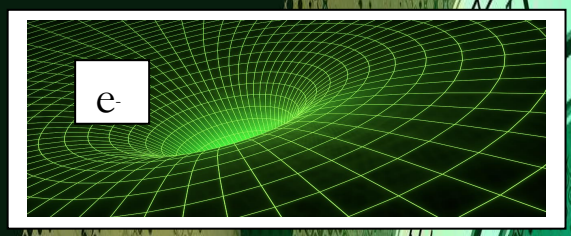
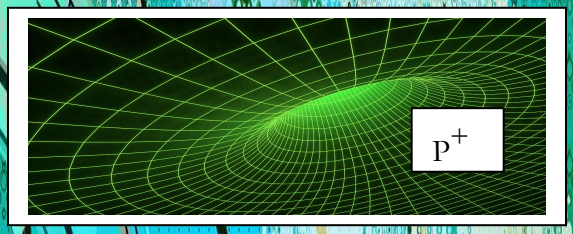
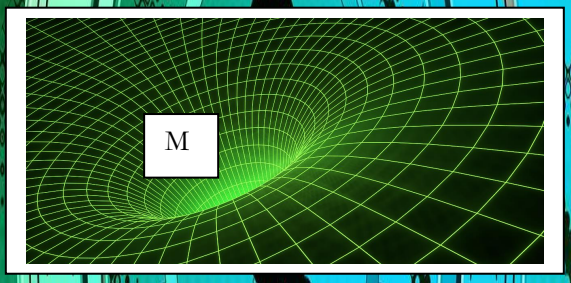
What Humans Perceive as Time and Space are just Facets of Energy

Moshe Segal

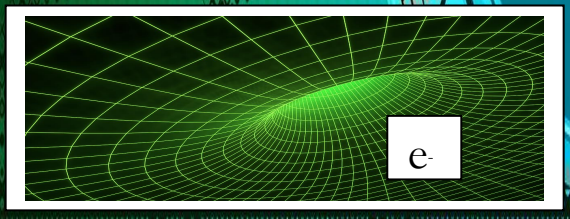


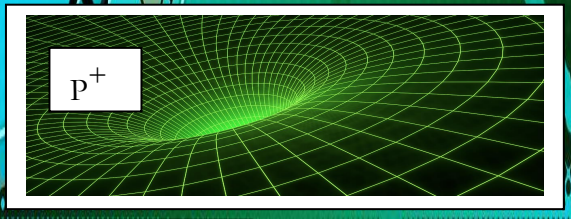


Positive Charge Interwoven Space/Time



Einstein's Interwoven Space/Time





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Preface

This book is about Physics.

The subject of Physics might sound unappealing, dull, and even frightening.

Physics might bring recollections of boring and frustrating physics classes at high school, and complicated, long, cumbersome equations based on frightening Mathematics.

This is not Physics.

Science in general, and the science of Physics in particular, are about human endeavors to understand Nature, the Universe, and the Existence in general.

Indeed, Physicists rightfully insist on presenting Physics theories using Mathematics, because Mathematics is the language that Science and Physics utilize, because it is based on unambiguous and precise statements.

But if the layer of Mathematics from fascinating Physics theories is peeled off, what is revealed is a layer of fascinating ideas, based on human ingenuity.

As stated already above, Mathematics provides validity to Science and Physics theories, because it provides unambiguousness and precision to the elements presented in these theories.

But the basics ideas, from which the elements of this layer, of human ingenuity emerged, can be usually presented also by using just common language, because Physics ideas can be also presented, with a limited use of Mathematics.

This is what this book tries to do.

As already stated above, Science in general, and the science of Physics in particular, are about human endeavors to understand Nature, the Universe, and the Existence in general.

As such, in the last few centuries, Science and Physics made significant progress in unveiling many mysteries about Nature and the Universe.

Although Mathematics provides unambiguousness and precision to the elements presented in Science and Physics theories, no Science and Physics theory is assumed to be the ultimate truth and embed complete validity, because, after all, all these theories are based on humans' ideas, and limited humans' ability to understand Nature.

An acceptable measure of validity of a Science and Physics theory is its compliance with physical experiments, which test the validity of its results.

Nevertheless, also these experiments are based on limited humans' ability to devise complete full proof experiments, which might result in observations, which cause the necessity to correct a Science or a Physical theory, or even replace it, with a totally new theory, which better complies, with the most recent observations.

And, although Science and Physics theories utilize Mathematics to present their statements, still Physics embeds many unresolved questions regarding Nature and the Universe, and it also embeds quite a few peculiarities and paradoxes.

Some of these unresolved questions, peculiarities, and paradoxes, that still exist in the Science of Physics today, are the subject of this book.

The author of this book is not a physicist by profession and education.

The author of this book is a retired Electronics Engineer.

However, many years ago, when the author of this book was a young student at high school, the author of this book found the drive to understand appealing.

For example, when the author of this book understood that Einstein's General Relativity Theory concluded, that Mass is just a form of Energy, the author of this book tried to understand why the Electric Charge is not also recognized as a form of Energy, based on many similarities between the Mass and the Electric Charge entities.

Recently, when the author of this book retired, he could concentrate on delving into such issues and finalizing the ideas that resulted in several published papers, and this book.

However, because as stated above, the author of this book is not a physicist by profession and education, the attempts to finalize these ideas encountered difficulties, which resulted in intermediate conclusions which were not correct, which were eventually replaced, by the ideas presented in the papers and this book.

And, as stated above, an acceptable validity test to new ideas might be proposals of physical experiments, which might be able to test the elements presented.

Thus, this book contains such proposals of experiments which might provide validity (or disprove) what is presented in this book.

As already stated above, this book is about attempts to explain some Physics unanswered questions, peculiarities, and paradoxes, which resulted in a revolutionary conclusion:

Time, Space, and the Electric Charge are just forms (or facets) of Energy,

like Mass is already recognized and accepted by the science of Physics as a form of Energy, following the introduction of Einstein's Special Relativity Theory.

This also boils down into another revolutionary conclusion:

Nature is composed of only one entity: Energy!!!

From the dawn of civilization humans are struggling to understand Nature. Many ideas, tools and theories were developed during this quest, in attempts to narrow down the elements that are important in understanding Nature.

Ideas that Nature contains only a limited number of independent elements start early. Examples are Aristo's Four Elements Theory [1], [2], and the ancient Greeks idea that matter is composed of Atoms [3], [4].

However, the science of Physics today still uses many elements to explain Nature, such as Energy, Mass, Electric Charge, Forces, Fields, Space, Time, etc.

This book concludes that all the elements, or entities, used by the science of Physics to explain Nature are just facets of one entity: Energy.

As already stated above, the conclusion that Nature is composed of only one entity, Energy, is the result of attempts to explain some unanswered questions, peculiarities, and paradoxes, that still exist in the science of Physics today.

These attempts use analysis, which is based only on nowadays acceptable Physics theories, and uses only thinking experiments, logic, and reason, as the tools to carry over this analysis.

Although the thinking experiments, login, and reason, used in the above-described analysis, seem as very sound and very difficult to contradict, these cannot be sufficient, to provide complete validity, to what is presented in this book.

Thus, in addition to the above, this book also proposes several experiments.

If these experiments will be executed, and their results will be successful, as this book predicts, this might provide validity, to what is presented in this book.

These experiments require means and funds which are beyond the reach of the author of this book.

But if these experiments will be executed, and their results will be successful, this might bring about important new insights regarding Nature and human understanding of the existence in general.

Also, if these experiments will be executed, and their results will be successful, important technological breakthroughs might be also achieved.

Some of these technological breakthroughs, which might be achieved, are also described, briefly, in this book.

The endeavors, presented in this book, to explain unanswered questions, peculiarities, and paradoxes, in the Science of Physics today, result in the following tentative explanations:

1. This book provides a tentative explanation to the question:

   why the Science of Physics today states, that Electromagnetic Waves, from separate sources, cannot consolidate, contrary to many sound argumentations, presented in this book, that Electromagnetic Waves, from separate sources, can and do consolidate?
2. This book provides a tentative explanation to the paradoxes embedded in consolidations of Electromagnetic Waves from separate sources.
3. This book provides a tentative explanation to a possible origin of the mysterious Dark Energy.
4. This book provides a tentative explanation to the question:

   Why Electric Charges attract or repel each other?
5. This book provides a tentative explanation to the question:

   Why Mass is recognized as a form of Energy, while the Electric Charge is not recognized yet as a form of Energy?
6. This book provides a tentative explanation to the question:

   Why Light and Electromagnetic Waves embed two different Facets?
7. This book provides a tentative explanation to the question:

   Why the velocity of Light is the maximum velocity attainable by any substance in the Universe?

All the above also concludes, as already presented above, in the following surprising statements:

1. *Time, Space, and the Electric Charge are just forms (or facets) of Energy.*

2. *Nature is composed of only one entity: Energy!!!*

The underlined ideas behind Physics theories, can be also presented with plain language, which embed only limited Mathematics.

Thus, this book tries ***not*** to delve into mathematics and equations to keep the presented explanations simple.

However, it refers to several articles published by the author of this book, and other articles and web sites, which might fill the necessary gap, providing some of the mathematics and equations necessary to support what is described in this book.

These references are referred to, in the bodies of the text, by the following notation: [x], where x is a number that identifies the specific reference, in the references section, in this book.

For example, the notation [1] , appended to a text, in this book, refers to the first reference, in the references section, in this book. Such notations are also links to the proper reference, which means that clicking on such a notation will result in a jump to that reference.

Each reference contains a proper web link to the required site or paper.

Unresolved questions related to the Light phenomenon

The section of science relating to how the science of Physics today understands and explains Light, and Electromagnetic Waves in general, is one section of science which still embeds quite a few unresolved questions, peculiarities, and paradoxes.

On one hand, Light, and Electromagnetic Waves in general, are clearly Wave phenomena.

Wave phenomena exhibit Interference patterns, and Light, and Electromagnetic Waves in general, do exhibit Interference patterns, as manifested, for example, via Double-slit.

Experiments [5]

The image below shows an example of Interference patterns.

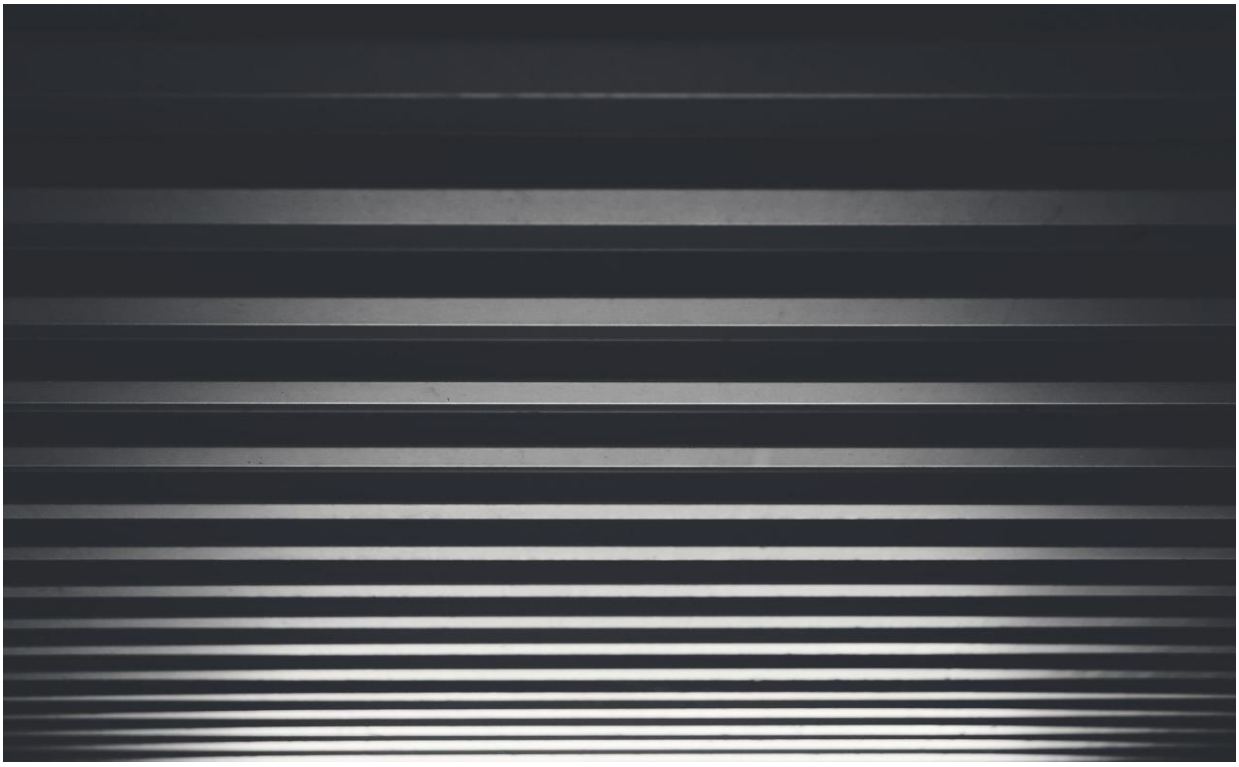

Image source: pixabay.com.

And the image below presents an example of a double slit experiment.

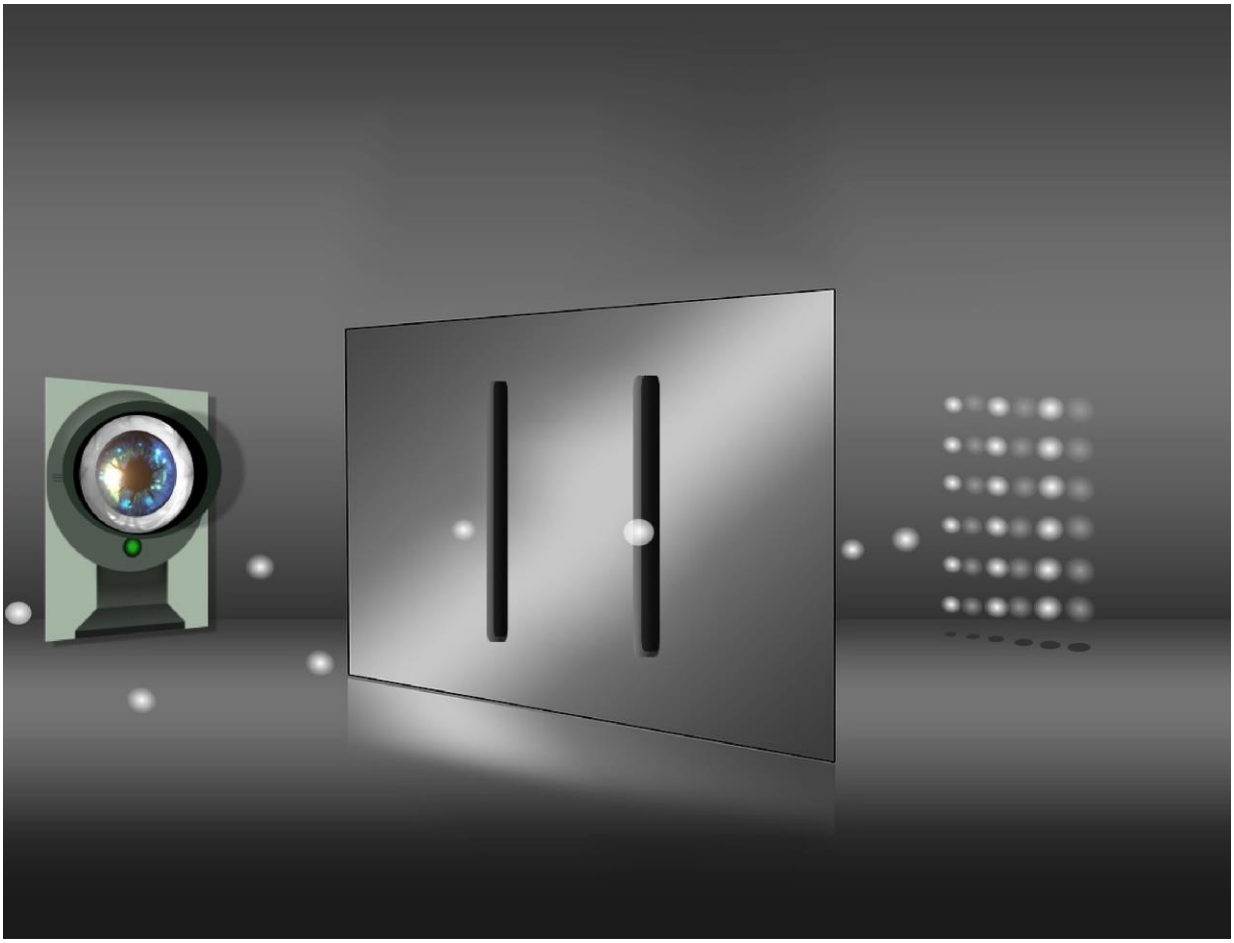

Image source: pixabay.com.

The wave facet of Electromagnetic waves is also a direct derivation from Maxwell equations, which conclude, that an accelerating Electric Charge emits Energy in the form of Electromagnetic waves, which can be presented by the following equations [6] :

$$Ey = E_0 \cos [2 \pi ((x / \lambda) - f t)]$$

$$Bz = B_0 \cos [2 \pi ((x / \lambda) - f t)]$$

The image below presents a schematic of an Electromagnetic Wave.

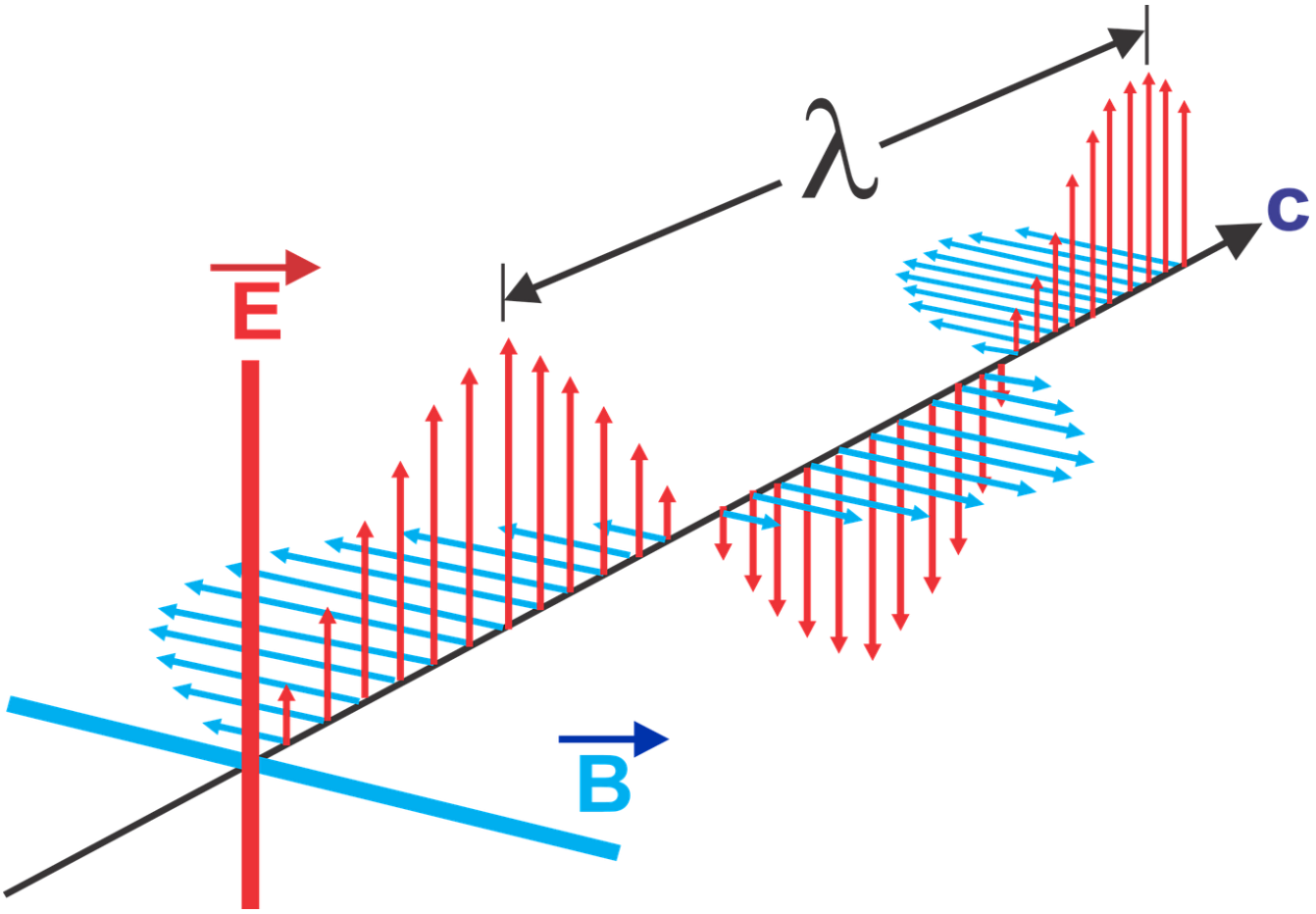

Image source: pixabay.com.

