electron or nuclear particles have the same rotational radius (same frequency). Given these explanations and the frequency values of electrons and nuclei, we must manufacture a specific laser to achieve the desired fission from the collision of the laser and the atom.

Note:

Given the extremely high difference between the rotational radius of electrons (and nuclei) of atoms and the rotational radius of visible lasers, these types of lasers are not suitable for the fission of an atom. We need to develop a laser with a frequency of at least 10^{18} Hz, as common lasers are not applicable. For the fission of a nucleus using this method, we propose using gravitational lasers or electron lasers [39].

2.11 NEW DISCOVERIES FOR THE BIG MOVEMENTS OF THE NEXT GENERATION (NEW AGE OR SPACE AGE)

The moving electron has a high ability to do work. The speed of electron in wires is close to the speed of light, but another effective parameter that makes electron have a very high ability to perform various tasks is its density. Considering the magnitude of its density, it can be said that the ability of an electron to do work is due to its very high density.
In this paper, we calculated the energy for 1 kg of electrons and according to the results for every kilogram of electrons, a lot of energy can be obtained, which is efficient and replaceable in all cases where electricity is used. So, by this energy which we can store it in electron tank

and the vehicles and everything that works with this power can be charged for months and years. On the other hand, by using this power supply we will explain its applications.
Calculating the ability of electrons to do work in consumer sources (trains, cars, planes, etc.)
To calculate the density of an electron, we can write:

$$\boldsymbol{\rho = \frac{m_e}{V_e} \rightarrow \rho = \frac{9 \times 10^{-31}}{2.19 \times 10^{-44}} = 4.1 \times 10^{13} \quad (^{kg}/_{m^3})}$$

Considering the magnitude of its density, it can be said that the ability of an electron to do work is due to its very high density. It can be said that the product of velocity (***S***) in density (***ρ***) is an effective parameter in the high ability of electron to do work.

$$\boldsymbol{E_{ff} = \rho s}$$

Now we calculate the energy of ***n*** electrons to do the work:

$$\boldsymbol{E_n = n\left(\frac{1}{2}ms^2\right)}$$

If we multiply and divide the above equation by the volume of an electron, we have:

$$\boldsymbol{\overset{\times \frac{V}{V}}{\rightarrow} E_n = n\left[\frac{1}{2}\rho s(sV)\right]}$$

To calculate the number of displaced electrons, we use the following formula:

$$\mathbf{n = \frac{\Delta m}{m_e}}$$

Where ***Δm*** is the mass changes of the source before and after doing the work and m_e is the mass of one electron and equal to $m_e = 9.10938356 \times 10^{-31}$ kg. By placing the values in the equation of E_n we have:

$$\boldsymbol{E_n = \frac{\Delta m}{m_e}\left[\frac{1}{2}E_{ff}\, sV_e\right]}$$

Given that the speed of electrons in wires is close to the speed of light,

$$\boldsymbol{s \cong 3 \times 10^8\, {}^{m}/_{s}}$$

And inserting the classic amount of electron volume,

$$\boldsymbol{V_e = 2.19 \times 10^{-44}\, m^3}$$

We have:

$$\boldsymbol{E_n = \frac{3 \times 10^8 \times 2.19 \times 10^{-44}}{2 \times 9.1 \times 10^{-31}} \Delta m \times E_{ff} \quad (joule)}$$

$$\boldsymbol{E_n \cong \Delta m E_{ff} = \Delta m \rho s \ (micro\ joule)}$$

$$\boldsymbol{\overset{\Delta m = 1gr}{\longrightarrow} E_n = \rho s \ (nano\ joule)}$$

Now by placing the density and speed of electron to calculate the energy of 1 gram of electrons:

$$\boldsymbol{E_n = 1.23 \times 10^{22}\ (nano\ joule) \cong 10^{13}\ (j)}$$

If we want to calculate this energy for 1 kg of electrons, we have:

$$E_{ff} \approx 10^{16} \ (\mathrm{j})$$

According to the above relations, it can be concluded that for every kilogram of electrons, a lot of energy can be obtained, which is efficient and replaceable in all cases where electricity is used. For example, consider a 2-ton car. This vehicle requires energy of about 10^9 j to travel 100 km. Therefore, one kilogram of electrons can easily provide the energy needed to travel a distance more than 500,000 kilometers, or in fact, can move this car for more than three years [40].

