

# THE ENERGY PAIRS THEORY

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## **ABSTRACT**

*The acceptable notion today is that Electromagnetic waves from separate sources cannot consolidate [4]. However, the author of this article published several articles [1], [2], [3], [5] which argue that Electromagnetic (EM) waves from separate sources do consolidate.*

*In addition to the scenarios described in articles [1], [2], [3], Article [5] adds further support to the statement that EM waves from separate sources can consolidate, support that everybody can experience, from everyday experience, every day, which can also be recorded on photos. This scenario is presented again, also in this article.*

*However, if EM waves from separate sources do consolidate, this seems to embed paradoxes, which must be addressed, because the Energy Conservation Principle seems to be violated.*

*The Energy Pairs Theory, proposed initially by the author of this article in article [1], and presented again briefly in this article, proposes a framework which resolves and explains the paradoxes embedded in consolidations of EM waves from separate sources, and other paradoxes and unanswered and open questions, as presented already in article [1], and presented briefly again in this article.*

## **KEYWORDS**

*Electromagnetic Waves, Energy, Energy Conservation Principle, Dark Energy, The Energy Pairs Theory*

## **1. INTRODUCTION**

An article titled: “Does Destructive Interference Destroy Energy?” by Kirk T. McDonald from Joseph Henry Laboratories, Princeton University [4] is an example to the fact that the nowadays acceptable notion is that EM waves from separate sources, cannot consolidate.

This article states that: “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” This implies that EM waves, from separate sources, cannot consolidate.

However, the author of this article published several articles [1], [2], [3], [5] which argue that Electromagnetic (EM) waves from separate sources do consolidate, contrary to what article [4] implies.

These arguments present scenarios which utilize a half transparent mirror, and because half transparent mirrors are usually recognized as linear apparatuses, these arguments are also supported by the Superposition Principle.

In addition, article [5] presents further support to the statement that EM waves, from separate sources, can consolidate, support that everybody can experience, from everyday experience, every day, which can also be recorded on photos.

However, if EM waves, from separate sources, do consolidate, this embeds paradoxes, because the Energy Conservation Principle, which is a corner stone of the Physical Sciences, seems to be violated.

In one presented scenario [1], [2], of EM waves consolidation, from separate sources, a Null EM wave is created, which contains no Electric and Magnetic fields at all, and thus, seems to contain no Energy at all, even though, the EM waves that created it embedded Energy. Thus, in that scenario, Energy seems to disappear.

In another presented scenario [3], of EM waves consolidation, from separate sources, the resultant EM wave seems to embed more Energy as compared to the combined Energies embedded in the EM waves that created it. Thus, in that scenario, Energy seems to be created out of nothing.

And in almost all other scenarios [3], of EM waves consolidation, from separate sources, the resultant EM wave seems to embed either more or either less Energy as compared to the combined Energies embedded in the EM waves that created it, which also seems like a clear violation of the Energy Conservation Principle, as described in article [3].

However, article [1] proposes a framework for resolving and explaining these paradoxes. This framework is based on a new theory, namely, the Energy Pairs Theory, proposed initially in article [1], which also addresses and resolves and explains other paradoxes and open issues and unanswered puzzling questions, relating to Electric Charges, which result in a conclusion, that Electric Charges might be just forms of Energies, like Mass is already recognized as a form of Energy, by Einstein's Special Relativity Theory.

The Energy Pairs Theory also proposes a possible explanation to the origin of most of the Dark Energy.

Until the discovery, in the 20<sup>th</sup> 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 in the science of Physics. However, the exact origin of this Dark Energy is still a mystery. The nowadays acceptable notions are that the origin of the Dark Energy must be looked for in the Gravitation using Einstein's General Relativity Theory.

However, the Energy Pairs Theory predicts, that most of the Dark Energy might originate from Electromagnetism.

## **2. A PHOTO THAT ANYONE CAN TAKE, WHICH MIGHT INDICATE, THAT LIGHT BEAMS, FROM SEPARATE SOURCES, CAN AND DO CONSOLIDATE**

Article [1] proposed an experiment, based on a half transparent mirror, which might implement EM waves consolidations from separate sources. In that experiment two EM waves, from separate sources, meet on a point on a half transparent mirror and in certain conditions, as described in article [1], consolidate into one consolidated EM wave.

This experiment is based on the conclusion that for two EM waves, from separate sources, to consolidate, these waves must meet, and then, continue to travel on the same direction and on the same line.