In the equations presented above, of an Electromagnetic Wave, E_y is the Electric Field component of the Electromagnetic wave and B_z is the Magnetic Field component of the Electromagnetic wave.

The above equations imply that an Electromagnetic Wave is composed of two propagating and oscillating Energy Fields, a propagating and oscillating Electric Field and a propagating and oscillating Magnetic Field.

The above equations also imply that an Electromagnetic Wave always travels at the speed of Light (c), and each of its fields is perpendicular to the other field, and both are perpendicular to the line of traveling of the Electromagnetic Wave.

On the other hand, another important phenomenon, the Photoelectric Effect [7] , could not be fully explained if Light, and Electromagnetic Waves in general, are assumed to be just Wave phenomena.

Einstein's explanation of the Photoelectric effect (which also awarded him a Nobel prize for that explanation) introduced the recognition that Light, and Electromagnetic Waves in general, behave also as streams of Particles, namely, the Photons.

Thus, it is common knowledge, that the science of Physics today, attributes to Light, and Electromagnetic Waves in general, two separate facets.

One facet is the Wave facet.

The other facet is the Particle facet, namely the Photon facet.

The image below is not a magnified real picture of a Light beam. It is presented here only as a visual demonstration of the two facets of a Light beam: a Wave facet which is also a stream of Particles.

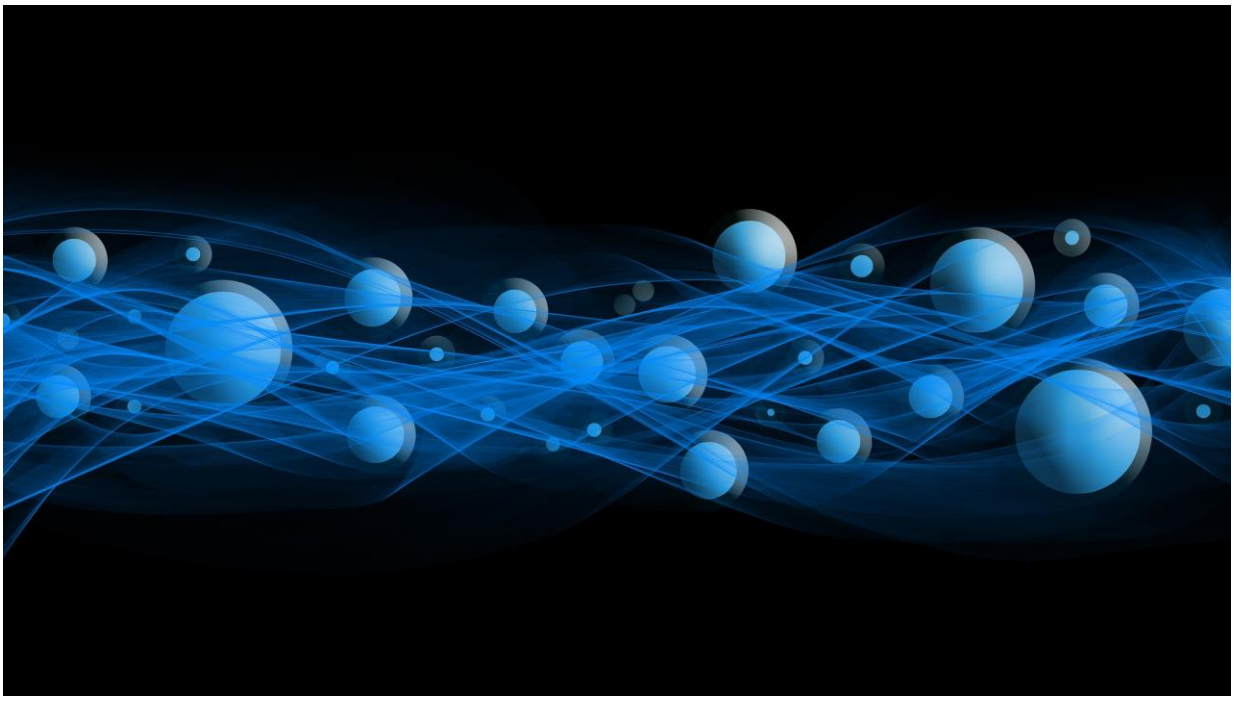

Image source: pixabay.com.

Thus, the science of Physics today states that although these two facets are clearly different facets, and exhibit different behaviors, Light, and Electromagnetic Waves in general, do contain these two facets, and exhibit these facets depending on the conditions under which that Electromagnetic Wave is examined.

This conclusion must be viewed as a peculiarity, in how the science of Physics today understands and explains Light, and Electromagnetic Waves in general.

The need to assign to a physical phenomenon such as Light, two such different facets, to explain its behavior, in different circumstances, should indicate that the real nature of Light, and Electromagnetic Waves in general, is not completely understood yet by the science of Physics today.

It should be also added that the Quantum Mechanics Theory, which is a significant and important part of the acceptable nowadays Physics Theories, also addresses the Wave-Particle paradox, and the acceptable notion held by the science of Physics today is, that a ***partial*** and ***incomplete*** explanation of the Wave-Particle paradox, may be provided by the Quantum Mechanics Theory.

However, reference [36], presented in the references section of this book, states:

"Although the use of the wave–particle duality has worked well in physics, the meaning or interpretation has not been satisfactorily resolved"

And

"Wave–particle duality is an ongoing conundrum in modern physics"

And these statements refer also to the ***partial*** and ***incomplete*** explanation of the Wave-Particle paradox, which is provided today by the Quantum Mechanics Theory, which implies that the Wave-Particle Paradox, is not completely resolved by the science of Physics today. This should also indicate that the real nature of Light, and Electromagnetic Waves in general, is not completely understood yet by the science of Physics today.

Later, in a following chapter of this book, a tentative explanation is proposed, which might shade some additional light on the question why Light, and Electromagnetic Waves in general, must exhibit such two different facets.

That chapter of this book addresses briefly the ***partial*** and ***incomplete*** explanation of the Wave-Particle paradox, provided by the Quantum Mechanics Theory today, and provides a better explanation to the Wave-Particle paradox, which is in line with the theories presented in this book.

A second unresolved question related to Light, might be the postulate presented by Einstein's Special Relativity Theory, that the velocity of Light is the maximum attainable velocity by any moving substance, and the velocity of Light is a constant value, which means that the velocity of a Light beam, measured by any spectator, results in that constant value, regardless of the velocity and the direction of motion of that spectator, relative to that Light beam.

The fact that Einstein's Special Relativity Theory needed to present that Light velocity postulate as an axiom, without any explanation, also seems like a peculiarity.

Why only the velocity of Light must be a constant value, and the maximum attainable velocity of any moving substance? Or, in other words, why Einstein did not provide any explanation to why the velocity of Light is the maximum attainable velocity and a constant value?

Clearly, this pustulate (or axiom) seems to be correct because it is a crucial base on which Einstein's Special Relativity Theory relies upon.

And, since Einstein's Special Relativity Theory was already proven to be a viable theory, via many observations, it implies that this pustulate must be correct.

But this might also imply that the science of Physics today does not fully understands the phenomena of Light, and Electromagnetic Waves in general, because it cannot explain why only the velocity of Light is such special and unique.

Later in this book a tentative explanation is proposed for tackling the question why the velocity of Light is such special and unique.

A third unresolved question relating to Light might be presented as follows:

The common acceptable notion, by the science of Physics today, is that Electromagnetic Waves, from separate sources, cannot unify or consolidate, into one unified, consolidated Electromagnetic Wave.

An example which indicates that this is the nowadays acceptable notion is presented in the paper “Does Destructive Interference Destroy Energy?” by Kirk T. McDonald [8] .

That paper states, when referring to Electromagnetic Waves, the following: “A one-dimensional wave moving in one direction can have only one source, and there can be only one such wave at a given point”, which implies that Electromagnetic Waves, from separate sources, cannot unify or consolidate.

Thus, in referring to that nowadays acceptable notion, which imposes a severe limitation on how Electromagnetic Waves can behave, the question should be asked: why the science of Physics today decided to adopt such a limitation imposed only on Electromagnetic Waves?

This limitation, imposed by the science of Physics today, on the behavior of Electromagnetic Waves, might also be the result of an incomplete understanding of the nature of Electromagnetic Waves by the science of Physics today, especially if sound argumentations can be provided, that Electromagnetic waves, from separate sources, can and do consolidate.

In the next chapters of this book such sound argumentations, that Electromagnetic waves, from separate sources, can and do consolidate, are provided, and explanations which might resolve the question: why the science of Physics today still holds the notion, that Electromagnetic Waves, from separate sources, cannot consolidate?

Electromagnetic Waves, from separate sources can unify

The acceptable notion, held by the science of Physics today, that Electromagnetic Waves, from separate sources, ***cannot*** unify and consolidate, was presented, in the previous chapter, of this book.

Because an Electromagnetic Wave, in its Wave facet, is composed of only two propagating and oscillating Energy Fields, a propagating and oscillating Electric Field and a propagating and oscillating Magnetic field, then, the necessary and sufficient conditions, for two Electromagnetic Waves, from separate sources, to unify and consolidate, are:

The two Electromagnetic Waves, from separate sources, must meet on a point in space, and following that meeting moment the following must occur:

1. Each Electromagnetic Wave must continue to propagate in the exact same direction that the other Electromagnetic Wave propagates.
2. The two Electromagnetic Waves must continue to propagate on the exact same line in space.
3. The polarization of each of the two Electromagnetic Waves must be such, that, following their meeting moment, the line of oscillation of the Electric Field of one Electromagnetic Wave is the exact same line on which the Electric Field of the other Electromagnetic Wave oscillates.
4. The polarization of each of the two Electromagnetic Waves must be such, that, following their meeting moment, the line of oscillation of the Magnetic Field of one Electromagnetic Wave is also the exact same line on which the Magnetic Field of the other Electromagnetic Wave oscillates.

If the above conditions apply, following the meeting moment of these two Electromagnetic Waves, which initially emerged from separate sources, then, the Electric fields of both waves, following their meeting moment, will always exist on the exact same location and on the exact same line in space, and also the Magnetic fields of both waves, following their meeting moment, will also always exist on the exact same location and on the exact same line in space.

Electric and Magnetic Fields are vectors, and such vectors which reside on the exact same location and on the exact same line in space, unify to create a resultant vector, by adding up, or subtracting from each other, depending on their polarities.

Thus, if the above conditions apply, then, these two Electromagnetic Waves, which initially emerged from separate sources, unify, and consolidate, continuously, following their meeting moment, to create continuously, a new consolidated Electromagnetic Wave.

Because the Electric Fields of the two original Electromagnetic waves consolidate, as explained above, into one consolidated Electric Field, and the Magnetic Fields of the two original Electromagnetic waves also consolidate, as explained above, into one

consolidated Magnetic Field, which implies that the two original Electromagnetic Waves consolidate into one consolidated Electromagnetic Wave.

It should be also noted, that in the list of the four conditions presented above, only the first two conditions are completely necessary, to create the situation in which Electromagnetic Waves, from separate sources, consolidate. The last two conditions, relating to the polarization of the Electromagnetic Waves, are added, only to demonstrate, the more obvious situation, in which the two Electromagnetic Waves consolidate ***completely***.

However, if these two additional conditions, relating to the polarization of the Electromagnetic Waves, are omitted from this list, still the situation in which Electromagnetic Waves, from separate sources, consolidate, will occur, but now only a partial consolidation of these Electromagnetic Waves will occur. And this is explained as follows:

As stated above, the Electric and Magnetic Fields of these Electromagnetic Waves are vectors, and each vector can be presented as a combination (vector summation) of two separate vector components which are perpendicular to each other.

Thus, if the two Electromagnetic Waves are not polarized at all, then, the Electric Field of one Electromagnetic Waves is tilted with an arbitrary angle, as relating to the Electric Field of the other Electromagnetic Wave, and the same applies also to the Magnetic Fields of the two Electromagnetic Waves.

Then, the Electric Field of one of the Electromagnetic Waves can be represented as a combination of two vectors. One of these vectors will be completely parallel to the Electric Field of the other Electromagnetic Wave, and the other vector will be perpendicular to the Electric Field of the other Electromagnetic Wave. And same applies also to the Magnetic Fields of the Waves.

Then, in this situation, the consolidations between the two Electromagnetic Waves will occur only between the components of the Electromagnetic Waves which are parallel, which implies that only a partial consolidation will occur.

However, all the following discussion in this book, applies equally, to such partial consolidations between Electromagnetic Waves, from separate sources, which implies that the necessary and sufficient conditions required, to implement consolidations, of Electromagnetic Waves, from separate sources, are only the first two conditions in the list of conditions presented above.

The author of this book published several papers which provide sound argumentations that Electromagnetic Waves from separate sources, can and do consolidate.

In these papers, scenarios that implement the above-described conditions occur, which result in unification and consolidation of Electromagnetic Waves, from separate sources.

One of these papers is: “Energy Analysis of a Null Electromagnetic Wave” [9] .

That paper proposes an experiment which uses a half transparent mirror. In this experiment, all the above-described conditions are met, and thus, this experiment, enables the consolidation of Electromagnetic Waves from separate sources.

That paper describes two Electromagnetic Waves, from separate sources, which meet on a half transparent mirror and unify after leaving the half transparent mirror into a consolidated, unified, Electromagnetic Wave, which is also a Null Electromagnetic Wave, that has no Electric or Magnetic Fields at all.

The first original Electromagnetic Wave comes from the transparent side of the half transparent mirror, and just passes and leaves the half transparent mirror, without being deflected by the half transparent mirror.

The second original Electromagnetic Wave comes from a direction perpendicular to the direction on which the first original Electromagnetic Wave propagated, hits the deflecting side of the half transparent mirror, and is deflected by the half transparent mirror.

The half transparent mirror is tilted at 45 degrees, relative to the direction of the propagation of the first original Electromagnetic Wave.

Thus, from the above follows, that the second original Electromagnetic Wave, which is deflected by the deflecting side of the half transparent mirror, continues to propagate, after it is deflected by the half transparent mirror, in the exact same direction and the on exact same line in space, on which the first original Electromagnetic Wave propagates, after it passes and leaves the half transparent mirror.

Thus, from the above follows, that after the two Electromagnetic Waves leave the half transparent mirror, they both continue to propagate in the exact same direction and on the exact same line in space.

If the original Electromagnetic Waves are also polarized as described in the paper [9], mentioned above, then, after the two Electromagnetic Waves leave the half transparent mirror, they meet all the four conditions presented above, which implies, that the two Electromagnetic Waves unify and consolidate ***completely*** into one consolidated Electromagnetic Wave.

However, as already stated previously in this chapter, if the two Electromagnetic Waves are not polarized at all, then, a partial consolidation of these Electromagnetic Waves will occur, which still fully complies with all the argumentations, presented in this book, relating to consolidating Electromagnetic Waves, from separate sources.

In addition to the above, if the two original Electromagnetic Waves meet additional conditions, as described in the paper [9], mentioned above, then, the resultant unified, consolidated Electromagnetic Wave created, is a Null Electromagnetic Wave, that has no Electric or Magnetic Fields at all.

Further detailed explanations about that experiment, and schematics of its setup, can be found in that paper [9], mentioned above.

Another paper, published by the author of this book, which also elaborates on the issue of consolidation of Electromagnetic Waves, from separate sources, is: “A discussion relating to the feasibility of a Null Electromagnetic Wave” [10].

That paper relates to the scenario proposed in the previous paper [9] and provides additional argumentations, which also support the conclusion, that such a scenario can generate consolidations of Electromagnetic Waves, from separate sources.

Since many halves transparent mirrors, which is the apparatus proposed in that experiment, can be considered as a linear apparatus, the conclusion that Electromagnetic Waves, from separate sources, can consolidate, is further supported because of the Superposition Principle [11], which always applies to linear apparatuses.

The Superposition Principle [11] states that "for all linear systems, the net response caused by two or more stimuli is the sum of the responses that would have been caused by each stimulus individually".

Thus, the scenario described in the paper [9], mentioned above, can be broken into two separate scenarios and then, the scenario described in the paper [9], can be described as a combination of these two separate scenarios.

One of these two separate scenarios will contain only the Electromagnetic Wave that comes from the transparent side of the half transparent mirror and just passes the half transparent mirror, without being deflected by the half transparent mirror.

The second of these two separate scenarios will contain only the second Electromagnetic Wave, the Electromagnetic Wave that is deflected by the half transparent mirror.

Then, in a scenario in which both original Electromagnetic Waves exist, the result, according to the Superposition Principle [11], must be the combinations of the results of the above described two separate scenarios, which implies the creation of a unified, consolidated Electromagnetic Wave.

More details, related to what was just presented above, can be found in the paper [10] mentioned above.

Yet another paper, published by the author of this book, provides further additional argumentations, that Electromagnetic Waves, from separate sources, can and do consolidate.

That paper is: "Consolidating Electromagnetic Waves from separate sources" [12].

That paper also provides an observation, that anybody can experience, every day, that indicate, that Electromagnetic Waves, from separate sources, can and do consolidate.

That observation can be described as follows:

When one looks at items that exist behind a glass, when the illumination around is not intense, one usually can see the items that exist behind that glass and a reflection of himself, looking at that glass.

The Light beams emerging from the items behind the glass, and the Light beams that return the reflection of this person, are Light beams that originate from separate sources (items behind the glass and the body of the person looking at the glass).

Then, some of these Light beams might be travelling in the exact same direction and on the exact same line in Space because these Light beams reach the person's eyes.

And thus, some of these Light beams might meet the necessary and sufficient conditions for Light beams, from separate sources, to consolidate, as presented above, and thus, these Light beams might become consolidated Light beams from separate sources.

The image below demonstrates manikins standing in front of a glass door. One of these manikins might represent the person looking at a glass, mentioned above. In the image the reflection of this manikin can be seen, along with items on the other side of the glass, the side external to where these manikins exist.

Image source: pixabay.com.

That paper [12] also provides additional arguments that Electromagnetic Waves, from separate sources, can consolidate, argumentations above and beyond the argumentations already mentioned above.

These additional arguments, that Electromagnetic Waves, from separate sources, can and do consolidate, are a bit lengthy, but it is important to provide them, to complete the argument that Electromagnetic Waves, from separate sources, can and do consolidate.