2.12 NEW EXPLANATION FOR COLOR VARIETY OF ELECTRONS IN VARIOUS TRAJECTORIES

Sometimes, electrons can be observed freely in nature; such as a spark generated from a wire, a lightning strike in nature, etc. However, upon closer inspection, they appear in various colors like yellow, blue, white, and so on. The reason for this color variety lies in the different frequencies of electrons in their various states. For instance, the frequency of lightning which produces colors like white, whereas the frequency of electrons emitted from a wire, typically displaying hues such as red and blue, is different. Essentially, different electron frequencies generate different colors.

Fig. 2.19

2.12.1 The Destructive Impact of Electrons in Various Trajectories

Given that the mass and speed of electron, among other factors, remain constant, its manifestation as lightning leads to severe destruction. In household electrical currents, this destruction is moderate, and in photoelectric currents, it is weak. The various effects of these types of currents can be attributed to the number of electrons present as well as their different frequencies. For instance, the approximate range of frequencies of electrons in photoelectric currents is around 10^{15} Hz, in household electrical currents is about 10^{16} Hz, for free electrons, it is 10^{17} Hz, in lightning is 10^{18} Hz, and for magnetars is about 10^{19} Hz [36].

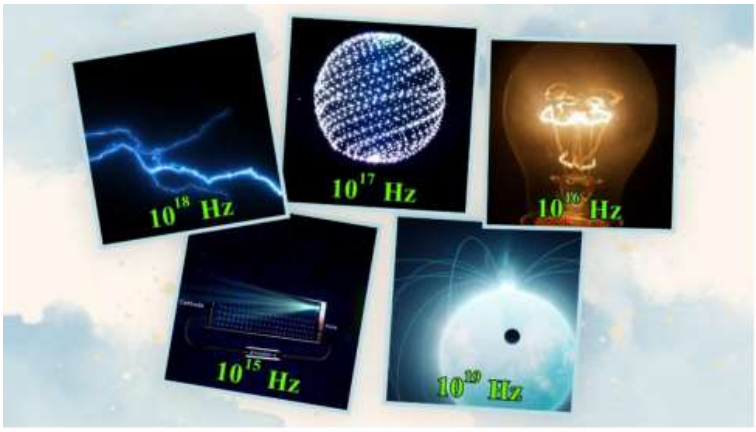


Fig. 2.20

2.13 CONCLUSION

In this chapter, fundamental concepts, including the actual structure of elementary particles, have been elucidated. It provides a clear explanation as to why electrons possess a negative charge while protons carry a positive charge. Furthermore, the configuration of the $1s^2$ orbital is detailed, alongside the frequencies of the electron and proton within the hydrogen atom. This chapter also derives the energy equations and the helical motion of electrons within the atom, exploring the novel applications of fundamental particle frequencies. Additionally, the underlying causes for the varying colours of electrons across different trajectories, among other topics, are thoroughly discussed and analysed.

CHAPTER 3

Sub-Photon Particles (Cidtonium, Irenium, Ilitonium)

3.1 INTRODUCTION

Following the exploration of the photon's structure as one of the universe's most fundamental components in previous chapters, this chapter takes a deeper step into the structure of matter. The main question is: does the photon itself possess an internal structure? And if so, what characteristics might this structure entail?

An examination of the density of highly compact celestial objects—ranging from white dwarfs to black holes and the initial conditions of the Big Bang—suggests that to account for such extreme densities, one cannot rely solely on photonic structures. This leads us to define a more fundamental level, where the structure of the photon is broken down and divided into smaller particles.

In this chapter, a more fundamental particle named ***"Cidtonium"*** is introduced, considered to be the building block of the photon. The geometric properties, mass, and density of this particle, as well as its deeper infrastructures (such as Ilitonium and Irenium), are examined. Subsequently, using density analysis and calculations related to the Big Bang, it is demonstrated that this framework can provide a more consistent explanation for the ultra-dense initial conditions of the universe.

This chapter represents an entry into the realm of ***"Sub-Photonic Physics"***, a place where new foundations for understanding the structure of matter and energy are proposed.

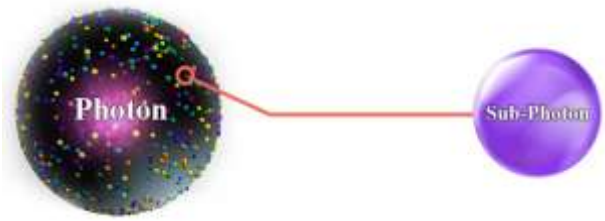


Fig. 3.1

3.2 PHOTON AS A NEW ATOM, CIDTONIUM AS AN ATOM OF PHOTON

The ancients believed that the materials are made up of four elements: fire, air, water and earth. Over time, with the progress of science, materials were classified based on the constituent molecules, and then they were classified based on the constituent atoms of the molecules, which are the same elements.