Because, in such a scenario, the Electric fields of both waves, after their meeting, will always exist in the same location, causing these Electric fields to consolidate by either annihilating each other, fully or partially, or adding up. And the same applies also to the Magnetic fields of these two waves.

Also, as explained in article [5] in more details, the occurrence of EM waves consolidations from separated sources, suggested by the above-mentioned experiment, is also supported by the Superposition Principle, because half transparent mirrors are usually recognized as linear apparatuses.

However, as also proposed in article [5], a simpler everyday experience that any one can experience, might provide a reasonable indication, that Light Beams, which are also EM waves, from separate sources, might also be able to consolidate.

That simpler everyday experience can be easily recorded on a photo, that anyone can take, every day.

Such a photo is presented in Figure 1 below.

This photo presents a glass covered cabinet. Items that exist inside the cabinet, behind the glass, such as the coffee pot, (pointed to by the second arrow on the right side of this photo) exit in the photo, and the reflection of the person that took this photo, standing in front of the glass, (pointed to by the first arrow on the right side of this photo) also appears in this photo.

Figure 2, below, presents a more detailed explanation which demonstrates that what is presented in Figure 1 implies that Light Beams, which are also EM waves, from separate sources, might consolidate.

In Fig 2 light beam “wave 1”, emitted from the coffee pot, passes the window as light beam “wave 2”. Also, light beam “wave 3”, emitted from the body of the person, is reflected as light beam “wave 4”, which might travel on the same direction and the same line as light beam “wave 2”.

Thus, Figure 1 demonstrates that many light beams like “wave 2” might meet many light beams like “wave 4”, and then, some of these light beams might also continue to travel on the same direction and in the same line and thus, consolidate.



Figure 1. A Photo which might imply, that Light Beams, from separate sources, can consolidate

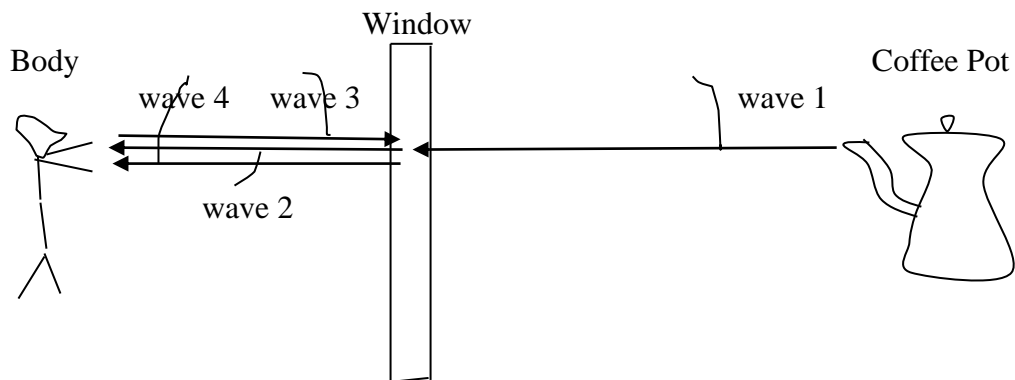


Figure 2. A Schematics for explaining what is presented in Figure 1 above

In addition to the arguments presented above, which might indicate that EM waves, from separate sources, do consolidate, article [5] presents additional arguments which further support the claim that EM waves, from separate sources, can consolidate. These arguments are presented in more details in chapter 4 of article [5].

### 3. Paradoxes involved in EM Consolidations from Separate Sources

If the experiment proposed in article [1], to implement consolidation of two EM waves, from separate sources, which utilizes a half transparent mirror, is conducted such that these two EM waves meet on the half transparent mirror when:

- They oscillate at the same frequency.
- Have the same intensities in their Electric Fields.
- Have the same intensities in their Magnetic Fields.
- Are at anti phase, which implies 180 degrees phase shift, as related to each other.
- And have suitable polarization, as explained in article [1]

Then, after the two EM waves meet, since they continue to propagate on the same direction and on the same line, the Electric Field of one wave annihilates completely, the Electric Field of the other wave, and the same applies to the Magnetic Fields of both waves.

Then, the resultant EM wave will be a Null EM wave which embeds no Electric or Magnetic Fields at all, which implies, that it seems that this EM wave embeds no Energy at all, even though, the two EM waves that created it embedded Energies.