These arguments are:

1. The following argument might be presented:

   when Electromagnetic Waves meet and might consolidate, instead of consolidating, they scatter each other, as massive balls scatter each other when they meet.

   This argument is not a viable argument.

   The particle facet of Electromagnetic Waves, the Photons, have no Mass, and thus, when they meet, they cannot scatter each other.

   If Light beams, which are also Electromagnetic Waves, would scatter each other, then, we would not be able to see anything, because each Light beam meets virtually an infinite number of other Light beams, until it reaches our eyes.

2. The following argument might be presented:

   when two Electromagnetic Waves meet on the half transparent mirror, in the experiment proposed in the paper [9], instead of emerging from the half transparent mirror as a consolidated Electromagnetic Wave, they are absorbed into the half transparent mirror, and no consolidated Electromagnetic Wave emerges from the half transparent mirror.

   If this would happen, and the experiment would be conducted for a very long period, then, the Energy dissipated into the half transparent mirror would be virtually an infinite amount of Energy, which should raise the temperature of the half transparent mirror to a virtually infinite temperature.

   In the Universe, many substances operate like the half transparent mirror presented in the experiment proposed in the paper [9], and because many of these substances are usually continuously bombarded by Electromagnetic Waves from all directions, the temperature of these substances should be virtually an infinite temperature.

   Since this seems not to happen, then, when two Electromagnetic Waves meet on the half transparent mirror, in the experiment proposed in the paper [9], their Energy is not

absorbed into this half transparent mirror, and a consolidated Electromagnetic Waves emerges from the half transparent mirror.

3. The following argument might be presented:

   when two Electromagnetic Waves meet on the half transparent mirror, in the experiment proposed in the paper [9], instead of emerging from the half transparent mirror as a consolidated Electromagnetic Wave, an Electromagnetic Wave which is not a consolidation of the two Electromagnetic Waves emerges from the half transparent mirror.

   Because half transparent mirrors are usually considered to be linear apparatuses, then, as already presented above, in this chapter, the Superposition Principle does conclude that if an Electromagnetic Wave emerges from the half transparent mirror, it should be an Electromagnetic Wave which is a consolidation of the two original Electromagnetic Waves that met on this half transparent mirror.

   However, even if half transparent mirrors would not be recognized as linear apparatuses, the Electromagnetic Wave that emerges from the half transparent mirror, in the experiment presented in the paper [9], should be a consolidation of the two original Electromagnetic Waves that met on this half transparent mirror, because of the following argumentation:

   Electromagnetic Waves are deflected by mirrors according to Snell's Law.

   If the half transparent mirror in the experiment presented in the paper [9], would ***not*** be tilted exactly at 45 degrees relative to the line of propagation of the first Electromagnetic Wave, that passes the half transparent mirror without being deflected, then, the two original Electromagnetic Waves would emerge from the half transparent mirror as two separate waves, which propagate into different directions, and not as a consolidated Electromagnetic wave.

   Because the Electromagnetic Wave, which is deflected by the half transparent mirror, would propagate, after it leaves the half transparent mirror, according to Snell's Law, ***not*** on the exact same line as the line of propagation of the first Electromagnetic Wave that passes the mirror, without being deflected, after it leaves the mirror, which implies that, in the above scenario, ***no consolidation***, of the two original Electromagnetic Waves occur.

   Because in the scenario just described, no consolidations of Electromagnetic Waves occur, the science of Physics accepts that in the above scenario, the two original Electromagnetic Waves emerge from the half transparent mirror as two separate waves, and this can be also validated via proper observations.

   But, when the half transparent mirror, in the experiment presented in the paper [9], ***is*** tilted exactly at 45 degrees relative to the line of propagation of the first Electromagnetic Wave, that passes the half transparent mirror without being deflected,

then, Snell's Law implies, that the Electromagnetic Wave which is deflected by the half transparent mirror, does leave the half transparent mirror, when it propagates on the exact same line as the line of propagation of the Electromagnetic Wave that passes the half transparent mirror, without being deflected by the half transparent mirror. This ***would cause a consolidation*** of the two Electromagnetic Waves, after they leave the half transparent mirror.

Thus, it seems unreasonable, that only in the case in which the half transparent mirror ***is*** tilted exactly at 45 degrees, relative to the line of propagation of the first Electromagnetic Wave, that passes the half transparent mirror without being deflected, the Electromagnetic Wave that is deflected by the half transparent mirror would not be deflected according to Snell's Law, in order to cause the situation, suggested above, at the beginning of this clause, in which an Electromagnetic Wave which is ***not*** a consolidation of the two Electromagnetic Waves, emerges from the half transparent mirror.

This implies that the Electromagnetic Wave which leaves the half transparent mirror, in the experiment presented in the paper [9], must be a consolidation of the two original Electromagnetic Waves, which met on the half transparent mirror, if the setup of this experiment is as described in the paper [9], when the half transparent mirror ***is*** tilted exactly at 45 degrees, relative to the line of propagation of the first Electromagnetic Wave, that passes the half transparent mirror without being deflected.

The argumentations presented above are indeed lengthy and cumbersome, but they provide the following additional important support to the claim that Electromagnetic Waves, from separate sources, can and do consolidate:

1. These arguments state that Electromagnetic Waves never scatter each other, which implies that Electromagnetic Waves which are positioned to consolidate do consolidate.
2. These arguments state that the Energy embedded in the two original Electromagnetic Waves, in the experiment presented in the paper [9] is not dissipated into the half transparent mirror, which implies that these Electromagnetic Waves emerge from the half transparent mirror, and these Electromagnetic Waves emerge from the half transparent mirror ***only*** as a consolidated Electromagnetic Wave, composed of a consolidation of these two Electromagnetic Waves, if the setup of this experiment is as described in the paper [9].

Thus, the several papers mentioned above, provide many sound argumentations that Electromagnetic Waves, from separate sources, can and do consolidate, contrary to the acceptable notion that the science of Physics today holds, that Electromagnetic Waves, from separate sources, cannot consolidate.

However, all these argumentations are based only on reason, logic and thinking experiments.

Thus, an implementation of the experiment, as proposed in the paper [9] mentioned above, is crucial, to bring about reliable evidence and an acceptable proof, that Electromagnetic Waves, from separate sources, can and do consolidate, a proof that could be accepted by the Physicists community.

Such an experiment might be very difficult to implement, and requires proper means and funds, which are beyond the reach of the author of this book, and thus, the author of this book hopes that this book will help in achieving the goal of implementing this experiment.

Thus, although such an experiment was not yet implemented, still the question why the science of Physics today holds the notion that Electromagnetic Waves, from separate sources, cannot consolidate, must be asked, and addressed, based on the many very sound argumentations that Electromagnetic Waves, from separate sources, can and do consolidate, presented above, because the reason and logic, on which these sound argumentations rely seem to be reason and logic which might be difficult to contradict (unless the proposed experiment will be conducted and its results will prove the opposite).

Thus, the subject of the next chapter of this book is: why the science of Physics today still holds the notion that Electromagnetic Waves, from separate sources, cannot consolidate?

Paradoxes in Electromagnetic Waves consolidations

Because Electromagnetic Waves, in their Wave facet are just two oscillating and propagating Energy Fields, an oscillating and propagating Electric Field and an oscillating

and propagating Magnetic Field, then, consolidating Electromagnetic Waves, from separate sources, ***seem*** to violate the Energy Conservation Principle.

If two Electromagnetic Waves, from separate sources, unify and consolidate when:

1. Their Electric and Magnetic Fields oscillate at the exact same frequency.
2. They embed the exact same intensities in their Electric Fields.
3. They embed the exact same intensities in their Magnetic Fields.
4. They are at anti phase as related to each other, which imply an exact 180-degree phase shift as related to each other.
5. They have proper polarization, as explained in the paper [9] mentioned already in this book.

Then, the Electric Field of one consolidating Electromagnetic Wave, annihilates completely and continuously, the Electric Field of the second consolidating Electromagnetic Wave, after the Electromagnetic Waves meet and consolidate.

Also, the Magnetic Field of one consolidating Electromagnetic Wave also annihilates completely and continuously the Magnetic Field of the second consolidating Electromagnetic Wave, after the Electromagnetic Waves meet and consolidate.

The above implies that the resultant consolidated Electromagnetic Wave has zero Electric and Magnetic Fields, which is a Null Electromagnetic Wave.

Because the Energy embedded in an Electromagnetic Wave is proportional to the combined squares of the intensities of its Electric and Magnetic Fields, then, the resultant Null Electromagnetic Wave ***seem*** to embed no Energy at all, even though, the Electromagnetic Waves that created it embedded Energy, which ***seems*** as if Energy disappeared, which ***seems*** like a clear violation of the Energy Conservation Principle.

All the above is described in more details in the paper [9], mentioned already in this book.

The above described an extreme scenario in which the consolidating Electromagnetic Waves meet and consolidate when they are exactly out of phase, or at anti phase (180-degree phase shift), as related to each other, when the Electromagnetic Waves meet and consolidate, which resulted in the creation of a resultant Null Electromagnetic Wave.

The other extreme scenario is the scenario in which the Electromagnetic Waves are exactly in phase (0-degree phase shift) as related to each other, when the Electromagnetic Waves meet and consolidate.

Thus, if condition 4, in the five conditions above, is replace by:

The consolidating Electromagnetic Waves are at phase as related to each other when they meet and consolidate, which imply a 0-degree phase shift as related to each other, when the Electromagnetic Waves meet and consolidate,

Then, the resultant consolidated Electromagnetic Wave ***seem*** to embed more Energy, as compared to the combined Energies embedded in the Electromagnetic Waves that created it, which ***seems*** as if Energy was created out of nothing, which is also a clear violation of the Energy Conservation Principle.

The explanation of why, in the scenario just described, the resultant consolidated Electromagnetic Wave ***seem*** to embed more Energy, as compared to the combined Energies embedded in the Electromagnetic Waves that created it, is as follows:

In the scenario just described, the Electromagnetic waves are in phase (0-degree phase shift) when they meet and consolidate, which implies that the Electric Fields of both consolidating Electromagnetic Waves add up, instead of annihilating each other, as in the case of the creation of the Null Electromagnetic Wave, when the Electromagnetic Waves consolidated when they were at anti phase (180-degree phase shift).

Then, if E_1 is the intensity of the Electric Field in the first Electromagnetic Wave of the two consolidating Electromagnetic waves, then, the Energy embedded in this Electric Field of this first Electromagnetic Wave is proportional to E_1^2, because the Energy embedded in an Electric Field is proportional to the square of the intensity of this Electric Field.

And, if E_2 is the intensity of the Electric Field in the second Electromagnetic Wave of the two consolidating Electromagnetic waves, then, the Energy embedded in this Electric Field of this second Electromagnetic Wave is proportional to E_2^2.

Because, as presented already above, in the scenario just described the Electric Fields of both consolidating Electromagnetic Waves add up, then, the intensity of the Electric field of the resultant consolidated Electromagnetic Wave is $E_1 + E_2$.

Then, the Energy embedded in the Electric Field of the resultant consolidated Electromagnetic Wave is proportional to $(E_1 + E_2)^2$.

And because $(E_1 + E_2)^2$ is always bigger than $E_1^2 + E_2^2$, then, the resultant consolidated Electromagnetic Wave, ***seem*** to embed more Energy in its Electric Field, as compared to

the combined Energies embedded in the combined Electric Fields, of the Electromagnetic Waves that created it.

The above related to the Electric Fields of the consolidating Electromagnetic Waves, but similar argumentations apply also to the Magnetic Fields of the consolidating Electromagnetic Waves.

Thus, the above implies that in a scenario, in which the two Electromagnetic Waves meet and consolidate when they are in phase, the Energy embedded in the resultant consolidated Electromagnetic Wave, ***seems*** to be bigger than the combined sums of the Energies embedded in the Electromagnetic Waves that created it, which ***seems*** as if Energy was created out of nothing, which also ***seems*** like a clear violation of the Energy Conservation Principle.

All the above is described in more details in the paper: "Consolidating Electromagnetic Waves might embed more traceable Energy than the sum of the traceable Energies embedded in the waves before consolidation" [13] , which was also published by the author of this book.

The scenario in which a Null Electromagnetic Wave was created, in which Energy ***seems*** to disappear, which was already described before,

and the scenario in which the Electromagnetic Waves consolidated when they were in phase, in which the resultant consolidated Electromagnetic Wave, ***seems*** to embed more Energy, as compared to the combined Energies in the Electromagnetic Waves that created it, which ***seems*** as if Energy was created out of nothing,

are just two extreme scenarios of consolidating Electromagnetic Waves, from separate sources.

In both these scenarios, the Energy Conservation Principle ***seems*** to be violated.

However, if none of the conditions presented at the beginning of this chapter apply, it can also be shown, that in ***any*** scenario of consolidating Electromagnetic Waves, from separate sources, the resultant consolidated Electromagnetic Wave, ***seems*** to embed either

less or either more Energy, as compared to the combined Energies embedded in the Electromagnetic Waves that created it.

This also ***seems*** like a clear violation of the Energy Conservation Principle, and this is also described in the paper [13], mentioned above.

Thus, from the above in ***any*** scenario of consolidation of Electromagnetic Waves, from separate sources, the Energy Conservation Principle, ***seems*** to be violated.

It should be also noted that all the above violations, of the Energy Conservation Principle, occurring in scenarios of Electromagnetic Waves, from separate sources, which consolidate completely, occur also in scenarios of partial consolidations of Electromagnetic Waves, from separate sources, in which the consolidating Electromagnetic Waves were not at all polarized.

Because, as presented in the previous chapter of this book, if the Electromagnetic Waves are not at all polarized, still the Electric (or Magnetic) Field of one Electromagnetic Wave can be described as a vector summation of two perpendicular vectors, in which one of these vectors is parallel to the Electric (or Magnetic) Field of the other Electromagnetic Wave.

Then, the components of the Electric (or Magnetic) Fields of the Electromagnetic Waves, which are parallel, which do consolidate, still fully comply with what was already described for Electromagnetic Waves which consolidate completely.

But because the components of the Electric (or Magnetic) Fields of the waves, which are perpendicular to the components that do consolidate, do not participate in the consolidation, only a partial consolidation of the Electromagnetic Waves occur.

This implies that the intensity of the violation of the Energy Conservation Principle is reduced, but still, the Energy Conservation Principle is still violated.

Because the Energy Conservation Principle is a foundation building block of the science of Physics, then, consolidations of Electromagnetic Waves, from separate sources, ***seem*** to embed paradoxes, because they ***seem*** to destroy one of the foundations upon which the science of Physics today is constructed

Thus, this might be an explanation to why the science of Physics today, still holds the acceptable notion, that Electromagnetic Waves, from separate sources, cannot consolidate, even though, there are many very sound argumentations, based on logic, reason and

thinking experiments, that Electromagnetic Waves, from separate sources, can and do consolidate, logic and reason that seem difficult to contradict.

As long as the experiment presented in article [9], to implement consolidation of Electromagnetic Waves, from separate sources, is not implemented, and as long as a hard proof is not provided that Electromagnetic Waves, from separate sources, can and do consolidate, (not just argumentations that are based on thinking experiments, logic and reason, being the reason as sound as it can be), the science of Physics today will keep holding the notion, that Electromagnetic Waves, from separate sources, cannot consolidate, to avoid the necessity to address the paradoxes presented in this book.

However, this book also proposes a reasonable explanation to these paradoxes, an explanation which keeps the Energy Conservation Principle intact, and this is the subject of the next chapter in this book.

The Energy Pairs Theory

The previous chapters of this book focused on unanswered questions, peculiarities and paradoxes relating to the Light phenomenon, and Electromagnetic Waves in general.

Sound argumentations were presented that Electromagnetic Waves, from separate sources, can and do consolidate, contrary to the acceptable notion held by the science of Physics today, that unification of Electromagnetic Waves, from separate sources, is a fiction, which implies that Electromagnetic Waves, from separate sources, cannot consolidate.

Also, the previous chapter of this book presented the assumption that the reason why the science of Physics today still holds the notion, that Electromagnetic Waves, from separate sources, cannot consolidate, might be based on the fact, that consolidating Electromagnetic Waves, from separate sources, embed paradoxes, because, consolidating Electromagnetic Waves, from separate sources, ***seem*** to violate the Energy Conservation Principle.

Since a very basic building block of the science of Physics is the Energy Conservation Principle, the science of Physics today prefers to ignore the possibility of consolidating Electromagnetic Waves, from separate sources, in order not to be put in a position, that such a crucial building block of the science of Physics might be found unstable.

Unless an experiment, as presented in the paper [9] , mentioned already in this book, is executed, and its results prove, beyond any doubts, that Electromagnetic Waves, from separate sources, can and do consolidate, the science of Physics will keep ignoring the possibility of consolidating Electromagnetic Waves, from separate sources, being the reason and logic of the argumentations provided, that Electromagnetic Waves, from separate sources, can and do consolidate, as sound as they can be.

However, a resolution to the above paradoxes, embedded in consolidating Electromagnetic Waves, from separate sources, might be found by analyzing another unanswered question and mystery, namely, the Dark Energy mystery.

As will be presented shortly, analyzing the mystery of the Dark Energy, from a new angle, might imply, that Electromagnetic Waves, from separate sources, can and do consolidate and still obey the Energy Conservation Principle, eliminating the paradox that consolidating Electromagnetic Waves, from separate sources, violates the Energy Conservation Principle.

The notion of the Dark Energy was introduced, into the science of Physics, because of observations related to the state of the Universe, relating to its being stable or expanding.

Initially, the science of Physics assumed that the Universe is stable. Then, observations revealed that the Universe is expanding.

But, in the 20^{th} century, additional observations revealed that the Universe is expanding in a rate much faster than it was assumed and found before.

Below is an image of the famous Hubble Telescope, which played a significant role in discovering that the Universe expands in a rate much faster than it was assumed and found before.

Image source: pixabay.com.

This observation revealed that the actual rate of expansion of the Universe embeds a mystery, because such a rapid rate of expansion must be supported by a much bigger amount of Energy, existing in the whole Universe, much bigger than the amount of Energy embedded in the Universe, that the science of Physics today can detect or calculate.

Many references relating to the expansion of the Universe, and the mystery related to that expansion, are on the web, two of these references might be references [14] , [15] , presented in the references section in this book.

As a result of the mystery presented above, relating to the expansion rate of the Universe, the notion of the Dark Energy was introduced into the science of Physics.

That notion states that there is an extra amount of Energy embedded in the Universe, above and beyond the amount of Traceable and Detectable Energy that the science of Physics can Trace, Detect, or Calculate.

That extra amount of Energy, the Dark Energy, is yet Untraceable and Undetectable, and thus presents an unanswered question and a mystery as related to the nature, source, or origin of that Dark Energy.

Current calculations predict that the amount of the Dark Energy in the Universe is about twice the amount of the Traceable and Detectable Energy in the Universe.

However, although the source and origin of that mysterious Dark Energy is unknown, the most acceptable notion, held by the science of Physics today is that it must be related to Gravity, and should be looked for, in Einstein's General Relativity theory.

Many references relating to the Dark Energy are on the web, one of these references might be reference [16], presented in the references section in this book.

As already mentioned above, this book presents the assumption, that analyzing the mysterious Dark Energy from a new angle, might provide a tentative possible resolution to the paradox embedded in consolidating Electromagnetic Waves, from separate sources.

Because consolidating Electromagnetic Waves exhibit, in one extreme situation, the creation of a Null Electromagnetic Wave, which contains no Electric or Magnetic Fields at all, and, in the creation of this Null Electromagnetic Wave, Energy ***seems*** to disappear, that Energy disappearance can be assumed to be the creation of Dark Energy, because Dark Energy is also Untraceable and Undetectable.