If you consider the periodic table of elements, the mother of all elements is hydrogen, which, by adding electrons, neutrons, and protons in atoms, we reach newer elements. The interesting point is that the elements with their structures are changed physically and chemically.

The next step is the structure of Electron, Proton and Neutron. We have found that all of them must be made of photon and their structure are as follows:

1. The Electron is an array of photons rotating on the surface of an imaginary sphere without any central core.
2. The Proton is a dense, compact globe filled with photons getting together and,
3. The Neutron is a sphere with the Proton core and the Electron shell.

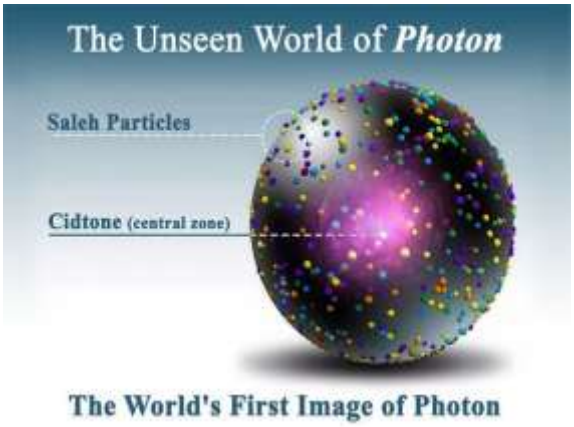


Fig. 3.2

So, the ***"photon"***, in the true sense of the word, could be called the new atom, which is the building block of all material in the universe.
On the other hand, for the next step, we will introduce Cidtonium. That is a particle and also the basis of the structure of the photon, and therefore all particles in the universe, like hydrogen, which is the basis of the elements of the periodic table.

3.3 A NEW, SIMPLE, AND CLEAR EXPLANATION FOR THE EXISTENCE OF THE NEW PARTICLE "CIDTONIUM" BASED ON THE DENSITY OF BLACK HOLES AND THE BIG BANG IN THE UNIVERSE

To understand the nature of celestial objects, we can refer to objects like natural satellites, planets, stars, black holes, and galaxies. As we know, each of these objects has a specific density. The simple equation for calculating this is:

$$\rho = {}^{m}/_{V}$$

Using this equation, you can find the density of any celestial object. For example:

$$\rho_{Earth} = 5500 \ {}^{\mathrm{Kg}}/_{\mathrm{m}^3}$$

$$\rho_{Sun} = 1400 \ {}^{\mathrm{Kg}}/_{\mathrm{m}^3}$$

$$\rho_{\text{white dwarf}} = 10^{9}\ to\ 10^{10}\ {}^{\text{Kg}}/_{\text{m}^3}$$

$$\rho_{magnetar} = 10^{17}\ to\ 10^{18}\ {}^{Kg}/_{m^3}$$

$$\rho_{black\ hole} = 10^{20}\ to\ 10^{32}\ {}^{\text{Kg}}/_{\text{m}^3}$$

$$\rho_{big\ bang} = 10^{39}\ {}^{\text{Kg}}/_{\text{m}^3}$$

The largest proportion of a star's volume is made up of hydrogen, which is being converted into helium and other heavier elements. A white dwarf is said to have a density of 10^9 to $10^{10}\ Kg/m^3$. In this view, a white dwarf is a small sphere whose constituent matter is just protons.
If we consider the density of a black hole, we can no longer clearly say that its constituent matter is like a single element, even protons or neutrons cannot be the building blocks of a black hole. This is because a black hole's density is a number far greater than that of a proton.

This suggests that to achieve the density of a white dwarf, the atomic structure must be broken down, and the entire sphere must be made up of protons. The atomic structure has been broken, and the protons have come together to create this high density. But if we want to define a material or substance for densities higher than this, for example above $10^{20}\ Kg/m^3$, like material near the big bang moment, a ***"Sub-Atom"*** or ***"Sub-Photon"*** would need to be defined. In such a state, the proton and "photon" structure would have to be broken down, with the particles dividing into smaller ones to achieve a greater density.
In other words, to achieve an object with a high density, as we had near the big bang moment, you can no longer consider an atomic structure to be the basis for it, as seen in white dwarfs and magnetars. If we want to have a density above $10^{20}\ Kg/m^3$, the particles that make up a proton, photons, would have to be broken down into even finer particles. Actually, the photon's structure would have to break down into even smaller particles that are packed together to achieve this incredibly high density [41].

