

An alternate Resolution of the Famous Grandmother Paradox which might be also validated via a classic experiment

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Abstract

The nowadays Science of Physics still embeds unresolved paradoxes, and incompatibilities between various Physics branches.

One significant unresolved paradox is the famous Grandmother Paradox, in which someone returns to the past, kills his grandmother and thus, inhibits his birth, which obviously, also inhibits his ability to travel to the past.

In addition to paradoxes, as presented just above, the nowadays Science of Physics still also embeds incompatibilities between various Physics branches.

One of these branches is the branch denoted as the Classic Physics, which focuses on understanding and explaining what is denoted as the Macroscopic Environment.

Another such branch is the branch denoted as the Quantum Physics, which focuses on understanding and explaining what is denoted as the Microscopic Environment.

And, as presented above, these two branches of Physics are not fully compatible, and Humans are still struggling, to expand the knowledge that might bridge the gap that still exists between these two branches of Physics.

Moreover, even the branch of the Classic Physics itself, still embeds branches which are also not fully compatible, as for example, the Gravity and the Electromagnetism, and more must be done to bridge the gap that exists also between these two branches, which both belong, as stated above, to the branch of the Classic Physics.

Additional papers, by the author of this paper, present significant and reasonable arguments, which argue that the nowadays branch of the Classic Physics might be misleading in how it presents the concept of the Space-Time.

By presenting an alternative view of how the Science of Physics should refer to the concept of the Space-Time, possible bridging between incompatible branches of the nowadays Science of Physics might be achieved, and also, a resolution to the famous Grandmother Paradox, might be presented.

The above-mentioned additional papers, also propose experiments, which if implemented successfully, might provide validity, to the proposed alternative view of how the Science of Physics should refer to the concept of the Space-Time, which is presented in these additional papers.

Thus, since a resolution of the famous Grandmother Paradox might be a significant step forward, and also the above-mentioned possible bridging between incompatible branches of the nowadays Science of Physics might also be a significant step forward, then, an implementation of the above-mentioned experiments, or any other experiments that might provide validity to the alternative view of how the Science of Physics should refer to the concept of the Space-Time, presented in the above-mentioned papers, should be an important and a significant endeavor.

1. Elaborations on resolutions attempts for the famous Grandmother Paradox

The nowadays Classic Physics, via Einstein's General Relativity Theory, which is also referred to in this paper as the GRT (1), assumes that the Universe embeds a Space-Time fabric which is continuous and in the presence of Mass or Energy overgoes suitable deformations.

That fabric is denoted as Einstein's four-dimensional Interwoven Space-Time Entity.

Moreover, the branch of the Classic Physics states that the environment embeds just one *single* four-dimensional Interwoven Space-Time Entity which is a *real* component of the environment, that really exists in the environment.

In the nowadays Science of Classic Physics, Einstein's Relativity theories are the leading acceptable theories of the Classic Physics.

The above-mentioned Einstein's four-dimensional Interwoven Space-Time concept, which the GRT assumes that it is a *real, existing* entity in the Existence, is the foundational backbone of the two most successful and experimentally verified theories in the mainstream Classic Physics: Special Relativity Theory (SRT) and General Relativity Theory (GRT) (1).

The standard confirmed view, which is the established, tested and practical realm of the current mainstream Classic Physics, is that the Universe, or the Existence, embeds a *single* four-dimensional Interwoven Space-Time manifold, which consists of three spatial dimensions (x, y, z) and one temporal dimension (t), unified into a *single* geometric Entity.

That model accurately predicts and describes Gravity, the orbits of planets, the bending of Light around massive bodies, time-dilation, and the propagation of Gravitational Waves, all of which have been experimentally confirmed.

Thus, for all practical macroscopic phenomena, and for the vast majority of Physics (including the Standard Model of Particle Physics which operates on this background), the Universe, or the Existence, is treated as a *single* four-dimensional Space-Time with a *single* geometry.

However, the GRT does present that Time Travel is indeed possible.

Actually, Time Travel to the future is demonstrated, by the nowadays Classic Physics, by what is denoted as the Twin's Paradox, which describes a scenario in which one of two twins leaves on a space ship, which travels away at a significant velocity, and when he returns, he is younger than the twin that was left behind.

Depending on the actual velocity of that space ship, the twin that left might return when the other twin still lives, passed away, or even after centuries passed by.