This book presents a new theory, the Energy Pairs Theory, which provides a tentative, reasonable resolution to the paradox embedded in the scenario of consolidating Electromagnetic Waves, from separate sources, which might resolve the mystery, in what ***seems*** to be, a violation of the Energy Conservation Principle.

The new Energy Pairs Theory explains how consolidation of Electromagnetic Waves, from separate sources, can occur, and still the Energy Conservation Principle is kept intact, and it is not violated.

The new Energy Pairs Theory, presented in this book, also might unveil part of the mystery relating to the source or origin of at least part of the mysterious Dark Energy.

Following is a short presentation of the elements embedded in the new Energy Pairs Theory, presented in this book:

The new Energy Pairs Theory states that, in certain conditions, Energies embedded in Electromagnetic Waves can be accumulated and be stored together in pairs.

These Energy Pairs disable each other from being detected, such that the Energies ***Exit*** but are Untraceable and Undetectable Energies, or ***Dark Energy***.

The new Energy Pairs Theory expands the concept of Energy to embed two forms (or facets) of Energy: Detectable Energy and Undetectable or Dark Energy.

The Undetectable or Dark Energy is accumulated in Pairs of Energies which Disable each other from being detected.

And the new Energy Pairs Theory also states that Photons can carry both, Detectable and Undetectable or Dark Energies.

Examples of Energy Pairs might be the two Electric Fields, or the two Magnetic Fields, of the two consolidating Electromagnetic Waves, from separate sources, which resulted in the creation of the Null Electromagnetic Wave, described before in this book.

These two Electric Fields annihilate completely each other, and disappear, after the two consolidating Electromagnetic Waves, from separate sources, meet and consolidate, causing the Energy embedded in these two original Electric Fields to ***seem*** also as disappearing.

And the same applies also to the two Magnetic Fields, of these two consolidating Electromagnetic Waves, from separate sources.

The new Energy Pairs Theory states that the Energies embedded in these two Electric Fields (or these two Magnetic Fields), did not disappear, even though the original two Electric Fields (or these two Magnetic Fields) annihilated each other, and disappeared.

The new Energy Pairs Theory states that the Energies embedded in these two Electric Fields (or these two Magnetic Fields) still exist. These Energies were converted into Untraceable or Undetectable or Dark Energy, embedded in Space.

The title of this book presents the statement that Time and Space are facets of Energies.

This statement is based on several sets of argumentations presented in this book, as will be explained in the following chapters of this book.

The first argument, of these several sets of argumentations, is related to the new Energy Pairs Theory, and is described as follows:

If it can be assumed that Space is just a form (or facet) of Energy, then, Space can be a media which stores the Energies of these two Electric Fields (or these two Magnetic Fields), which annihilated each other, causing also the Energies embedded in them to ***seem*** also as being disappearing.

An analogy to what was just presented might be the rope pulling game named tag-of-war.

In that game, two persons pull a rope, each from the other side of the rope.

The image below presents a tag-of-war game.

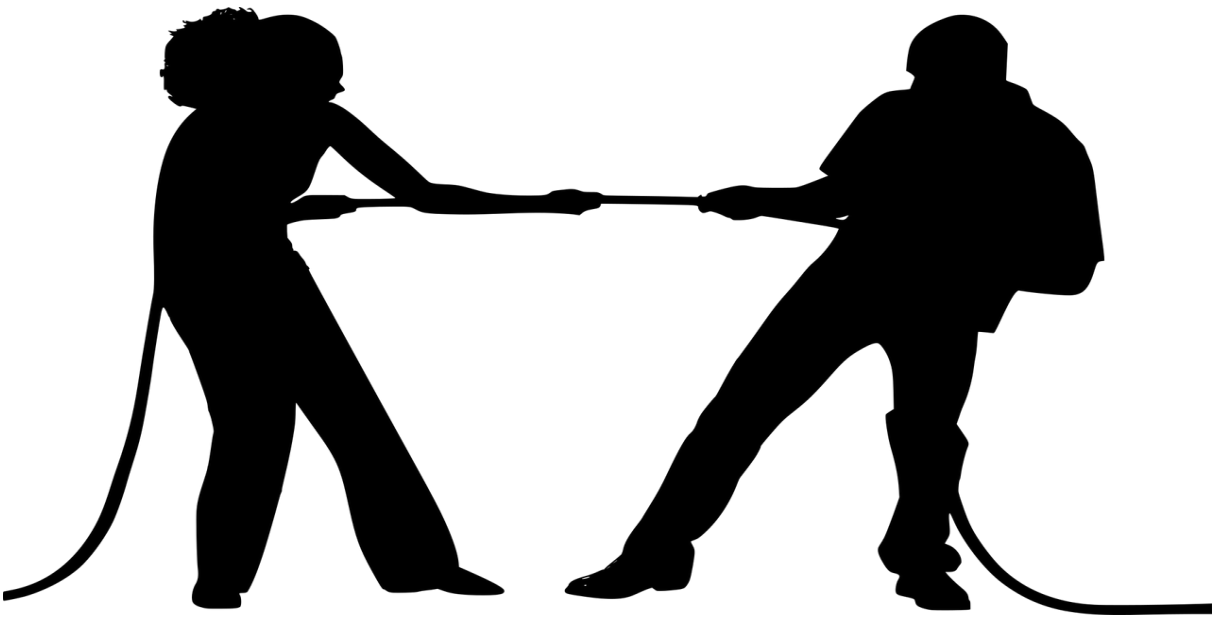

Image source: pixabay.com.

If the magnitude of the force exerted on the rope, by the first person, is equal exactly to the magnitude of the force exerted on the rope, by the other person, the rope does not move at all.

This might seem as there is no force exerted at all on the rope, and no Energy imposed on the rope.

But because the rope is a tangible substance, the Energy imposed on the rope can be detected via the tension embedded in the rope, which stores the Energy inserted in the rope, even though, the rope does not move at all.

Similarly, to the above, the two Electric Fields (or the two Magnetic Fields) mentioned above, do annihilate each other, because they are of exact equal magnitude and opposite polarity, and this also ***seems*** as if the Energies embedded in them also disappeared.

But the new Energy Pairs Theory states that the Energies embedded in these two Electric Fields (or these two Magnetic Fields) did not disappear.

The new Energy Pairs Theory states that these Energies were converted into Untraceable, or Undetectable or Dark Energy embedded in Space.

And if Space is just a facet of Energy, as this book predicts, then, it can store these Energies which ***seem*** to disappear.

But because Space is not a tangible substance, as the rope is, in the tag-of-war game, the Energies it stores cannot be detected, and are stored as Dark Energy.

In some of the references provided in the references section of this book, relating to the Dark Energy, information is presented, that presents, that some Physicists believe, that the media that holds the Dark Energy is Space itself.

This is exactly what the new Energy Pairs Theory, presented in this book, also assumes.

However, these Physicists believe that the Energies that might be stored in Space as Dark Energy are only Energies related to Gravitation.

The new Energy Pairs Theory, presented in this book, assumes that Space might also be the media that stores Dark Energy originating from Electromagnetism.

And, the new Energy Pairs Theory also assumes, that it might be that ***most*** of the Dark Energy stored in Space is from Electromagnetism origin. This will be further elaborated later in this book.

Thus, the new Energy Pairs Theory also presents the argument that Space is a form or facet of Energy.

Later in this book, additional arguments will be presented which further support the claims that Space (and Time) might be just forms or facets of Energies.

These arguments will present the statement, that Space (and Time) are just facets of Energies, from a completely different angle, as compared to the argument presented by the new Energy Pairs Theory, that Space is a facet of Energy.

Thus, the statement that Space is a facet (or form) of Energy is presented in this book, from several separate angles, which might provide further support to the statement, that Space is a facet (or form) of Energy.

The previous paragraphs provided a partial explanation to how the new Energy Pairs Theory resolves the paradox embedded in consolidating Electromagnetic Waves, from separate sources.

The Following discussion completes the explanation relating to how the new Energy Pairs Theory resolves the paradox embedded in consolidating Electromagnetic Waves, from separate sources.

As already stated above, in the creation of the Null Electromagnetic Wave, the new Energy Pairs Theory states that the Energy did not disappear.

Instead, the Energies embedded in the Electric Fields (or the Magnetic Fields) of the two consolidating Electromagnetic Waves that created the Null Wave, which annihilated each other, and thus, ***seem*** as if the Energies also disappeared, can be considered as Energies that were converted together into Dark Energy, that still exist, and stored in Space, as Untraceable or Undetectable Energies or Dark Energies.

It was already presented above, that the new Energy Pairs Theory, presented in this book, states that Photons can also embed both, Traceable and Untraceable (or Dark) Energies.

Thus Space, which as presented above, is assumed to store the Energies that ***seem*** to Disappear, can be also assumed to be able to store this Energy as Photons, which embed Untraceable (or Dark) Energy.

This implies that in the scenario of the creation, for example, of the Null Electromagnetic Wave, described previously in this book, the missing or what ***seemed*** like disappearing Energies, are Photons embedded in Space which carry just Untraceable, or Dark Energies.

The above explained how the new Energy Pairs Theory resolves the paradox of the Energy that ***seem*** to disappear, in the creation of the Null Electromagnetic Wave.

However, in the previous chapter of this book, an additional paradox was presented, the paradox in which Energy ***seemed*** to be created out of nothing, when the Electromagnetic Waves, from separate sources, met and consolidated when they were in phase.

The new Energy Pairs Theory also resolves this paradox.

In that scenario, the new Energy Pairs Theory states, that Energy was not created out of nothing.

Instead, in that scenario, Untraceable or Dark Energy, stored in the Photons of the consolidating Electromagnetic Waves, converted back into Traceable Energy, embedded in the Photons of the resultant consolidated Electromagnetic Wave.

More details about the new Energy Pairs Theory, can be found in the papers [9] , [10] , [12] , [13], published by the author of this book, and mentioned already before in this book, and in the additional papers "The Energy Pairs Theory" [17] , [40] , and "The Nature of Space and Dark Energy, Based on Electric and Magnetic Fields' Behavior in Space, in the Energy Pairs Theory Framework" [18], also published by the author of this book.

The additional paper [18], provides also additional details relating to Space being just a form or facet of Energy.

Thus, the new Energy Pairs Theory, proposed by this book, provides a tentative reasonable resolution to the paradoxes related to consolidating Electromagnetic Waves, from separate sources.

But, the new Energy Pairs Theory, proposed by this book, provides resolutions also to other unanswered questions, and this is the subject of the next chapter of this book.

Electric Charge is also a form of Energy

In the previous chapter of this book the new Energy Pairs Theory was presented, which provided a tentative, reasonable explanation, to the paradoxes that ***seem*** to exist in consolidating Electromagnetic Waves, from separate sources, which ***seem*** to violate the Energy Conservation Principle.

However, the paradox that ***seems*** to exist in consolidating Electromagnetic Waves, from separate sources, is not the only paradox that gets resolved by the new Energy Pairs Theory.

The new Energy Pairs Theory explains two additional paradoxes.

One of these two additional paradoxes relate to the famous Mutual Annihilation process [25].

The second of these two additional paradoxes relate to the famous Pair Production Process [26].

The following refers first to the paradox in the Mutual Annihilation process:

In the Mutual Annihilation process an Electron and a Positron meet and annihilate each other to create Photons.

An Electron is composed of Mass and a Negative Electric Charge.

A Positron is composed of Mass (equal in magnitude to the Mass of the Electron) and a Positive Electric Charge (but equal in magnitude to the magnitude of the Negative Electric Charge embedded in the Electron)

In the process of a Mutual Annihilation, the Energy Conservation Principle implies, that the combined Energies embedded in the Electron and the Positron, which converted to Photons, must be equal to the Energies embedded in the created Photons, because the Electron and the Positron converted into Photons, and Energy cannot disappear.

Photons are recognized as being composed of Energy only, and do not embed any Mass or Electric Charge.

Mass, on one hand, is already recognized as a form of Energy, following the introduction of Einstein's Special Relativity Theory.

On the other hand, Electric Charge is not recognized (yet), by the science of Physics, as being a form of Energy.

From the above follows, according to the Energy Conservation Principle, that the Energies embedded only in the ***Masses*** of the Electron and the Positron must be equal to ***all*** the Energies embedded in the created Photons.

The above also implies that the Electric Charges of the Electron and the Positron just ***disappeared***.

That disappearance of the Electric Charges ***seems*** like a paradox.

Electric Charges, along with Mass are the basic building blocks of any tangible substance.

Before Mass was recognized as a form of Energy, the science of Physics contained a Mass Conservation Principle stating that Mass is conserved and cannot disappear.

After Mass was recognized as a form of Energy, following the introduction of Einstein's Special Relativity Theory, this conservation rule was discarded, and Mass was included in the Energy Conservation Principle, stating that the sum of the Energy embedded in the Masses and the Energy which does not originate from Masses, in the Universe, is conserved, because Mass is a form of Energy, and can be converted to pure Energy, as Energy, can be converted back to Mass.

Thus, why the Electric Charge can be let to disappear?

Why the science of Physics allows a basic building block of materials, the Electric Charge, to just disappear, while the other basic building block of materials, the Mass, never disappears?

Thus, the Electric Charge disappearance ***seems*** like a paradox.

The following refers now to the paradox embedded in the Pair Production process:

In the Pair Production process, a Photon, in certain conditions, converts into an Electron and a Positron.

Similarly, to the above, because the Electric Charge is not recognized (yet) as a form of Energy, according to the Energy Conservation Principle, ***all*** the Energy embedded in the Photon, which converted into an Electron and a Positron, in a Pair Production process, must be embedded only in the ***Masses*** of the created Electron and Positron.

The above implies that the Electric Charges embedded in the created Electron and the created Positron were created out of nothing.

How the science of Physics can allow, that a basic building block of materials (the Electric Charge) be created out of nothing, while the other basic building block of materials (the Mass) is never allowed to be created out of nothing?

Thus, that creation of Electric Charges, in a process of a Pair Production, also ***seems*** like a clear paradox.

The new Energy Pairs Theory, presented in this book, resolves also the above-described paradoxes.

The new Energy Pairs Theory states that in the Mutual Annihilation process, the Electric Charges did not disappear.

They were converted into Untraceable or Dark Energy, and stored in Space, as Photons, which embed Dark Energies (originating from the Electric Charges that ***seemed*** to disappear), in addition to Traceable Energies (originating from the Masses of the Electron and the Positron that converted to Photons).

The above explanation, of how the new Energy Pairs Theory resolves the paradox embedded in the Mutual Annihilation process, is similar, to how the Energy Pairs Theory resolved the paradox embedded in the creation of the Null Electromagnetic Wave, in which Energy ***seemed*** to disappear, because the Energy Pairs embedded in the creation of the Null Electromagnetic Wave, in which Energy ***seemed*** to disappear, were converted into Untraceable or Dark Energies, and stored in Space, as Photons that embed only Dark Energies.

The new Energy Pairs Theory also states, that in a Pair Production process, Electric Charges are not created out of nothing.

The new Energy Pairs Theory states, that in a Pair Production process, Untraceable or Dark Energy embedded in the Photon, which converted into an Electron and a Positron, converted into the Electric Charges embedded in the created Electron and Positron.

The above explanation, of how the new Energy Pairs Theory resolves the paradox embedded in the Pair Production process, is similar, to how the Energy Pairs Theory resolved the paradox, in which Energy ***seemed*** to be created out of nothing, in the consolidations of Electromagnetic Waves, from separate sources, when the Electromagnetic Waves were in phase, when they met and consolidated.

Because in the scenario of consolidating Electromagnetic Waves, from separate sources, when the Electromagnetic Waves were in phase, and Energy ***seemed*** to be created out of nothing, the new Energy Pairs Theory stated that Dark Energy embedded in Photons, in the consolidating Electromagnetic Waves, converted back into Traceable Energy, in the creation of the resultant Electromagnetic Wave, that ***seems*** to embed more Energy as compared to the combined Energies embedded in the Electromagnetic Waves which created it.

Thus, the new Energy Pairs Theory states that Electric Charges can be converted into Dark Energy, and that Dark Energy can be converted back to Electric Charges, similarly to what is already recognized and accepted, by the science of Physics today, that Mass can be converted to Energy, and Energy can be converted back to Mass.

Thus, the above implies that Electric Charges are also forms of Energy.

But Mass is always Positive and Electric Charges can be Positive or Negative.

It should be also noted that the science of Physics does contain a Charge Conservation Principle, which states that the amount of all the Positive Electric Charges in the Universe, must be equal to the amount of all the Negative Electric Charges in the Universe.

It was already presented above, that the science of Physics today states, that any amount of Mass can be converted to Energy, and any amount of Energy can be converted back to Mass.

But, from the Charge Conservation Principle presented above also follows, that Electric Charges can be converted only to Dark Energy, and an amount of Positive Electric Charge can convert to Dark Energy only with an exact same amount of Negative Electric Charge, to keep the amount of all the Positive Electric Charges in the Universe, equal to the amount of all the Negative Electric Charges in the Universe.

Also, from the Charge Conservation Principle presented above also follows, that only Dark Energy can convert back to Electric Charges, but only into a pair of Positive and Negative Electric Charges, where the amount of the Positive Electric Charge created equals exactly the amount of the Negative Electric Charge created, to keep the amount of all the Positive Electric Charges in the Universe, equal to the amount of all the Negative Electric Charges in the Universe.

But still, although Mass can convert to regular Traceable Energy, and Electric Charge can convert only into Dark Energy, Electric Charge must still be recognized as a form of Energy, because Dark Energy is still Energy.

The recognition of the Electric Charge, as a form of Energy, presented above, can be also seen, as an expansion of the Energy Conservation Principle, to include in it the Electric Charge entity, as the Energy Conservation Principle was expanded when the entity of Mass was included into it.

Thus, the new Energy Pairs Theory was shown to resolve the paradoxes embedded in the Mutual Annihilation and the Pair Production processes, which also resulted in the statement that the Electric Charge is also a form of Energy, similarly to Mass being already recognized as a form of Energy, following the introduction of Einstein's Special Relativity Theory.

In addition to what was presented above, an additional separate argument can be also provided, which also implies that the Electric Charge is also a form of Energy. That additional argument is presented as follows:

Energy can be defined as the ability of an entity to create activities.

The Mass entity creates a Gravitational Field which interacts with other Masses.

The Electric Charge entity creates an Electric Field, (and a Magnetic Field, when the Electric Charge is moving), and these Fields interact with other Electric Charges.

Thus, a Particle embedding both Mass and Electric Charge creates a Gravitational Field and an Electric Field, (and a Magnetic Field, if the Particle is moving), and these Fields interact with both, other Masses, and other Electric Charges.

The above implies that Particles embedding Mass and Electric Charge can create more activities as compared to Particles which embed only Mass.

Because the extra activity, mentioned above, relating to Particles embedding Mass and Electric Charge, as compared to Particles which embed only Mass, must be attributed to the Electric Charge, this also implies that the Electric Charge should be also recognized as a form of Energy, which further supports the conclusion, brought about by the new Energy Pairs Theory, that Electric Charge is also a form of Energy.

The conclusion that the Electric Charge is also a form of Energy also implies that all the tangible matter in the Universe is just forms of Energies, because of the following argumentation:

All the tangible matter in Universe is composed of Atoms.

Atoms are composed of Elementary Particles.

And each Elementary Particle embeds either only Mass or Mass and Electric Charge.

Mass is already recognized as a form of Energy, by the science of Physics, following the introduction of Einstein's Special Relativity Theory.

If also the Electric Charge is a form of Energy, as this book concludes, then, all the tangible matter in the Universe is just forms of Energies.

The other two significant Entities remaining are Time and Space.