3.4 NEW EXPLANATION FOR CIDTONIUM, BASIC OF PHOTON AND EQUATIONS BETWEEN CIDTONIUM AND PHOTON

For the ancients, the world around them was the Earth on which they walked and the sky in which the Sun was believed to revolve around the Earth. Gradually, as human science advanced, they realised that the Sun was at the centre and the Earth revolved around it.
But after the discovery of telescopes, they realised that the world around them consisted of solar systems, galaxies, and more.
They also realised that water, wind, earth, and fire—the four main elements—could be divided into smaller components called molecules and atoms. This process of scientific growth did not stop. Scientists, through research, experiments, and the collection of evidence, discovered that atoms are composed of electrons, protons, and neutrons. Although mistakes were often made in the process of scientific growth, the correct path and correct conclusions were always found through trial and error, and the errors were corrected over time.

In the previous sections, it was stated that these three subatomic particles themselves are composed of photons. The photon is described as having a constant rest mass. But this process continues. A photon, like a galaxy that looks like a luminous point from afar but has a world hidden within it, has an unseen world inside.
Despite its small size, the photon, which has a radius of about $\mathbf{10^{-17}}$ meters, is itself composed of smaller particles called Cidtonium. The Cidtonium particles that together form a photon, despite having a smaller mass and radius than a photon, have a larger density than that of a photon.
The radius of Cidtonium is about one thousandth of the radius of a photon, its mass is about one tenth of the mass of a photon, and its density is about one billion times that of a photon.

Particle	Mass (kg)	Radius (m)	Density (kg/m^3)
Photon	$\mathbf{1.64 \times 10^{-36}}$	$\mathbf{1.2 \times 10^{-17}}$	$\mathbf{2.2 \times 10^{14}}$
Cidtonium	$\mathbf{\sim 10^{-37}}$	$\mathbf{\sim 10^{-20}}$	$\mathbf{\sim 10^{22}}$

Table 3.1

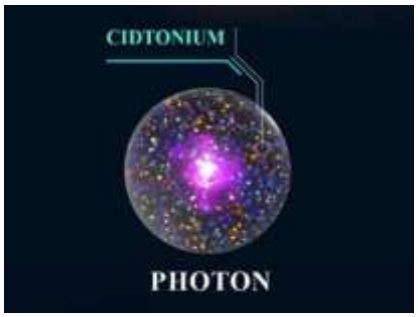


Fig. 3.3

Furthermore, other sub-photons can be defined for the photon such that, in terms of radius, they are one-thousandth, one-millionth, or one-billionth of a photon [42].

$(r_{p_1} = r_p \times 10^{-3} = 1.2 \times 10^{-20}$ m), **one-thousandth**
$(r_{p_2} = r_p \times 10^{-6} = 1.2 \times 10^{-23}$ m), **one-millionth**
$(r_{p_3} = r_p \times 10^{-9} = 1.2 \times 10^{-26}$ m), **one-billionth**

3.5 DISCOVERY OF THE SMALLEST PARTICLE IN THE UNIVERSE WITH A DENSITY OF 10^{39} KG/M^3 USING THE DENSITY OF WHITE DWARFS, BLACK HOLES, BIG BANG?!

If we pay attention to the elements in Mendeleev's table, the density range starts from Hydrogen (about 0.09 kg/m^3) and continues to Osmium (22590 kg/m^3).

After the elements of Mendeleev's table, in which some of them have partly high density, we reach objects in the universe such as white dwarfs, magnetars, black holes, etc., if it looks carefully, the density range of these objects is $\mathbf{10^{14}}$ to $\mathbf{10^{20}}$ kg/m^3.
If we look carefully, the nature of these objects is no longer atomic, but their structure has been broken and they do not have the previous atomic structure, in fact, these are atomic nuclei (nucleons) that are placed together and create high density.
If we examine elements such as iron, lead, and mercury, we observe that the density of mercury is higher than the others, yet its hardness is significantly lower. In fact, it can be argued that an element may sometimes possess a higher density but much lower hardness and solidity. Conversely, materials like compressed wood exhibit high hardness but lower ensity. Essentially, density may be high while hardness and compactness are low, and at times, the reverse is true.
In other words, every object in the universe possesses a specific density, a specific hardness, and a specific compactness, and these three attributes are not necessarily equivalent; indeed, they are sometimes inversely related. Take water, for example: when it transitions from a liquid to a solid state, it becomes a hard object, yet its mass density decreases.