Thus, in this case, Energy seems to disappear.

Also, if the experiment proposed in article [1], to implement consolidation of two EM waves, from separate sources, which utilizes a half transparent mirror, is conducted such that all the above conditions apply, excluding only the 4<sup>th</sup> condition relating to the phase shift, which is replaced by the condition that instead of the waves being at anti phase they are in phase when they meet, which implies a zero degree phase shift, as related to each other, then,

- If  $x$  is the intensity of the Electric Field of the first wave.
- And  $y$  is the intensity of the Electric Field of the second wave.

Then,  $x+y$  is the intensity of the Electric Field of the resultant wave, because the two waves meet when they are in phase, and thus, their fields intensities add up (and not annihilate each other, as in the case of the creation of the Null wave).

And since the Energy in an Electric Field is proportional to the **square** of its intensity.

- Then,  $x^2$  is proportional to the Energy embedded in the Electric Field of the first wave.
- And  $y^2$  is proportional to the Energy embedded in the Electric Field of the second wave.
- And  $(x+y)^2$  is proportional to the Energy embedded in the Electric Field of resultant wave.

And since  $(x+y)^2 > x^2 + y^2$

Then, the Electric Field of the resultant wave seems to embed **more** Energy as compared to the combined Energies embedded in the Electric Fields of both waves that created it.

And because the above argumentations apply also to the Magnetic Fields of the two waves, the resultant wave seems to embed **more** Energy as compared to the combined Energies embedded in the two waves that created it.

Thus, in this scenario Energy seems to be created out of nothing.

Also, in **any** implementation of the experiment proposed in article [1], to implement consolidation of two EM waves, from separate sources, which utilizes a half transparent mirror, since the two waves continue to propagate, after they meet, on the same direction and on the same line, the consolidated wave will contain either more **or** either less traceable Energy as compared to the combined traceable Energies embedded in the waves that created it, which also seems as a clear violation of the Energy Conservation Principle, which is a paradox.

Usually, this paradox might be difficult to detect, because, on the **average**, no Energy is lost or created.

## 4. The Energy Pairs Theory

As stated, before in this article, article [1] proposed a framework which resolves and explains the paradoxes presented in the previous section of this article, embedded in scenarios of consolidations of EM waves from separate sources.

That framework is based on the new Energy Pairs Theory proposed in article [1].

The main premise of the new Energy Pairs Theory is as follows:

Energies embedded in Electromagnetic Waves (or related directly or indirectly to an Electric Charge) can accumulate and be stored together in pairs, while disabling each other from being detected, such that the Energies **Exist** but are **Untraceable** (or Latent Energy) or Exist as Untraceable or **Dark** Energy.

Thus, the new Energy Pairs Theory brings about a new **Facet** of Energy which is **Untraceable** Energy that is also stored as **Energy Pairs**.

So, the new Energy Pairs Theory Elements are:

- It Expands the Energy notion to contain two Facets of Energies:
- A Detectable or Traceable Energy
- An Untraceable or Dark Energy
- The Untraceable Energy is Untraceable because it is accumulated in Pairs which Disable each other from being Detected
- The new Energy Pairs Theory also predicts that Photons can carry both, Traceable and Untraceable Energies

## **5. The new Energy Pairs Theory resolves Paradoxes embedded in Scenarios of Consolidations of Electromagnetic Waves from Separate Sources**

The new Energy Pairs Theory resolves the Paradoxes embedded in the scenarios of Consolidations of Electromagnetic Waves from separate sources as follows:

The new Energy Pairs Theory predicts that in the scenario of the creation of the Null Electromagnetic Wave the Energy did not Disappear. It was Converted into Untraceable, or Dark Energy, embedded into the Photons of the created Null Electromagnetic Wave.

The new Energy Pairs Theory also predicts, that in scenarios of consolidations of Electromagnetic Waves that seem to create Energy out of nothing, that created Energy is Untraceable, or Dark Energy, embedded in the Photons of the created consolidated Electromagnetic Wave, which Converted back, into Traceable Energy.

## **6. The new Energy Pairs Theory resolves additional Paradoxes related to Electric Charges**

However, the Paradoxes in scenarios of consolidations of Electromagnetic Waves from separate sources, which seem to violate the Energy Conservation Principle, are not the only Paradoxes that get resolved or explained by the new Energy Pairs Theory.

Two additional puzzling questions are also resolved by the new Energy Pairs Theory.