The conclusion that the Space is also a form (or facet) of Energy, derived from the new Energy Pairs Theory, was already presented in a previous chapter of this book.

And, in the next chapters of this book, additional arguments will be presented, that Space is a facet of Energy, together with the statement that Time is also just a facet of Energy.

These additional arguments will be presented as conclusions derived from an analysis which is related to the concept of the Interwoven Space/Time brought about by Einstein's General Relativity Theory.

That analysis will start by presenting the following question:

Why do Electric Charges attract or repel each other?

That question is still an additional mystery or an unanswered question, as relating to the science of Physics today.

Thus, this is the subject of the next chapter of this book.

Why do Electric Charges Attract or Repel Each Other?

The above presented question: why do Electric Charges attract or repel each other?

might be related to another question:

why do Mass bodies attract each other?

The issue of Mass bodies attraction was initially investigated by Newton.

Newton's measurements concluded that two Mass bodies attract each other according to the Universal Gravitational Law, which is formulated as [19] :

$$F = G\cdot(m_1\cdot m_2)/\ r^2$$

Where G is the Gravitational Constant and is equal to

$6.674\times10^{-11}\ m^3\cdot kg^{-1}\cdot s^{-2}$,

m_1 is the Mass magnitude of the first Mass body, m_2 is the Mass magnitude of the second Mass body and r is the distant between the center of Masses of the two Mass bodies.

The Universal Gravitational Law presented above provides the amount of Force that attracts these two Mass bodies.

However, Newton could not provide a complete explanation relating to what causes this force, or what is exactly the origin of the attraction between Mass bodies.

Newton tried to explain the origin of the attraction force between Mass bodies by introducing the concept of the Gravitational Field.

Newton stated that a Mass body creates a Gravitational Field around it, which generates the force presented in the Universal Gravitational Law.

However, Newton could not explain how any Field, including his Gravitational Field, can cause the attraction forces between bodies.

Newton's Gravitational Field is presented by the following equation [20]:

$$g = G\cdot(m)/\ r^2$$

Where g is the Gravitational Field magnitude, G is the Gravitational Constant, which was already presented above in the Universal Gravitational Law, m is the Mass magnitude of the Mass body which creates this Gravitational Field g and r is the distance between the center of Mass of this Mass body, and the point in Space, where this Gravitational Field g is measured.

Thus, the Universal Gravitational Law can be reformulated as:

$$F = m\cdot g$$

Where m is the magnitude of the Mass body on which the Gravitational Field g exerts the force F.

However, as already stated above, the notion of a Field, does not provide a complete answer to the question: how can a Field generate the Forces that it is assumed to create?

Thus, the question:

what is the origin of the force presented by the Universal Gravitational Law? remained an unanswered question, until the introduction of Einstein's General Relativity Theory [21] .

Einstein succeeded to explain the origin of the attraction forces between Mass bodies by concluding that Newton's Gravitational Field is a form of Acceleration.

That conclusion can be derived directly from Newton's work.

Newton's Second Law of Motion [22] states, that a force F exerted on a Mass body of Mass magnitude m obeys the following equation:

$$F = m \cdot a$$

Where a is the Acceleration that this Mass body of Mass magnitude m acquires because of the force F exerted on it.

However, the above already presented, that a Gravitational Field g exerted on a Mass body of Mass magnitude m also results in a force F exerted on this Mass body:

$$F = m \cdot g$$

Thus, from the above follows that:

$$g = a$$

Thus, the Gravitational Field must also be a form of Acceleration.

From the above, Einstein concluded that this could provide an explanation to the question: how Newton's Gravitational Field can generate the force F expressed by Newton's Universal Gravitational Law? or, in other words, what is really the origin of the attraction force between Mass bodies?

Following is a brief explanation how the origin of the attraction force between Mass bodies can be explained using the understanding that Newton's Gravitational Field is a form of Acceleration:

Acceleration is the second derivative of Space as related to Time:

$a = d^2s/dt^2$

Where s is the Space point at which the Acceleration a is measured, and t is the Time moment at which the Acceleration a is measured.

Space is a three-dimensional entity, while Time is a one-dimensional entity.

From the above Einstein concluded that if it can be assumed, that Space and Time are not independent entities, and they are always interweaved into a four-dimensional construct, which replaces the three-dimensional Space entity, then,

this four-dimensional Interwoven Space/Time entity already embeds an Acceleration at each point of it,

because the second derivate of Space in relation to Time can be calculated at each point of it,

because this four-dimensional Interwoven Space/Time entity already embeds the Space ***and*** the Time entities at each point of it.

Thus, Einstein concluded, that if a form of this four-dimensional Interwoven Space/Time entity can be assumed to be Newton's Gravitational Field, then,

this Interwoven Space/Time entity, will exert an Acceleration, on any Mass body, residing in it, which is the Acceleration embedded in the point of this Interwoven Space/Time entity, where this Mass body resides.

However, this form of four-dimensional Interwoven Space/Time entity, can be assumed to be Newton's Gravitational Field, only if also the following applies:

Any Mass body of Mass magnitude m, residing also in this Interwoven Space/Time entity,

must affect this Interwoven Space/Time entity,

such that the Acceleration embedded at any arbitrary point of this Interwoven Space/Time entity,

is equal to the Acceleration that a Mass body, of Mass magnitude m, will induce,

in that arbitrary point of this Interwoven Space/Time entity,

as Newton's Universal Gravitational Law states, that a Mass body of Mass magnitude m would induce in this arbitrary point in Space (which is also that arbitrary point of this form of four-dimensional Interwoven Space/Time entity, because this Interwoven Space/Time entity replaces the Space entity, as already stated above).

What was just described above can be also presented, in other words, as follows:

Any Mass body must affect Einstein's interwoven Space/Time entity, by inducing a proper ***distortion*** into Einstein's Interwoven Space/Time entity, to induce into it an Acceleration which complies with the Acceleration presented by Newton's Universal Gravitational Law.

Such a distortion, induced into Einstein's Interwoven Space/Time entity by a Mass body, would resemble a Pit in the fabrics of Einstein's Interwoven Space/time entity.

Thus, if all the above applies, then, this form of four-dimensional Interwoven Space/Time entity can be equated with Newton's Gravitational Field.

Thus, if Newton's Gravitational Field, can be replaced with the above presented form of four-dimensional Interwoven Space/Time, then, this also explains how Newton's Gravitational Field, can generate the force presented in the Universal Gravitational Law, which provides an answer to the question: what is the real origin of the force that attracts Mass bodies?

Because now, any Mass body m_1, residing in Einstein's Interwoven Space/Time entity will induce into Einstein's Interwoven Space/Time entity an Acceleration which complies with Newton's Universal Gravitational Law,

And any other Mass body m_2, residing also in Einstein's Interwoven Space/Time entity, will be attracted to the Mass body m_1, via the Acceleration that the Mass body m_1 induced in the point where the Mass body m_2 resides, in Einstein's Interwoven Space/Time entity.

Thus, Einstein's Interwoven Space/Time entity, provided the answer to the question: what is the real origin of the force that attracts Mass bodies?

That question was unanswered before Einstein's General Relativity Theory was introduced.

It should be emphasized, that the above provides a very simplified presentation of how Einstein's General Relativity explains the attraction between Mass bodies.

The exact full explanation of how Einstein's General Relativity explains the attraction between Mass bodies involves complex mathematics, which is beyond the scope of this book.

The above discussion provided a simplified explanation, to how the Einstein's Interwoven Space/Time entity concept, resolves the question: what is the origin of the attraction forces between Mass bodies?

Similarly, to the above, this book presents an explanation to what might be the origin of the attraction or repulsion forces between Electric Charges, which is still a mystery today.

Analogous to Newton's Universal Gravitational Law, which provides the force of attraction between Mass bodies, Coulomb's Law provides the force of attraction or repulsion between Electric Charges.

Coulomb's Law is presented by the following formula [23] :

$$F = Ke \cdot (q_1 \cdot q_2)/r^2$$

Where Ke represents the Coulomb's Constant and is equal to $8.99 \times 10^9\ N \cdot m^2 \cdot C^{-2}$, q_1 is the amount of Electric Charge in the first Electric Charge, q_2 is the amount of Electric Charge in the second Electric Charge and r is the distance between the two Electric Charges.

As in the case related to the attraction between Mass bodies, the origin, or cause of Coulomb's Law is attributed to an Electric Field that each Electric Charge generates, which, as explained already, in relation to the attraction between Mass bodies, this cannot provide a complete explanation to the question: why Electric Charges attract or repel each other?

It should be noticed that the ***structure*** of Newton's Universal Gravitational Law and the ***structure*** of the Coulomb's Law are identical.

Thus, the following question might be asked:

Since the ***structure*** of Newton's Universal Gravitational Law and the ***structure*** of the Coulomb's Law are identical, why the origin of the attraction between Mass bodies was resolved via Einstein's General Relativity Theory, and its concept of a four-dimensional Interwoven Space/Time entity, and the origin of the attraction or repulsion forces between Electric Charges, is still a mystery?

Thus, the possibility, that there is an explanation to the cause of attraction or repulsion between Electric Charges, might be a reasonable possibility.

The author of this book published the paper “A New Theory Expands Einstein’s General Relativity Theory to include Both Electric Charges and Mass Entities” [24], which addresses this possibility.

Detailed explanations of how this paper explains why Electric Charges attract or repel each other can be found in that paper [24] .

Following is a short, simplified explanation of what is presented in that paper.

Similarly, to what was presented above, that Newton’s Gravitational Field is also a form of Acceleration, the paper [24] assumes that an Electric (and a Magnetic) Field is also a form of Acceleration.

However, Masses are always positive, while Electric Charges appear as both, Positive and Negative Electric Charges.

Thus, as Newton’s Gravitational Field was replaced by Einstein’s Interwoven Space/Time entity, the paper [24] assumes, that there are two additional Interwoven Space/Time entities, one related to the Positive Electric Charges, which replaces the Electric (and Magnetic) Fields generated by the Positive Electric Charges, and one related to the Negative Electric Charges, which replaces the Electric (and Magnetic) Fields generated by the Negative Electric Charges.

The paper [24] assumes that each of these Interwoven Space/Time entities is ***separate and independent*** from the other Interwoven Space/time entities, which implies that the paper [24] assumes, that there are three ***independent and separate*** Interwoven Space/time entities.

Based on the above, the paper [24] explains the origin of attraction or repulsion between Electric Charges, similarly to how Einstein’s General Relativity Theory, explains the origin of the attraction between Mass bodies.

Following is a short, simplified, and brief explanation of the above, details can be found in the paper [24].

Einstein's General Relativity Theory explained the origin of attraction between Mass Bodies by stating that any Mass body affects Einstein's Interwoven Space/Time entity, by distorting Einstein's Interwoven Space/Time entity, by inducing a proper Pit in it. Details regarding this Pit can be found in Einstein's General Relativity Theory.

Analogically to the above, the paper [24] states that an Electric Charge induces in each of the two additional Interwoven Space/Time entities related to Electric Charges, either a Pit or a Bump.

Humans cannot visualize four-dimensional structures.

Thus, to represent such structures, three-dimensional ***slices*** of a four-dimensional structure can be presented, which provide a visual presentation of ***portions*** of the four-dimensional structure.

Following are some examples of such three-dimensional slices:

The image below presents a three-dimensional slice of Einstein's four-dimensional Interwoven Space/Time.

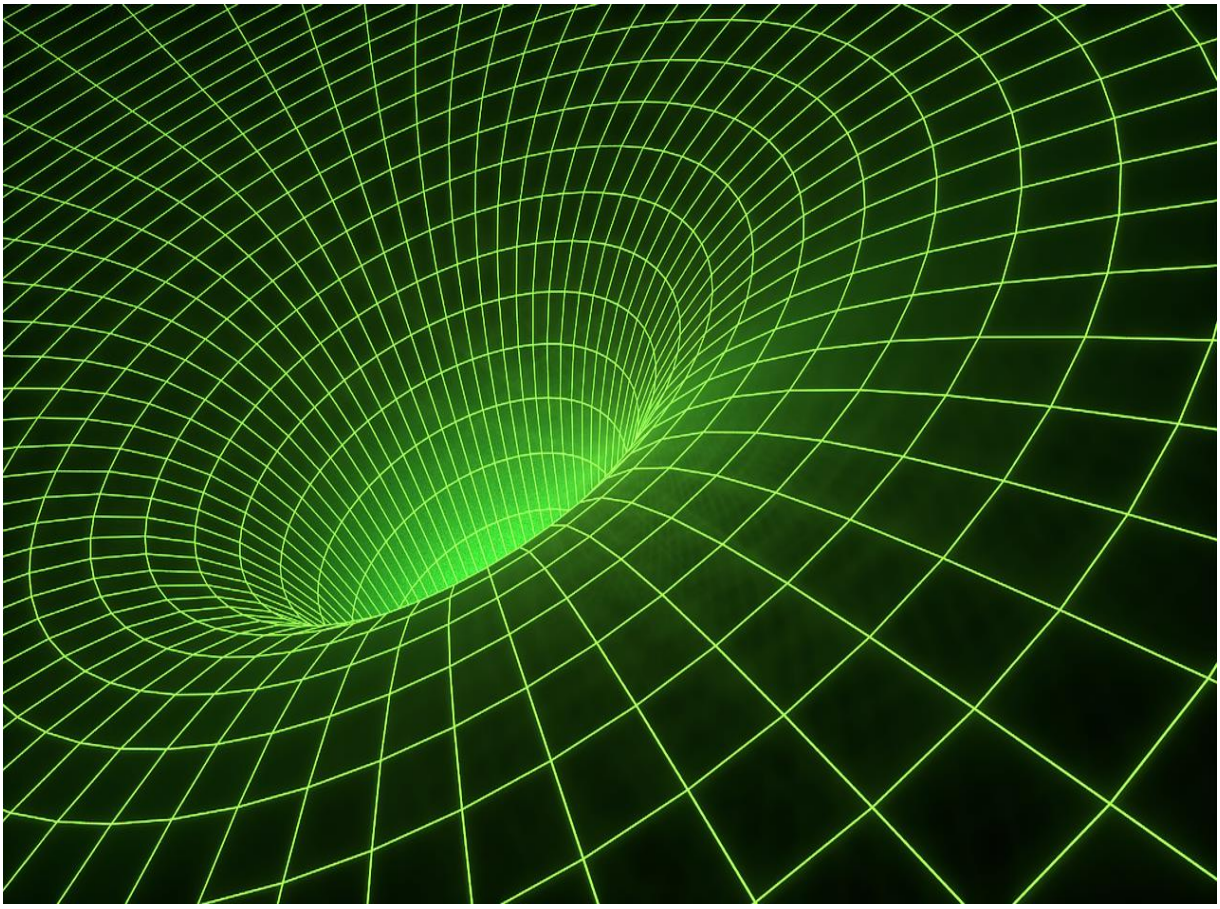

Image source: pixabay.com.

This image demonstrates a Pit induced in this Interwoven Space/Time by a Mass body.

A very superficial explanation of how this Pit attracts other Mass bodies can be visualized, by imagining that any other Mass body tends to fall into that Pit, generated by the Mass body that attracts this other Mass body.

Again, this is not a viable explanation to how Mass bodies attract each other, according to Einstein's General Relativity Theory, it is provided here only to provide a feeling, how this happens.

Similarly, to the above, the paper [24] assumes that Similar Pits are induced by Electric Charges, into the proper Interwoven Space/Time entities relating to the additional two separate Interwoven Space/Time entities related to Electric Charges, to induce attraction between Electric Charges, as, for example, when a Positive Electric Charge attracts a Negative Electric Charge, or, for example, when a Negative Electric Charge attracts a Positive Electric Charge.

Another example of a three-dimensional slice of a four-dimensional Interwoven Space/Time entity is represented by the image bellow:

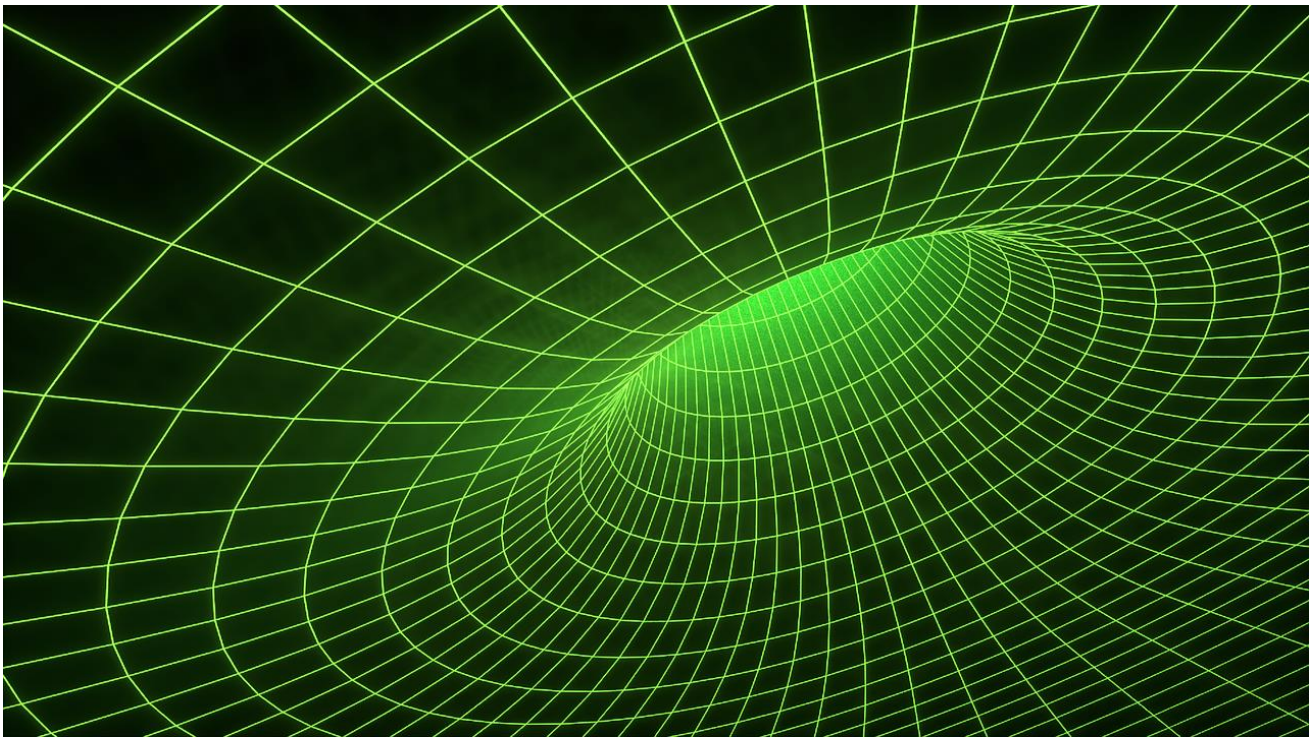

Image source: pixabay.com.

This image demonstrates a Bump induced in this Interwoven Space/Time by an Electric Charge to induce repulsion.

Because Mass bodies only attract each other, the above image can be related only to Electric Charges, because only Electric Charges repel each other.

A very superficial explanation of how this Bump repels another Electric Charge can be visualized, by imagining that any other Electric Charge tends to roll down, away from the top of this Bump, and away from the Electric Charge that induced this Bump, as, for example, when a Positive Electric Charge repels another Positive Electric Charge, or, for example, when a Negative Electric Charge repels another Negative Electric Charge.

Again, this is not a viable explanation to how Electric Charges repel each other, it is provided here only to provide a feeling, how this happens.

The cover page of this book demonstrates the five versions of Pits or Bumps induced in the three separate Interwoven Space/Time entities, presented in the paper [24].