Note:

Whenever ***"Compactness"*** is discussed in physics, it is expected that the radius of an object is reduced by a fraction or a decimal. Consequently, the volume decreases by a factor of the power of 3. However, in the case of a sub-photon—where, for instance, the photon's radius is $\mathbf{10^{-6}}$ times smaller, and its volume is $\mathbf{10^{-18}}$ times smaller—the term "compactness" is not strictly applicable. Rather, the structure of the photon has been divided into a smaller structure, much like an atomic nucleus being divided into its constituent parts, such as electrons, protons, and neutrons.
If we want to find the constituent matter of the Big Bang, we can suggest the photon as the chosen option, as it is the smallest, lightest, and fastest particle in the universe. Considering this particle, the volume and density of the Big Bang are as follows:

$$\boldsymbol{m_T = 10^{53}\ kg}$$
$$\boldsymbol{m_p = 1.64 \times 10^{-36}\ kg}$$
$$\boldsymbol{r_p = 1.2 \times 10^{-17}\ m}$$
$$\boldsymbol{n = \frac{m_T}{m_p} = \frac{10^{53}}{1.64 \times 10^{-36}} \Rightarrow n = 6 \times 10^{88}}$$

$$\boldsymbol{V_p = \frac{4}{3}\pi {r_p}^3 = \frac{4}{3}\pi(1.2 \times 10^{-17})^3 \Rightarrow V_p = 7.23 \times 10^{-51}\ m^3}$$
$$\boldsymbol{\rho_p = \frac{m_p}{V_p} = \frac{1.64 \times 10^{-36}}{7.23 \times 10^{-51}} \Rightarrow \rho_p \approx 2.27 \times 10^{14}\ {kg}/{m^3}}$$
$$\boldsymbol{V_{BB} = nV_p = 6 \times 10^{88} \times 7.23 \times 10^{-51} \Rightarrow V_{BB} \approx 4.33 \times 10^{38}\ m^3}$$
$$\boldsymbol{V_{BB} = \frac{4}{3}\pi {r_{BB}}^3 \Rightarrow {r_{BB}}^3 = \frac{4.33 \times 10^{38}}{\frac{4}{3}\pi} \Rightarrow r_{BB} \approx 4.7 \times 10^{12}\ m}$$
$$\boldsymbol{\rho_{BB} = \frac{m_T}{V_{BB}} = \frac{10^{53}}{4.33 \times 10^{38}} \Rightarrow \rho_{BB} \approx 2.31 \times 10^{14}\ {kg}/{m^3}}$$

Where m_T is the total mass of the universe, n is the number of photons, $m_p, r_p, V_p \; and \; \rho_p$ are the mass, radius, volume and density of the photon and $r_{BB}, V_{BB} \; and \; \rho_{BB}$ are the radius, volume and density of the Big Bang sphere.

Given that the density of the Big Bang obtained using photons is not more than 10^{14}, and the volume of the Big Bang is equal to the volume of the distance from Earth to Jupiter, therefore, the photon will not be a suitable option for the Big Bang. Because it does not fulfill the definition we expect from the Big Bang. In order to achieve our desired goal, we define a particle in the photon whose radius is one billionth of a photon, ***"Sub-Photon"***. According to this definition, the data will be as follows:

It should be noted that for sub-photons with the given specifications, we consider the following three names:

Cidtonium with a density of 10^{24} to 10^{28} kg/m^3

Irenium with a density of 10^{31} to 10^{36} kg/m^3

Ilitonium with a density of 10^{37} to 10^{42} kg/m^3

$$r_{sp} = 10^{-9}\, r_p \Rightarrow r_{sp} = 10^{-9} \times 1.2 \times 10^{-17} \Rightarrow r_{sp} \approx 1.2 \times 10^{-26}\ \mathbf{m}$$
$$V_{sp} = \frac{4}{3}\pi {r_{sp}}^3 = \frac{4}{3}\pi(1.2 \times 10^{-26})^3 \Rightarrow V_{sp} \approx 7.23 \times 10^{-78}\ \mathbf{m^3}$$

Studies have shown that the mass of Ilitonium is approximately 5×10^{-3} times the mass of a photon.

$$m_p = 1.64 \times 10^{-36}\ \mathbf{kg}$$
$$m_{sp} \approx 5 \times 10^{-3} m_p \approx 8.2 \times 10^{-39}\ \mathbf{kg}$$