These two additional puzzling questions are:

- Why in the famous Mutual Annihilation scenario, Electric Charges Disappear?
- How come that Electric Charges are created out of nothing in the famous inverse Pair Production scenario?

In the Mutual Annihilation scenario an Electron and a Positron annihilate each other to create Photons. But because Electric Charges are not recognized (yet) as a form of Energy, then, according to the Energy Conservation Principle, the Energies embedded in the Masses of the annihilating Electron and Positron is Fully embedded in the Energy embedded in the created Photons, and the Electric Charges of the annihilating Electron and Positron, just Disappear.

Where these Electric Charges went?

How can Basic Elements such as Electric Charges Disappear, without leaving any trace of their prior existence?

And, in the inverse Pair Production scenario, a Photon, in certain conditions, converts back into an Electron and a Positron. But because Electric Charges are not recognized (yet) as a form of Energy, then, according to the Energy Conservation Principle, the Energy embedded in the Photon is Fully embedded in the Masses of the created Electron and Positron, and the Electric Charges of the created Electron and Positron are created out of nothing.

How can this happen?

The new Energy Pairs Theory resolves also these two new puzzles:

It predicts that in the Mutual Annihilation scenario the Electric Charges did not Disappear. They were Converted into Untraceable (or Dark) Energies embedded in the created Photons.

Similarly, to how the new Energy Pairs Theory predicts that the Null Electromagnetic Wave embeds the Energy that seemed to Disappear as Untraceable Energy in its Photons.

And in the inverse Pair Production Scenario, the new Energy Pairs Theory predicts, that the Electric Charges which seem to be created out of nothing, were Untraceable (or Dark) Energy,

embedded in the Photon, which Converts to Traceable Energy embedded in the Electric Charges of the created Electron and Positron.

Thus, another significant conclusion, or prediction, of the new Energy Pairs Theory is:

Electric Charges are just forms of Energy.

However, Mass was already recognized as a form of Energy by Einstein's Special Relativity Theory, and now, the new Energy Pairs Theory adds to this the conclusion that Mass, Electric Charge and Energy, might be the exact same Entity.

This also can be concluded from the following:

Since in the Mutual Annihilation scenario, Electric Charges in the Electron and the Positron convert to Photons, which are pure Energy, without any Mass or Electric Charge, and since, in the inverse, Pair Production scenario, a Photon, which is just pure Energy without any Mass or Electric Charge, converts into Mass and Electric Charges embedded in the created Electron and Positron, this might also imply, that Electric Charges are also just forms of Energy, as Mass is already recognized as a form of Energy.

And, another important conclusion, or prediction, of the new Energy Pairs Theory might be:

Most of the Dark Energy, whose origin is still a mystery, might originate from Electromagnetism!

## 7. Summary and Conclusions

The Energy Pairs Theory, which was proposed by the author of this article, initially in article [1], is described again briefly, in this article. That new theory resolves and explains paradoxes relating to consolidations of Electromagnetic (EM) waves from separate sources in which Energy seems either to disappear or be created out of nothing, which seems like a clear violation of the Energy Conservation Principle.

The new Energy Pairs Theory resolves and explains also other paradoxes relating to Electric Charges disappearance in the mutual annihilation scenario, in which an Electron and a Positron annihilate each other to create Photons and relating also to Electric Charges being created out of nothing, in the inverse Pair Production scenario, in which a Photon, in certain conditions, converts back to an Electron and a Positron.

From the above it can be concluded that Electric Charges might be just forms of Energies, like Mass is already recognized as a form of Energy by Einstein's Special Relativity Theory.

The new Energy Pairs Theory also predicts that most of the Dark Energy might originate from Electromagnetism.

This article and article [5], add further support to the statement that EM waves from separate sources do consolidate, support that everybody can experience, from everyday experience, every day, which can also be recorded on photos.

However, although this article provided **very sound** argumentations to the claim that EM waves, from separate sources, do consolidate, an important conclusion from this article might also be, that this claim must be accompanied with **additional** and proper experimentations, as described in article [1], that will try to provide **acceptable** proof that EM waves from separate sources do consolidate.

Thus, such experimentation might be a very important endeavour, considering what was already presented in the above discussion.

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Please also note that the article referenced in reference [1] whose title is: "Energy Analysis of a Null Electromagnetic Wave" was also written by Moshe Segal and was also inserted in the open e-Print archive viXra.org.

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