The images in the cover demonstrate the following:

The top left image demonstrates how a Negative Electric Charge (e^-) induces a Pit in the Interwoven Space/Time entity related to the Positive Electric Charges, to cause attraction of any other Positive Electric Charge to it.

Then, the top right image, demonstrates how a Positive Electric Charge (p^+) induces a Bump in the Interwoven Space/Time entity related to the Positive Electric Charges, to cause a repulsion of any other Positive Electric Charge from it.

Then, the middle image, demonstrates how a Mass body (M) induces a Pit in Einstein's Interwoven Space/Time entity, to cause attraction of any other Mass body to it.

Then, the bottom left image demonstrates how a Negative Electric Charge (e^-) induces a Bump in the Interwoven Space/Time entity related to the Negative Electric Charges, to cause a repulsion of any other Negative Electric Charge from it.

Then, the bottom right image demonstrates how a Positive Electric Charge (p^+) induces a Pit in the Interwoven Space/Time entity related to the Negative Electric Charges, to cause attraction of any other Negative Electric Charge to it.

However, what is important to emphasize is the statement, presented in the paper [24], that there are three ***separate and independent*** Interwoven Space/Time entities.

One Interwoven Space/Time entity is Einstein's Interwoven Space/Time entity, related to Mass bodies, and, in addition to that Interwoven Space/Time entity there are two additional Interwoven Space/Time entities, relating to Electric Charges, one relating to the Positive Electric Charges, and another relating to the Negative Electric Charges.

Thus, if these three Interwoven Space/Time entities are ***separate and independent*** from each other, and each contains ***its own Space and its own Time*** entity, then, Space and Time, as humans perceive them, ***cannot exist***.

If the above applies, then Space and Time are just facets of three Energies, the three interwoven Space/Time entities presented above.

One of these Energies is the Energy embedded in Einstein's Interwoven Space/Time entity.

It was already presented above that Einstein's interwoven Space/Time entity replaces Newton's Gravitational Field, which was recognized as a form of Energy. Thus, Einstein's Interwoven Space/Time entity must also be a form of Energy.

The second form of Energy, which embeds its own facets of Space and Time, is the Interwoven Space/Time entity, relating to the Positive Electric Charges, presented in the paper [24], which replaces the Electric (and Magnetic) Fields generated by Positive Electric Charges.

The third form of Energy, which embeds its own facets of Space and Time, is the Interwoven Space/Time entity, relating to the Negative Electric Charges, presented in the paper [24], which replaces the Electric (and Magnetic) Fields generated by Negative Electric Charges.

In the previous chapter of this book it was presented, that the new Energy Pairs Theory also states that Space is just a form (or facet) of Energy.

Now, the paper [24] provides an additional support, from a completely different angle to the statement, that Space and Time are just facets of Energies.

However, the conclusion, that there are three ***separate and independent*** Interwoven Space/Time entities, might seem peculiar, although it provides a reasonable explanation to why Electric Charges attract or repel each other.

Because this conclusion is also based only on a thinking experiment, logic, and reason, which support this conclusion, the paper [24] also proposes an experiment that can validate, or disprove, this conclusion.

This experiment is based on the following:

The assumption provided in the paper [24] that Electric (and Magnetic) Fields are also forms of Acceleration, as Newton's Gravitational Field is a form of Acceleration, also resulted in a conclusion that Newton's Second Law of Motion (F=ma) does not always applies.

That conclusion stated that Newton's Second Law of Motion applies only for very massive bodies such as Planets, or Uncharged bodies (bodies which are not Electrically charged).

From the above, the paper [24] states, that if Electric (or Magnetic) Fields are also forms of Acceleration, which is a base on which the conclusion relating to the three separate Interwoven Space/Time entities relies, then the Acceleration imposed on two bodies Charged with Electric Charges which are attracted to each other (or are repelled from each other), under Coulomb's Law, must be dependent on the magnitudes of the Electric Charges that these bodies carry, and not on the magnitudes of the Masses of these bodies.

The science of Physics today claims that in the scenario presented above, the Acceleration of these Electrically Charged bodies will be dependent only on the magnitudes of the Masses of the bodies, and not on the magnitudes of the Electric Charges they embed.

The experiment proposed by the article [24], is designed to evaluate if the Acceleration of these Electrically Charged bodies is dependent on the magnitudes of the Masses of the bodies, or on the magnitudes of the Electric Charges they embed.

If that experiment will prove, that in the above scenario, the Acceleration of the Electrically Charged bodies is dependent on the magnitudes of the Electric Charges that these bodies embed, this should provide validity to the theory presented in the paper [24],

and thus, provide validity also to the statement that Time and Space are just facets of Energies.

Implementation of such an experiment seems to be relatively simple, but still requires means and funds which are beyond the reach of the author of this book.

Thus, the author of this book hopes, that this book will bring about the implementation of this experiment, and, possibly, a validation of the theory presented in the paper [24].

The next chapter of this book presents a summary of what was presented already in this book, a summary related mainly to the Energy entity, which embeds new angles and points of views about the Energy entity.

Traceable and Untraceable Energies

This chapter summarizes what was presented already in this book, which relates especially to the Energy entity.

Energy and the Energy Conservation Principle might be the most important building blocks of the Physical Sciences.

Until the discovery, in the 20th century, that the Universe expands much faster than the expansion that can be justified by the amount of the calculated Energy in the whole Universe, the Energy was believed to be composed of only Traceable Energy components.

After the above-mentioned discovery, the notion of Untraceable Energy (or Dark Energy) was introduced into the science of Physics. However, the exact origin of this Dark Energy is still a mystery.

The acceptable notions by the science of Physics today are, that the Dark Energy must be looked for in Gravitation, using Einstein's General Relativity Theory.

However, this book presents argumentations that the origin of ***most*** of the Dark Energy might be in Electromagnetism.

This book also provides other new insights into the Energy entity, which might also explain additional peculiarities and paradoxes that are yet ignored.

These explanations start with the following observations:

This book argues that Electromagnetic waves, from separate sources, might consolidate, contrary to the acceptable notion [8], that such consolidation cannot occur.

This book presents several papers [9], [10], [13], which present a scenario, of two Electromagnetic Waves, from separate sources, that meet on a half transparent mirror, and in certain conditions, as described in the paper [9], consolidate.

In an extreme case of such Electromagnetic Waves consolidations, a Null Electromagnetic Wave is composed, without any Electric or Magnetic fields. Thus, in this scenario, Energy ***seems*** to disappear, which ***seems*** like a clear violation of the Energy Conservation Principle.

In another extreme case of such Electromagnetic Waves consolidations, Energy ***seems*** to be created out of nothing, which also ***seems*** like a clear violation of the Energy Conservation Principle.

And in almost all cases of such Electromagnetic Waves consolidations, the Energy embedded in the resultant consolidated Electromagnetic Wave ***seems*** to embed either more or either less Traceable Energy, as compared to the Traceable Energies embedded in

the original consolidating Electromagnetic Waves, which also ***seems*** like a clear violation of the Energy Conservation Principle.

Thus, in all cases of such Electromagnetic Waves consolidation, the Energy Conservation Principle ***seems*** to be violated.

Thus, the papers [9], [10], [13] present, that Electromagnetic Waves consolidations, from separate sources, result in surprising paradoxes, because the Energy Conservation Principle ***seems*** to be violated, if such Electromagnetic Waves consolidations do occur.

The paper [9] resolves this paradox by introducing the novel Energy Pairs Theory, which explains these paradoxes by arguing that the Energy which ***seems*** to be missing in the Null Electromagnetic Wave, is conserved as Untraceable Energy in the Photons of the resultant consolidated Electromagnetic Wave, which are conserved in Space

The paper [13] explains that the Energy that was ***seemingly*** generated out of nothing, is Untraceable Energy embedded in Photons, in the consolidating Electromagnetic Waves, that converted back to Traceable Energy.

The paper [9] also explains other paradoxes in the famous Mutual Annihilation process which refers to the Electron-Positron Annihilation process [25], and in the famous Pair Production process [26], in which a Photon, in certain conditions, converts into an Electron and a Positron.

The explanations of the paradoxes embedded in the Mutual Annihilation and in the Pair Production processes also provide a new insight into the nature of the Electric Charge, which is shown to be a form of Energy, as Mass is recognized as a form of Energy, following the introduction of Einstein's Special Relativity Theory.

In addition to the above, this book presents the paper [18], which presents that what the Science of Physics recognizes as Space, manifests a phenomenon like what was presented in the paper [9].

This paper [18] presents that Electric fields in Space always annihilate each other, and the same applies to the Magnetic fields in Space, which ***seems*** like a violation of the Energy Conservation Principle.

Based on the above, the paper [18], uses the novel Energy Pairs Theory introduced in the paper [9], to explain this paradox, and the paper concludes that Space itself is also a form of Energy, that contains continuously, and at each point of it, Traceable and Untraceable Energies, which implies that most of the Untraceable (Dark) Energy, is of Electromagnetic origin.

That paper [18], also calculates the total amount of the Dark Energy in Space and concludes that the Energy embedded in the Dark Energy in Space is about two thirds of the total Energy in the Universe, which complies with the acceptable agreement about the amount of Energy embedded in the Dark Energy in the Universe.

Thus, from the above follows that the paper [18] implies that the Dark Energy which originates from Electromagnetism might be ***most*** of the Dark Energy in the Universe.

It was already mentioned before, that although the nature and origin of the Dark Energy is still a mystery, the acceptable notion held, by the science of Physics today, is that the Dark Energy relates to Gravitation, and must be looked for, using Einstein's General Relativity Theory.

This book does not discard the possibility that parts of the Dark Energy might be related to Gravitation, because there are similarities between the Mass and the Electric Charge entities such as:

The identical structures between Newton's Universal Gravitational Law and Coulomb's Law,

And Gravitation embeds the entity of Gravitational Waves [28]-which is analogous to the Electromagnetic Waves,

And, analogous to the detection of Magnetism by a spectator external to a moving Electric Charge, a spectator external to a Mass moving at a constant velocity sees a phenomenon denoted as Gravitational Electromagnetism (GEM) [29], which is the analogy of Electrical Magnetism in Gravitation.

All the above-described similarities, between the Mass and the Electric Charge entities implies that like the prediction presented by this book, that parts of the Dark Energy originate from Electromagnetism, parts of the Dark Energy, might originate also from Gravitation.

However, Electromagnetism is much more ***potent*** as compared to Gravitation, this can be demonstrated by the following:

The Gravitational Force between two 1-kg Mass Objects that are 1 meter apart is

$6.67 \cdot 10^{-11}$ [30],

while the Attraction or Repulsion Force caused by the Coulomb's Law, between two 1 Coulomb Electrically Charged Bodies, held 1 meter apart, is

$9 \cdot 10^{9}$ Newtons [31].

The above clearly indicates that the Coulomb's Force might be more ***potent***, as compared to the Gravitational Force, by a magnitude factor of $1.35 \cdot 10^{20}$!

Thus, the above might indicate that ***most*** of the Dark Energy originates from Electromagnetism, as this book predicts.

In addition to the conclusions already presented above, that most of the Dark Energy in the Universe might originate from Electromagnetism, and that Electric Charges are also forms of Energies, as Mass is already recognized as a form of Energy, this book presents arguments that Space, and Time, are also just facets of Energies.

The conclusion that Space is a form (or facet) of Energy was already presented in this book as a conclusion which is derived from the new Energy Pairs Theory and from the paper [18].

However, this book also presents the paper [24] which provides further argumentations that Space and Time are just facets of Energies.

These argumentations, which conclude that Space and Time are just facets of Energies, relate to Einstein's Interwoven Space/Time concept presented by Einstein's General Relativity Theory.

Einstein's General Relativity Theory explained why Mass objects attract each other, by introducing the Interwoven Space/Time notion, which replaced Newton's Gravitational Field, to explain Mass objects attraction.

Since the Gravitational Field is a form of Energy, then, the Interwoven Space/Time Entity should also be a form of Energy.

In a speech, in the University of Leiden on May 5th, 1920, [27], Einstein claimed that ether should exist to provide physical properties to his Space/Time entity, which implies, that Einstein also agreed that his Space/Time Entity is a form of Energy.

Although the origin of Mass bodies attraction was resolved by Einstein's General Relativity Theory, the origins of Electric Charges attractions or repulsions remained a mystery.

The paper [24], presented briefly in this book, explains the origin of Electric Charges attractions or repulsions by arguing that Electric (or Magnetic) Fields are also forms of

Acceleration, as Newton's Gravitational Field (and Einstein's Space/Time Entity) are forms of Accelerations, which also implied that the Electric (or Magnetic) Fields are also Space/Time Entities and are also just forms of Energies.

In that paper, [24], two more Space/Time Entities were introduced, in addition to Einstein's Space/Time Entity, a Space/Time Entity attributed to the Positive Electric Charges, and a Space/Time Entity attributed to the Negative Electric Charges.

However, each of these three Interwoven Space/Time Entities are ***separate***, and each embeds ***its own, separate Space, and its own, separate Time***, which implies that Space and Time are not independent entities, they are only facets of three separate forms of Energies, the three Interwoven Space/Time Entities presented in the paper [24].

The claims presented in the paper [24] also result in a prediction that Newton's Second Law of Motion (F = ma) might be correct only for very massive bodies (such as planets) or Uncharged bodies (bodies that are not Electrically Charged).

That prediction states that for most Electrically Charged bodies the Acceleration between such bodies resulting from the Coulomb's Force exerted between such bodies, is dependent on the Electric Charges magnitudes that such bodies embed and not on their Mass magnitudes (as Newton's Second Law of Motion states).

Based on the above, the paper [24] suggests an experiment that might validate the above prediction, and thus, provide validity to the three Interwoven Space/Time Entities suggested in that paper.

Thus, if Mass is a form of Energy (derived from Einstein's Special Relativity Theory), and Electric Charges are forms of Energy (suggested by the paper [9]), and the notions of Space and Time are not independent notions because there are three separate Space entities and three separate Time entities, and each such entity is just a facet in one of the three separate Interwoven Space/Time Entities, which are also forms of Energy, then, Energy is not only the most basic building block of the Physical Sciences, it might be the only independent Entity.

The following chapters of this book present possible explanations to additional unanswered questions and peculiarities, already presented in this book, and possible technological breakthroughs that can be achieved, if the experiments suggested in this book, will be executed, and their results will be successful, validating the theories presented in this book, as this book predicts.

Why Light embeds two facets?

The Wave-particle duality problem of Light [36], dates to Newton's days.

The question of Light being a flux of particles, or a propagated perturbation in a medium or luminiferous ether, resulted in the Science of Physics accepting the conclusion that Light manifests two facets simultaneously, a Wave facet and a Particle facet.

The Wave facet or the periodic nature of Light, was first recognized by Newton, who measured the wavelength of Light with his Newton's rings interference observations.

Then, the conclusion derived from Maxwell's equations, that accelerating Electric Charges emit radiation in the form of Electromagnetic Waves, brought about the understanding that Light is just a subset group of frequencies of the broader phenomena of Electromagnetic Waves.

Then, after the Photoelectric Effect was explained by Einstein, the science of Physics concluded that Electromagnetic Waves (including Light), are also streams of Particles, namely the Photons, which established the recognition, that Light, and any other Electromagnetic Wave, have also a Particle facet.

However, although the science of Physics accepts these two simultaneous facets of Light, and any other Electromagnetic Waves, this situation, in which Light, and any other Electromagnetic Waves, embeds such separate and different facets simultaneously, seems to be an unnatural situation, which seems like an open problem, that should be resolved.

This unanswered question or peculiarity, relating to Light, and Electromagnetic Waves in general, embedding two such different facets, was already addressed previously in this book, and it was already stated, that it seems that this implies, that the science of Physics today does not completely understands the real nature of Light, and Electromagnetic Waves in general, unless this peculiarity is explained.

This book also presented, in a previous chapter of this book, that the Quantum Mechanics Theory, which is a significant and important part of the acceptable nowadays Physics Theories, also addresses the Wave-Particle paradox, and the acceptable notion held by the science of Physics today is, that a ***partial*** and ***incomplete*** explanation of the Wave-Particle paradox, may be provided by the Quantum Mechanics Theory.

However, reference [36], presented in the references section of this book, states:

"Although the use of the wave–particle duality has worked well in physics, the meaning or interpretation has not been satisfactorily resolved"

And

"Wave–particle duality is an ongoing conundrum in modern physics"

And these statements refer also to the ***partial*** and ***incomplete*** explanation of the Wave-Particle paradox, which is provided today by the Quantum Mechanics Theory,

which implies what was presented above, that the Wave-Particle Paradox, which is not completely resolved by the science of Physics today,

should indicate that the real nature of Light, and Electromagnetic Waves in general, is not completely understood yet by the science of Physics today.

Reference [37], in the references section of this book, also relates to this partial and incomplete explanation of the Wave-Particle duality paradox, provided by the Quantum Mechanics, which introduces the concept of a physical particle which is always a point-like particle, and a separate wavefunction with some sort of physical reality, which provides the trajectories that this point-like particle might occupy.

By separating the two entities embedded in the Wave-Particle duality, the Particle and the Wavefunction into two separate entities, the above explanation claims to resolve the paradox, because these entities are now separate entities, and are not assumed to be parts of one single entity.

However, that reference [37] also indicates that this explanation is partial and incomplete because it states:

“This model has not been satisfactorily extended to relativistic levels”, and “Standard quantum theory contains a paradox known as the wave-particle duality paradox” and “This paradox might be symptomatic of a theory with intrinsic problems or a theory with an incorrect interpretation of its results."

In addition to the above, that partial and incomplete explanation, to the Wave-Particle duality paradox, provided by the Quantum Mechanics, does not also address the following:

The Wave-Particle duality paradox related to Light, and Electromagnetic Waves in general, does refer to physical Electromagnetic Waves, which are composed of physical propagating and oscillating Energy Fields (the Electric and the Magnetic Fields which compose an Electromagnetic Wave) which can be physically detected and measured.

And since the Particle facet, of the Wave-Particle duality paradox related to Light, the Photon, is recognized as pure Energy, without any Electric Charge, the following question, as related to this paradox, might also be asked:

How Photons, which are pure Energy, without any Electric Charge, can generate physical Electric and Magnetic Fields, and be equated with such Fields?

While the science of Physics already recognizes that the generation of Electric and Magnetic Fields are related to Electric Charges, and not to an entity that embeds only pure Energy, without Electric Charges, such as Photons.

Thus, from the above, it might be concluded, that the partial and incomplete explanation of the Wave-Particle paradox explanation provided by the Quantum Mechanics Theory, is indeed partial and incomplete, and as stated by reference [36]

“Wave–particle duality is an ongoing conundrum in modern physics”,

which implies, as already stated above, that the science of Physics today does not completely understands the real nature of Light, and Electromagnetic Waves in general, unless this peculiarity is explained.

This book presents another explanation to the Wave-Particle duality paradox, which is based on a previous work done already by (the late) Prof. J. P. Wesley, which explains this paradox more satisfactorily, including an explanation, how Photons, which are pure Energy, can generate physical Electric and Magnetic Fields, and be equated with such Fields.

The Electron Positron-Photon idea, which is due originally to (the late) Prof. J. P. Wesley, in his paper titled: "Light, a Flux of Electric Dipole Photons" [32],

proposed a model of the Photon as an Electric Dipole Photon which might be an Electron-Positron pair separated by a distance L.

Such a model can explain how Photons, which according to this model are an Electric Dipole, can generate Electric and Magnetic Fields.

However, since Photons propagate at the velocity of Light, and Electrons and Positrons have rest Mass values which are not zero, then, if Einstein's Special Relativity Theory conclusion, relating to Mass gain with velocity, is accepted as valid, then, if Photons are Electron-Positron pairs, their Masses must increase to become infinite magnitude Masses.