To obtain the number of sub-photons that make up the mass of the Big Bang, it is enough to divide the mass of the entire universe by the mass of one sub-photon, that is:

$$n = \frac{m_T}{m_{sp}} = \frac{10^{53}}{8.2 \times 10^{-39}} \Rightarrow n \approx 1.22 \times 10^{91}$$
$$\rho_{sp} = \frac{m_{sp}}{V_{sp}} = \frac{8.2 \times 10^{-39}}{7.23 \times 10^{-78}} \Rightarrow \rho_{sp} \approx 1.13 \times 10^{39}$$
$$V_{BB} = nV_{sp} = 1.22 \times 10^{91} \times 7.23 \times 10^{-78} \Rightarrow V_{BB} \approx 8.82 \times 10^{13}\ \mathbf{m^3}$$
$$V_{BB} = \frac{4}{3}\pi {r_{BB}}^3 \Rightarrow 8.82 \times 10^{13} = \frac{4}{3}\pi {r_{BB}}^3 \Rightarrow r_{BB} \approx 2.7 \times 10^{4}\ \mathbf{m}$$
$$\rho_{BB} = \frac{m_T}{V_{BB}} = \frac{10^{53}}{8.82 \times 10^{13}} \Rightarrow \rho_{BB} \approx 1.13 \times 10^{39}\ {}^{\mathbf{kg}}/_{\mathbf{m^3}}$$

Where m_T is the total mass of the universe, n is the number of Cidtonium, $r_{sp}, V_{sp}, \rho_{sp}$ are the radius, volume, and density of the sub-photon (Ilitonium), and $r_{BB}, V_{BB}, \rho_{BB}$ are the radius, volume, and density of the Big Bang sphere based on the sub-photon (Ilitonium).

The density of the Big Bang is about $\mathbf{10^{39}}$, so this particle is a good candidate for the nature of the Big Bang. As a result, the introduced particle is the same as Ilitonium, whose radius is $\mathbf{10^{-9}}$ times the radius of a photon or whose volume is $\mathbf{10^{-27}}$ times the volume of a photon [43].

3.6 AFFORDABLE, ABUNDANT, CLEAN, ETC. ENERGY GENERATION UTILISING CIDTONIUM FUELLED POWER PLANTS

Energy and especially clean ones is most important in our life. There are different types of energy in our world but a few ones are clean, abundant and affordable. One of them is using energy from Cidtonium.

As mentioned in previous articles, Cidtonium is the smallest block that made photons. We have proved that this particle, Cidtonium is need to explain the big bang density and also massive black holes. We have also explained that these particles have a speed about 5 times of ***C***. In this article we are going to explain how could we use such a huge energy.

We know that an atom is made of electrons, protons and neutrons and to use the hidden structural energy of atoms, it is enough to destroy the structure and separate these particles.

We have proved that photon is made of Cidtonium and move in helical motion and have different types of speed. So, if we bombard a photon and destroy its structure it could be a good source for energy, because the Cidtonium particles have the speed of their source, photon.

Cidtonium have a speed about 5 times of ***C***. So, it could create an affordable, abundant, clean energy if we destroy the structure of photons. We could use laser beams with special frequency in fixed and special environment to do that. In the other words, we use special laser to destroy the photon structure and have the huge energy. Therefore, if we design a special place for this purpose we have Cidtonium fuelled power plants.

Conclusion of Chapter Three

In this chapter, the internal structure of the photon was re-evaluated, and the hypothesis of particles more fundamental than the photon was proposed and elucidated. The analysis of the density of highly concentrated celestial objects demonstrated that to achieve densities of such extreme orders of magnitude, a structure smaller and more condensed than the photon is required. On this basis, ***"Cidtonium"*** was introduced as the constituent unit of the photon, a particle with a smaller radius and less mass, yet a significantly higher mass density than the photon. Subsequently, deeper sub-photonic levels, such as Ilitonium, were defined to allow for the consistent modelling of Big Bang density conditions.

The results presented indicate that if we view the structure of matter hierarchically, the photon is not the end of the road, but rather a bridge to a more fundamental level. This perspective, in addition to providing a theoretical framework for explaining ultra-high densities, opens new horizons for understanding the origin of energy and the primary structure of the universe.

In this way, Chapter 3 provides a theoretical foundation for the transition from photonic to sub-photonic physics and paves the way for the development of a more comprehensive model of the structure of the universe.

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