Because the Mass of any particle, with non-zero rest Mass, must increase to become an infinite Mass magnitude, when this particle travels at the velocity of Light, according to Einstein's Special Relativity Theory.

Thus, if Einstein's Special Relativity Theory is accepted as a valid theory, Photons cannot be pairs of Electrons and Positrons.

J.P. Wesley did not accept the relativistic Mass gain with velocity as concluded from Einstein's Special Relativity Theory, and as such, proposed this Photon model, which provides a possible resolution to the Wave-Particle problem of Electromagnetic waves, exhibiting two separate facets simultaneously, the Wave facet and the Particle facet, (or the Photon's facet).

However, the new Energy Pairs Theory, presented in this book, might provide a ***modification*** to the J.P. Wesley's Electron Positron Photon idea, by presenting the argument, that Photons embed also Untraceable Energy, in addition to Traceable Energy, and this Untraceable Energy, might still exhibit the behavior of an Electric Dipole, even though, these Untraceable (or Dark) Energies are pure Energies, with no Mass associated to them.

The new Energy Pairs Theory argues that such Untraceable Energy embedded in a Photon might be also the result of a Mutual Annihilation [25] between an Electron and a Positron.

In this Mutual Annihilation process, the new Energy Pairs Theory argues,

that the Masses of the annihilating Electron and Positron are embedded in the Traceable Energy embedded in the created Photons,

and the Electric Charges of the annihilating Electron and Positron are converted into the Untraceable Energy embedded in the created Photons.

Also, the new Energy Pairs Theory argues that in the inverse Pair Production [26] process, in which a Photon, in certain conditions, converts back to an Electron and a Positron,

the Traceable Energy embedded in the Photon is converted into the Masses of the created Electron and Positron,

and the Untraceable Energy embedded in the Photon, is converted into the Electric Charges of the created Electron and Positron.

So, according to the new Energy Pairs Theory, because Photons can embed both, Traceable Energy and Untraceable Energy, and because this Untraceable Energy originate from physical Electric Charges and converts back to physical Electric Charges,

it might be argued that this Untraceable Energy might also retain their ability to function as an Electric Dipole, as the original physical Electric Charges could act as Electric Dipoles before being converted into Untraceable Energy.

Thus, the new Energy Pairs Theory argues, that the Untraceable Energy embedded in Photons might be able to behave as Electric Dipoles, even though they are embedded in the Photon as pure Untraceable Energy, without any Mass associated to them, and not as physical Electric Charges.

And this might also explain how Photons, which compose an Electromagnetic Wave, might also be able to generate the Electric and Magnetic fields, which compose this Electromagnetic Wave,

and travel at the velocity of Light,

because they embed Untraceable Energy, instead of the Masses, that were embedded in the Electron and the Positron, before they converted to Untraceable Energy.

This resolves the problem mentioned above, relating to the original Electron Positron-Photon idea, as presented in J. P. Wesley's paper.

The problem which inhibited the possibility that Photons are pairs of Electron-Positron,

because Photons travel at the velocity of Light.

Thus, the above presented modification to J. P. Wesley's paper, brought about by using the new Energy Pairs Theory, resolves the Wave-Particle duality paradox.

Because if the Electric Dipoles embedded in Photons, as presented above, which result from a Mutual Annihilation process, of an Electron and a Positron, are just pure Energy (although Untraceable Energy) without any Mass associated to them, they can travel at the speed of light, and are also able to generate the Electric and Magnetic Fields which compose an Electromagnetic Wave, which present the Wave facet of this Electromagnetic Wave, which explains the Wave-Particle paradox of Electromagnetic waves as brought about by (the late) J.P. Wesley's paper.

Why Light velocity is so special and unique?

Einstein's Special Relativity Theory presented the postulate, that the velocity of Light is the maximum attainable velocity, that any tangible material can achieve, and the measured velocity of a Light beam, measured by any spectator, always results in a constant value, regardless of the velocity and the direction of the movement of that spectator, relative to that measured Light beam.

The question: why this postulate was presented by Einstein as a postulate (or axiom) without any explanation? was already presented in this book, as an unanswered question that needs an explanation.

Why only the velocity of Light is so special and unique?

It was already stated in this book, that this postulate must be a viable postulate, because it is a crucial base on which Einstein's Special Relativity Theory is based.

And because Einstein's Special Relativity Theory is already recognized, and accepted, as a viable Theory, based on many observations, this postulate should be also accepted as a viable postulate.

Still, the following question should be addressed: why Einstein presented this postulate as a postulate (or an axiom), without providing any proof or explanation as related to its validity?

This chapter might provide a possible explanation to the question presented above.

As presented already in this book, this book presented the hypothesis, that the Universe is composed of only one entity, Energy.

If the Universe is composed of only one entity, Energy, then, all the movements in the Universe must be just a result of ***interactions*** between Energies, whose outcomes is perceived by humans as an Energy (or Energies) which is moving.

The explanation provided, in this chapter, to the question: why the velocity of Light is such special and unique? is based on several elements.

The first element is the recognition, that Space and Time as humans perceive, do not really exist.

As already presented in this book, this book concluded that the Universe is composed of only one entity, Energy, also, because it concluded, that Space and Time are not independent entities, they are just facets, attributed by humans, to three Energies, the three separate Interwoven Space/Time entities, presented in the paper [24], which also imply, that Space and Time ***does not really exist***, they are only notions, invented by humans, to perceive movements and changes in the Universe.

It should be emphasized that this book presents that each of the three ***separate*** Interwoven Space/Time entities, presented in this book, should embed ***its own*** Space and ***its own*** Time entities, which implies that ***if*** such Space and Time entities ***are really*** embedded in the three Interwoven Space/Time entities, presented in this book, then, the Space and the Time entities, as humans perceive these entities, ***cannot really exist***, because humans assume that there should be only ***one*** (and not three) Space entity and only ***one*** (and not three) Time entity.

From the above it can be concluded that the separate Space and the separate Time attributes (or facets) attributed to each of the three Interwoven Space/Time entities, presented in this book, is based on how humans ***interpret*** the ***interactions*** between each of the three Interwoven Space/Time Energy entities with other Energy entities, and this might also imply that Space and Time attributes might ***not be really*** embedded in any of the three Interwoven Space/Time entities, presented in this book.

What was just presented, also implies that the way that a ***specific*** Interwoven Space/Time entity ***interacts*** with ***another specific*** Energy entity, might ***enable*** humans to ***assign*** to that ***specific*** Interwoven Space/Time entity attributes of Space ***or*** Time, or even attributes of Space ***and*** Time, to ***explain*** the ***interaction*** that this ***specific*** Interwoven Space/time entity conducts with this ***other specific*** Energy entity, even though such Space and Time entities are not really embedded in that specific Interwoven Space/Time entity.

For example, the Einstein's Interwoven Space/Time Energy entity (which replaced Newton's Gravitational Field, which is also an Energy entity) ***interacts*** with Masses (which are also forms of Energy) in a way, which enabled Einstein's ***interpretation*** regarding the nature of that Interwoven Space/Time entity, which resulted in assigning to that Interwoven Space/Time entity, an attribute of a Space entity ***and*** an attribute of a Time entity (which are interweaved), because such an ***interpretation*** enabled Einstein to explain the origin of the attraction between Mass bodies.

But it might be that ***interactions*** of the Einstein's Interwoven Space/Time entity with Energy entities which ***are not*** Masses, ***might indicate*** that Einstein's Interwoven Space/Time entity ***does not need*** to embed any Space or Time attributes at all.

From the above it can be stated that the three Interwoven Space/Time entities, presented in this book, ***might not embed*** any Space or Time entities, and all that it can be established is that each of the three Interwoven Space/time entities is a form of an Energy entity, which ***interacts*** with other forms of Energy entities. But humans might ***interpret some*** of the ***interactions*** that a specific Interwoven Space/Time entity conducts with some other specific forms of Energies, as if that Interwoven Space/Time entity does embed Space ***or*** Time attributes, or even Space ***and*** Time attributes.

A second element on which the explanation provided, in this chapter, to the question: why the velocity of Light is such special and unique? is the observation that the measured velocity value of a Light beam, by humans, also presents a severe peculiarity, which is presented as follows:

When a human spectator measures the velocity value of any tangible substance, for example, the velocity of a moving Mass body, the velocity, and the direction of motion of this spectator ***does affect*** the measured velocity value of this Mass body, by this human spectator,

But, as already stated above, when a human spectator, measures the velocity value of a Light beam, the velocity, and the direction of motion of this spectator ***does not affect at all***, the measured velocity value of this Light beam, by this human spectator.

This should be regarded as a severe peculiarity, in any velocity value measurements of Light beams, by humans, which must be also explained.

This peculiarity might imply that humans ***cannot*** execute at all, a reliable measurement of the velocity value of a Light beam, because of the following:

Humans can perceive any motion only by using the terms Time and Space, because velocity is perceived (and calculated) by humans as the first derivative of Space as related to Time (for example $v_x=dx/dt$).

Thus, two velocities can be measured by humans, and compared reliably to each other, only if each of these velocities is ***affected*** by what humans perceive as a Space element, ***and*** a Time element.

If, as stated above, the three Interwoven Space/Time entities ***do not really*** embed any Space or Time attributes, then, there might be ***interactions*** between a specific Interwoven Space/Time entity and a specific other form of Energy, which will ***not enable*** humans to assign Space and Time attributes to that Interwoven Space/time entity, as related to that ***interaction***.

Thus, in such an ***interaction*** between that specific Interwoven Space/Time entity and a specific other form of Energy, the measured velocity value of this Energy movement, ***cannot be measured by humans***, because the first derivative of Space as related to Time (for example $v_x=dx/dt$), cannot be established, which also implies, that humans cannot reliably compare the measured velocity of this Energy movement to any other velocity of any other Energy movement.

The only ***interactions*** that humans ***can and need*** to attribute to them Time ***and*** Space facets, to perceive, or explain, these ***interactions***, are the ***interaction*** between Einstein's Interwoven Space/Time Energy entity with the Mass Energy entity, and the interactions between the two additional Electrical Interwoven Space/Time Energy entities, presented in the paper [24], and the Electric Charge Energy entities, because these three Interwoven Space/Time entities are the ***only*** Energy entities, which cause ***non-instantaneous*** movements in the Universe, movements of either Mass bodies, or Electrically Charged bodies.

The statement presented above, that the three Interwoven Space/Time entities are the ***only*** Energy entities, which cause ***non-instantaneous*** movements in the Universe, requires some additional explanation:

In addition to movements, caused by the three Interwoven Space/Time entities, as presented in this book, Energies might start moving, or change their movement, because of other causes.

For example, when a moving Particle bumps into a non-moving Particle, the non-moving Particle starts moving, and the movement of the Particle that bumped into the non-moving Particle, acquires a change in its movement.

However, what was just described above, is just an ***instantaneous*** transfer of Energies between these two Particles, and after this instantaneous transfer of Energies occurs, the ***non-instantaneous*** movements of these Particles are continued to be controlled only by the three Interwoven Space/Time entities, until some of these Particles undergo another ***instantaneous*** transfer of Energy.

As related to all other forms of Energies, for example, Mass or Electric Charges, humans don't need to attribute, to these forms of Energies, any facets of Space or Time, because Mass or Electric Charge do not move, unless they interact with each other ***instantaneously*** which causes just an instantaneous Energy transfer, (as presented above), or interact with either one or more of the three Interwoven Space/Time Energy entities, mentioned above, to undergo ***non-instantaneous*** movements.

Then, the ability to measure the velocity value of a specific Energy movement by humans, and the ability to compare reliably this measured velocity value, of this specific Energy movement, by humans, to the value measured of any other velocity, is dependent on how this Energy ***interacts*** with the three Interwoven Space/Time entities (or any one of them).

Thus, if this Energy movement is affected by the three Interwoven Space/Time entities (or any one of them) such that ***both***, the facet of Time ***and*** the facet of Space, which humans attribute to this specific ***interaction*** of this specific Interwoven Space/Time entity, participate in that ***interaction*** of this specific Interwoven Space/time entity with that specific Energy movement, then, the measured velocity value of that Energy movement

can be reliably compared to the measured velocity value of any other velocity, because the first derivative of Space as related to Time (for example $v_x=dx/dt$), in this movement, can be calculated.

But, if only one of these facets seem to ***interact*** with that Energy movement, for example, only the Space facet seem to interact with that Energy movement, and the other facet, the Time facet does not participate in the interaction with that Energy movement, then, it will be impossible to establish a reliable measured value of the velocity of that Energy movement, by humans, which can be reliably compared to the measured value of any other velocity, because it will be impossible to establish the first derivate of Space in relation to Time (for example $v_x=dx/dt$) in relation to that Energy movement.

However, in such a case, humans might still perceive that Energy movement as an active movement, because, as stated above, the Space facet does seem to affect this movement, even though the Time facet, did not seem to affect this movement.

In all movements of entities in the Universe that are movements of Particles, what are moving are either Mass or Mass plus Electric Charges, because all Particles are composed, of Elementary Particles, which are composed of either Mass or Mass plus Electric Charges.

As presented in the paper [24], all movements in the Universe which are movements of Particles, are controlled by one or more of the three Interwoven Space/Time entities, and such Energy movements (which are movements of Particles) also continue to interact with these Interwoven Space/Time entities, such that both, the facet of Space ***and*** the facet of Time, attributed to these Interwoven Space/Time entities, by humans, participate in these interactions.

This implies that the measured velocities embedded in these Energy movements, which are movements of Particles, which are the movements of all the tangible materials in the Universe, can be compared to any other measured velocity.

For example, the velocity in the movement of a Mass body movement caused by Einstein's Interwoven Space/Time, can be compared to the velocity of an additional Mass body, caused also by Einstein's Interwoven Space/Time entity, because the Space and the Time facets, attributed to Einstein's Interwoven Space/Time entity, are both involved and participate in the interactions of all these Energy movements.

However, in addition to Particles, two additional entities are moving in the Universe.

These two additional movements, which are not movements in which Particles are moving, are the movements of entities which are pure Energies, and still move in the Universe, mainly, the movements of Electromagnetic or Gravitational Waves, which both move at the velocity of Light.

These movements, of these entities, (the Electromagnetic or Gravitational Waves), also interact with these three Interwoven Space/Time entities.

Einstein's General Relativity Theory predicted, and that prediction was supported later by observations, that Light which passes near a star is bended according to the Space bending, that this star Mass induces into Einstein's Interwoven Space/Time entity.

However, the measured velocity of this Light remains the same constant velocity attributed to the velocity of Light.

Thus, based on this prediction and observation, it might be concluded, that interactions between Interwoven Space/Time entities and pure Energies, such as Electromagnetic Waves, or Gravitational Waves, result in the Space facet, attributed to the Interwoven Space/Time entities by humans, affecting the movements of Electromagnetic or Gravitational Waves in the Universe.

But, it might also be concluded, that in interactions between Interwoven Space/Time entities and pure Energies, such as Electromagnetic Waves, or Gravitational Waves, the Time facet, attributed to these Interwoven Space/Time entities, by humans, ***does not*** participate in affecting the movements of Electromagnetic or Gravitational Waves in the Universe, because, as stated above, measured velocities of Electromagnetic Waves, or Gravitational Waves, by humans, involve the peculiarity presented above, in which that measurement, is not affected at all, by the velocity or the direction of movement, of the spectator which measures that velocity.

Thus, in view of the above, the velocity of Electromagnetic or Gravitational Waves in the Universe, cannot be reliably measured, by humans, and cannot result in a velocity value

which can be reliably compared to any other velocity, for example, to any velocity of a moving Particle in the Universe.

However, if the measured velocity value of Electromagnetic or Gravitational Waves in the Universe, by humans, will result in a velocity value which is bigger as compared to a specific set of velocities in the Universe, but is also smaller as compared to another set of velocities in the Universe, this should imply that this measured velocity value of Electromagnetic or Gravitational Waves in the Universe, by humans, is a reliable measurement, because its comparison with other velocity values in the Universe, results in what seems to be, a reasonable comparison.

Thus, as stated above, if the measured velocity value of Electromagnetic or Gravitational Waves in the Universe, by humans, cannot result in a velocity value which can be reliably compared to any other velocity, because of the peculiarity, presented above, existing in such a measurement, in which the velocity and the direction of movement of the spectator that executed this measurement, does not affect at all this measurement, then, this measured velocity value of Electromagnetic or Gravitational Waves in the Universe, by humans, cannot be bigger as compared to a set of velocities in the Universe, and also smaller as compared to another set of velocities in the Universe.

Thus, the only possible velocity values remaining for a measured velocity value of Electromagnetic or Gravitational Waves in the Universe, by humans, might be either a zero-velocity value, or the maximum velocity value.

Because, as stated above, a Light beam is still detected by humans as moving, then, a zero-velocity value cannot be the result of a measured velocity value of a Light beam by humans.

Thus, the ***only*** possible measured velocity value of a Light beam by humans, under all circumstances, ***must*** result in a constant velocity value which is the maximum attainable velocity value, of any moving substance.

Electromagnetism and Anti-Gravity

In the paper [24] published by the author of this book, and presented already in this book, an explanation for the origin of Electric Charges attractions or repulsions was provided, by arguing that Electric (or Magnetic) Fields are forms of Acceleration, as Newton's Gravitational Field (and Einstein's Space/Time Entity) are forms of Accelerations, which also implied that Electric (or Magnetic) Fields are also Space/Time Entities and are also just forms of Energies.

This also led to a prediction that Newton's Second Law of Motion (F=ma) does not apply to most Electrically Charged bodies, because the Acceleration between most Electrically Charged bodies might be dependent on the Electric Charges magnitudes that these bodies embed and not on their Mass magnitudes.

Thus, this might also imply, that Electromagnetism can be utilized as an Anti-Gravity means to control the motions between Electrically Charged bodies.

Because the above implies that what controls the motion of most Electrically Charged bodies is the amount of Electric Charge they embed and not the amount of Mass they embed,

and thus, Gravity might have negligible effect on the motions between Electrically Charged bodies.

That paper [24] also suggests an experiment to validate the above-mentioned prediction, which might provide validity to the theory presented in that paper.

The above pointed to a possible utilization, of the theories presented in this book, to implement means to overcome Gravity.

However, endeavors to overcome Gravity were already implemented in the past.

One such significant endeavor was Nikola Tesla's endeavors to overcome Gravity.

Nikola Tesla is recognized for incredible contributions to Technology and Science, in the field of Electromagnetism.

Without his work, our nowadays technology would be considerably worse [33].

As already presented in the reference [33], provided in the references section of this book, "without the genius of Tesla we could not have: Radio, Television, AC Electricity, Tesla coil, fluorescent lighting, Neon lighting, Radio control devices, X-Rays, Radar, Microwaves, and dozens of other amazing inventions. Quite an impressive list"

The image below represents a Tesla coil [34].

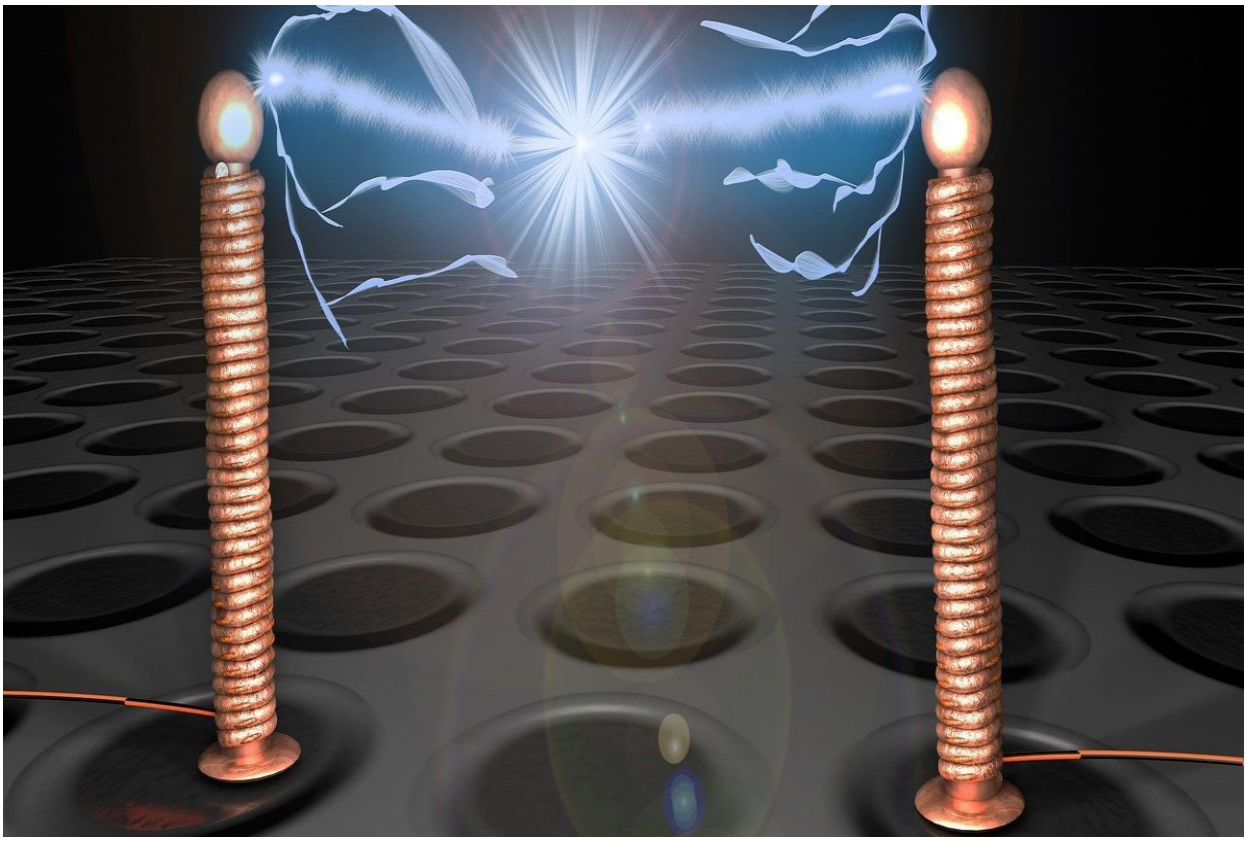

Image source: pixabay.com.

Among his works was his work on Anti-Gravity which he addressed as:

The dynamic theory of Gravity.

There are references on the web about Tesla's work relating to Anti-Gravity, such as reference [35].

From these references one might conclude that Tesla worked on the issue of finding Anti-Gravity solutions, and might have found, technological means to overcome Gravity.

However, Tesla did not accept Einstein's Relativity Theories, as viable theories.

Because Einstein's Relativity Theories have been already accepted, by the science of Physics, as viable theories, based on many observations, the author of this book thinks that Tesla was wrong, in relation to his attitude to Einstein's Theories.

However, it seems that his Anti-Gravity work embedded elements which might resemble what is presented in the paper [24], published by the author of this book, mainly because his Anti-Gravity work was based on Electromagnetism.

However, most documentation of his work on Anti-Gravity is not available to the public because it is marked as classified by the USA authorities and kept out of reach, as the following quote from reference [33], provided in the references section of this book indicates:

"While researching Tesla's statements, Lyne discovered that more complete statements concerning these discoveries could only be gleaned from scattered and sparse sources, because Tesla's papers are concealed in government vaults for national security reasons. When Lyne specifically asked for these papers at the National Security Research Center (*now the Robert J. Oppenheimer Research Center*) in 1979, he was denied access because they were still classified."

The prediction in the paper [24], published by the author of this book, and presented already in this book, that Newton's Second Law of Motion (F=ma) might not apply to most Electrically Charged bodies, is a prediction, that seems to be in the same investigation fields, as Tesla's work, which implied that Electromagnetism might be a means to achieve Anti-Gravity.

This prediction implies that the acceleration between most Electrically Charged bodies might not be affected at all by Gravity, and thus, Electromagnetism might be a means to control the motion between Electrically Charged bodies, without the effect of Gravity on these bodies.

If the suggested experiment in the paper [24], to validate this prediction, might turn successful, this might steer a technology endeavor to understand how to overcome Gravity, and possibly implementing propulsion means which embed anti-Gravity abilities, means that might overcome Gravity.

Tesla's work might have solved some (or maybe most) of the theoretical and technological obstacles relating to Anti-Gravity, but since Tesla's work is kept out of public reach by the USA authorities, the information provided in the paper [24], if found viable, might help, as stated above, a new endeavor to achieve new achievements in this field.

Dark Energy as a new source of Green Energy

As presented already in this book, the author of this book published a paper [13] which described a special case of Electromagnetic Waves consolidation, in which Energy ***seemed*** to be created out of nothing.

That paper [13], referenced another paper [9], by the author of this book, which introduced the novel Energy Pairs Theory, which argues that Photons might embed Traceable and Untraceable Energies. This was also already presented in this book.

In view of the explanations provided by the Energy Pairs Theory, the paper [13] argues that the Energy that seemed to be generated out of nothing is Untraceable (or Dark) Energy embedded in Photons, that converted back to Traceable Energy.

This implies that a new source for Green, clean Energy might be the mysterious Dark Energy.

An additional paper [12] , also published by the author of this book and presented already in this book, describes an observation, that anybody can experience, every day, that might indicate, that Electromagnetic Waves, from separate sources, can and do consolidate.

That observation was also already described in a previous chapter of this book.

This observation implies that our environment is ***filled*** with consolidating Electromagnetic Waves, which, some of them, might convert ***continuously*** Dark Energy back into Traceable Energy.

This cannot be detected yet, because, as already presented in this book, consolidating Electromagnetic Waves also continuously create Null Electromagnetic Waves, in which, Energy ***seems*** to disappear.

Thus, ***on the average***, consolidating Electromagnetic Waves do not create or destroy Traceable Energy.

But, if a technological mean might be devised, which will be able to detect and use ***only*** the Traceable Energy converted from Dark Energy, which, as presented above, might exist ***continuously*** in our environment, this might be a new source for Green, clean Energy whose origin is the mysterious Dark Energy.

Epilogue

This book presents a summary of endeavors, by the author of this book, to resolve yet unanswered questions, peculiarities, and paradoxes, that exist in the science of Physics today.

This resulted in the following revolutionary conclusion:

Time, Space and Electric Charge are just forms (or facets) of Energy,

like Mass is already recognized and accepted by the science of Physics as a form of Energy, following the introduction of Einstein's Special Relativity Theory.

This also boils down into another revolutionary conclusion:

Nature is composed of only one entity: Energy!!!

The book concludes that the Universe is composed only of Energy, which might embed many forms.

Each form of Energy can convert to another form of Energy, but the total amount of the Energy, in the Universe, is constant, which implies, that Energy is always conserved, it can be never destroyed or eliminated.

Also, parts of the Energy are Traceable Energy, and parts of the Energy are Dark Energy.

And Dark Energy can convert to Traceable Energy, and Traceable Energy can convert to Dark Energy.

Because the book concludes that Time and Space are also facets of Energies, Time travel can never occur, because Time does not really exist, it is only an illusion, which humans adopted, to perceive and understand motions and changes.

Then, if Time travel cannot occur, this eliminates the paradoxes that would occur, if Time travel could occur. This might also support the conclusion that Time does not really exist, as this book concludes.

Because these conclusions are based only on thinking experiments, reason and logic, this book proposes several experiments.

The experiments that the book proposes require means and funds which are beyond the reach of the author of this book. Thus, the author of this book hopes, that this book will help in bringing about the executions of these experiments.

If these experiments will be executed, and the results of these experiments, will turn out to be successful, as this book predicts, then new important understanding, regarding our Universe, will be achieved, and, important technological breakthroughs, might be also achieved.

This book presents briefly, two possible technological breakthroughs, which might be achieved, if the theories presented in this book will be proved as viable theories.

One of these possible technological breakthroughs might be a future possibility, to start again an endeavor, to devise anti-Gravity propulsion means, an endeavor, which Nikola Tesla might have started, and might have also achieved significant progress in it, but, as presented in a previous chapter, of this book, his work is not available to the public, because it is held in vaults, by the USA authorities, because of claims related to USA national security.

Another possible technological breakthrough might be a future possibility to generate clean, green Energy, by utilizing the mysterious Dark Energy.

However, if the theories presented in this book will be proved as viable theories, it might be reasonable to assume, that additional technological breakthroughs might be also achieved, in addition to the two technological breakthroughs already presented in this book.

However, this book will not be complete, without also stating the following:

The author of this book is not a religious person.

The claim presented in this book, that the Universe might be composed of only one entity, the Energy, might be appealing to some religious people, especially religious people who believe in a single God, which created and controls the Universe.

This might resemble the appealing, that some religious people find, in the Bing-Bang theory, which according to such people, might contain some elements, which resemble what is described in the Genesis chapter in the Bible.

It should be emphasized that the author of this book did not first conclude that the Universe might be composed of only one entity, and then, chose and presented only the arguments that support this conclusion.

As already stated before, the theories presented in this book, emerged ***only*** from attempts to resolve unanswered questions, peculiarities, and paradoxes, that still exist in the science of Physics today.

These attempts use analysis, which is based ***only*** on nowadays acceptable Physics theories, and uses only thinking experiments, logic, and reason, as the tools to carry over this analysis, and ***not*** on any religious believes or religious inclinations.

The theories presented in this book might be found not viable at all, if the experiments proposed in this book will be executed, and their results will not be successful.

On the other hand, all the theories presented in this book, or only some of the theories presented in this book, might be found viable, if all (or some of) the experiments proposed in this book, will be executed, and their results will be successful, as predicted by this book.

The Theory related to the new Energy Pairs Theory, based on argumentations that Electromagnetic Waves, from separate sources, can consolidate, which concluded that the Electric Charge is also a form of Energy, and most of the Dark Energy originates from Electromagnetism, might be found viable if the experiment proposed in the paper [9] , will be executed, and its results will be successful.

The logic and reason provided in relation to the new Energy Pair Theory, seem to be very sound logic and reason, which might be very difficult to contradict, but the experiment proposed in the paper [9] , might be very difficult to implement, which might end up, in significant difficulties to provide sound physical evidence, for this theory, although the login and reason, on which it is based upon, might be recognized as very sound reason and logic.

On the other hand, the claim that Space, and especially Time, are just facets of Energy, which is based on the paper [24], might be less convincing, especially because it claims that natural notions held by humans, relating to Space and Time, are just fictions.

Especially the notion, held by humans, that there is only one Space and only one Time, and not, as this book claims, three separate Spaces and three separate Times, each being just a facet, attributed by humans, in a form of Energy, and all these separate Spaces and Times, are just notions invented by humans, to perceive movements and changes in the Universe.

However, the experiment proposed in the paper [24], might be relatively simple to implement, which might provide validity to the claims that Space and Time do not really exist.

But, if the theories presented in this book, will be found viable, this might open a hatch, or an aperture, to peep into a significant limitation of human’s ability.

If the conclusion presented in this book, that the measured velocity of Light always ends up in a constant value, and the velocity of Light is the maximum attainable velocity of any moving substance, occur because humans are ***unable*** to establish a reliable measurement of the velocity of Light, this might point to a severe intrinsic, built-in limitation, in the possibilities that humans have, to completely understand Nature.

Modern physics already embeds theories, which are found viable theories, based on acceptable observations, which embed arguments, which defies human's common sense.

The Quantum Mechanics Theory, which is a significant and important section of modern Physics, has quite a few examples of claims, which defies human's common sense, of which Schrödinger's cat [38] might be an outstanding example.

Also, Mathematics, which is the base on which Science and Physics relies, and the language Science and Physics employs, is shown by Gödel's incompleteness theorems [39], to be an incomplete tool, which might render, the basis on which Science and Physics rely, to be an unstable base.

Now this book, adds to the above, an addition possibility to peep into an intrinsic crucial inability, which humans might have, which might be impossible to overcome, a possibility that should be recognized and contemplated, which might have nothing to do with religious believes or inclinations, which the author of this book, has none.

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Some of the papers published by Moshe Segal and presented also in the references section of this book bellow can be also found in the open e-Print archive viXra.org.

References

[1] Diagram of Aristotle's Four-Element Theory

https://www.researchgate.net/figure/Diagram-of-Aristotles-four-element-theory-According-to-Aristotle-the-prime-matter-was_fig4_32894309

[2] Aristotelian Physics. Wikipedia. https://en.wikipedia.org/wiki/Aristotelian_physics

[3] Atomic Theory. https://www.infoplease.com/math-science/physics/atomic-theory

[4] Atomism. Wikipedia. https://en.wikipedia.org/wiki/Atomism

[5] Double-slit experiment. Wikipedia. https://en.wikipedia.org/wiki/Double-slit_experiment

[6] Electromagnetic radiation. Wikipedia. Electromagnetic radiation - Wikipedia

[7] Photoelectric effect. Wikipedia. https://en.wikipedia.org/wiki/Photoelectric_effect

[8] Does Destructive Interference Destroy Energy? Kirk T. McDonald Joseph Henry

Laboratories, Princeton University http://kirkmcd.princeton.edu/examples/destructive.pdf

[9] Moshe Segal, "Energy Analysis of a Null Electromagnetic Wave", Theoretical Physics Letters (PTL). That paper is under PTL copyright and consent form, signed by the author Moshe Segal with PTL.

https://2edd239a-21aa-41cc-a45e-84832f36b982.filesusr.com/ugd/04176b_f8d75fc7c61d455d8bda102055d6b92d.pdf

[10] A Discussion relating to the feasibility of a Null Electromagnetic Wave. Moshe Segal. Academia Letters, Article 3600. https://doi.org/10.20935/AL3600

[11] The Superpositions Principle. https://en.wikipedia.org/wiki/Superposition_principle.

[12] Consolidating Electromagnetic Waves from separate sources. Moshe Segal. That paper is under AIRCC Publishing Corporation copyright and consent form, signed by the author Moshe Segal with AIRCC Publishing Corporation.

https://wireilla.com/engg/eeeij/papers/11222elelij01.pdf

[13] Consolidating Electromagnetic Waves might embed more traceable Energy than the combined traceable Energies embedded in the waves before consolidation. Moshe Segal. Academia Letters, Article 3768. https://doi.org/10.20935/AL3768

[14] There is a mystery in our universe's expansion rate and the Hubble Space Telescope is on the case. Space.com.

https://www.space.com/universe-expansion-rate-hubble-telescope-measurements

[15] Expansion of the Universe. Wikipedia. https://en.wikipedia.org/wiki/Expansion_of_the_universe#:~:text=The%20expansion%20of%20the%20universe,to%20exist%20%22outside%22%20it.

[16] Dark Energy. Wikipedia. https://en.wikipedia.org/wiki/Dark_energy

[17] The Energy Pairs Theory. Moshe Segal. viXra e-print archive. https://vixra.org/pdf/2204.0044v1.pdf

[18] Moshe Segal, "The Nature of Space and Dark Energy, Based on Electric and Magnetic Fields' Behavior in Space, in the Energy Pairs Theory Framework", Theoretical Physics Letters (PTL). That paper is under PTL copyright and consent form, signed by the author Moshe Segal with PTL.

https://2edd239a-21aa-41cc-a45e84832f36b982.filesusr.com/ugd/04176b_5e77c3b53281421290d97119d0b90052.pdf

[19] Newton's Law of Universal Gravitation. Wikipedia.

https://en.wikipedia.org/wiki/Newton%27s_law_of_universal_gravitation

[20] Gravitational Field formula

Gravitational Field Formula: Concept, Important Formulas, Examples (toppr.com)

[21] Einstein's Theory of General Relativity. Space.com site.

https://www.space.com/17661-theory-general-relativity.html

[22] Newton's Laws of Motion. Wikipedia. https://en.wikipedia.org/wiki/Newton%27s_laws_of_motion

[23] Coulomb's Law, Wikipedia. https://en.wikipedia.org/wiki/Coulomb%27s_law

[24] A New Theory Expands Einstein's General Relativity Theory to Include Both Electric Charge and Mass entities. Moshe Segal. Theoretical Physics Journal by Physics Tomorrow Letters (PTL). That paper is under PTL copyright and consent form, signed by the author Moshe Segal with PTL.

https://2edd239a-21aa-41cc-a45e-84832f36b982.filesusr.com/ugd/04176b_5399eb07c7334d9d965cc3685558dea1.pdf

[25] Electron-Positron annihilation. Wikipedia.

https://en.wikipedia.org/wiki/Electron%E2%80%93positron_annihilation

[26] Pair Production. Physics.

https://www.britannica.com/science/pair-production

[27] Einstein: Ether and Relativity. http://mathshistory.st-andrews.ac.uk/Extras/Einstein_ether.html

[28] Gravitational Wave. Wikipedia. https://en.wikipedia.org/wiki/Gravitational_wave

[29] Gravitational Electromagnetism. Wikipedia. https://en.wikipedia.org/wiki/Gravitoelectromagnetim

[30] Attraction Force Between two 1 kg Mass Bodies 1 meter Apart. ER. services. University Physics Volume 1.

13.1 Newton's Law of Universal Gravitation | University Physics Volume 1 (lumenlearning.com)

[31] Attraction Force Between two 1 Coulombs Charges 1 meter Apart. The Physics Classroom.

Physics Tutorial: Coulomb's Law (physicsclassroom.com)

[32] Light, a Flux of Electric Dipole Photons. Prof. J. P. Wesley

https://www.jamespaulwesley.org/Document_Files/Light,_a_Flux_of_Electric_Dipole_Photons_JPWesley.pdf

[33] Did Tesla Discover the Secrets of Antigravity?

https://electrical-engineering-portal.com/did-tesla-discover-the-secrets-of-antigravity

[34] Tesla Coil. Wikipedia. https://en.wikipedia.org/wiki/Tesla_coil

[35] Electrogravitics: Antigravity, Tesla, and a Military Cover-Up.

https://www.gaia.com/article/electrogravitics-antigravity-tesla-and-a-military-cover-up?utm_source=google+paid&utm_medium=cpc&utm_term=&utm_campaign=1-INTL-PERFORMANCE-MAX&utm_content=performancemax&gclid=CjwKCAjw_b6WBhAQEiwAp4HyIEW0WmiKqHnyXNb0felpdcLL4n5cg0sVGcHZU-6U5KSOe6SApCUnQBoCJiQQAvD_BwE

[36] Wave-particle duality. Wikipedia. https://en.wikipedia.org/wiki/Wave%E2%80%93particle_duality

[37] A model that solves the to the wave-particle duality paradox. Eduardo V. Flores.

https://arxiv.org/ftp/arxiv/papers/1410/1410.3416.pdf

[38] Schrödinger's cat. Wikipedia. https://en.wikipedia.org/wiki/Schr%C3%B6dinger%27s_cat

[39] Gödel's incompleteness theorems. Wikipedia.

https://en.wikipedia.org/wiki/G%C3%B6del%27s_incompleteness_theorems

[40] The Energy Pairs Theory. Moshe Segal. Electrical Engineering: An International Journal (EEIJ) vol. 9, No. 1/2, June 2022. That paper is under AIRCC Publishing Corporation copyright and consent form, signed by the author Moshe Segal with AIRCC Publishing Corporation. https://airccse.com/eeij/papers/9222eeij01.pdf