The Twin's Paradox is actually not a paradox at all, because it was already verified via the famous Hafele-Keating experiment (2), in which cesium-beam Atomic Clocks were used to test if there are differences in these Atomic Clocks readings, between Atomic Clocks which were mounted on commercial jet flights, and identical Atomic Clocks which remained on the ground.

This experiment validated that such differences indeed occurred and these differences coincided with the differences that Einstein's SRT and GRT predicted, which provided testable evidence that Einstein's Time-Dilations predictions were indeed correct.

However, from GRT follows, that not only Time Travel to the future is a real possibility, the GRT does also enable, theoretically, Time Travel to the past, because the GRT also presents the possibility of Time Loops (often called CTCs), or, Worm Holes, which theoretically might also enable Time Travel to the past.

But, Time Travel to the past does also embed the famous Grandmother Paradox, in which someone returns to the past, kills his grandmother and thus, inhibits his birth, which obviously, also inhibits his ability to travel to the past.

Thus, as already presented above, on one hand Einstein's Relativity Theories are the leading acceptable theories of the Classic Physics, and, on the other hand, the GRT might enable the occurrence of the Grandmother Paradox, although, as will be also presented in a following chapter, the possibility that the Grandmother Paradox might occur because of the CTCs or the Worm Holes that the GRT might enable, seems to be a relatively low possibility, but not a Null possibility.

Thus, because the possibility that the Grandmother Paradox might occur because of the CTCs or the Worm Holes that the GRT might enable, is not a Null possibility, and because the possibility that the Grandmother Paradox can indeed occur might mean that the GRT Theory still embeds significant issues, prominent physicists, including Stephen Hawking, or David Deutch tried to provide explanations for resolving the Grandmother Paradox.

For example, Hawking stated that Physics is based on the principle of Causality (Cause and Effect), and the Cause must always appear before the Effect, or the Result. Because Time Travel to the past might create Closed Causality Loops, this might destroy the Scientific Reason, which implies, that Time Travel to the past is not a possible occurrence.

In order to settle the possibility that the GRT does enable, theoretically, closed Time Loops (CTC's), or Worm Holes, Stephen Hawking also presented his "Chronology Protection

Conjecture", as an alternate physical solution, presented in his quote "It seems there is a Chronology Protection Agency, which makes the world safe for Historians".

In this Conjecture, proposed by Stephen Hawking in a 1992 research paper (3), Hawking argued that the laws of Physics, specifically Quantum Mechanics and General Relativity, actively will *conspire* to prevent Time Loops (closed Time like curves) from ever forming.

Hawking argued, that if one will try to create a Time Machine and travel to the past, Vacuum fluctuations (Quantum Energy) would loop back on themselves endlessly, creating an infinite buildup of radiation, (similarly to positive feedbacks in a loudspeaker), that would instantly destroy the Time Machine, or the Worm Hole, before the Time Machine could ever function for Time Travel to the past.

And thus, by physically rendering the past as inaccessible, Hawking argued that the Universe will naturally prevent casual loops and paradoxes (like the Grandmother Paradox), from ever ripping apart the fabric of reality.

Also, in order to try and prove his theory, Hawking famously hosted a party of Time Travelers on June 28th, 2009, but only after June 28th, 2009, Hawking sent out invitations for this party which contained its exact location and time coordinates, hoping that someone from the future will get this invitation and will travel back in time to participate in that party. And, true to his conjecture, nobody showed up, and Hawking accompanied this with another famous quote: "the best evidence we have that Time Travel is not possible, and never will be, is that we have not been invaded with hordes of tourists from the future".

Clearly, in that quote Hawking referred only to Time Travel to the past, because, as already presented, Time Travel to the future is already verified as a possible occurrence.

An additional attempt to resolve the famous Grandmother Paradox is based on the multi-Universes, or the Multiverse approach, as presented by the work of David Elieser Deutch (9).

Deutch, who is often recognized as the pioneer, or the father of the Quantum Computing Technology, proposed to solve the famous Grandmother Paradox by the Multiverse, or multi-Universes interpretation of the Quantum Mechanics.

According to this approach, our Universe is just part of an infinite net of parallel Universes.

When someone tries to travel to the past, he does not return to the past of his original Universe, instead, he arrives to the past of a parallel Universe.

In that parallel Universe this Time Traveler can indeed succeed to kill his grandmother, in that parallel Universe, and thus, his birth in that parallel Universe never occurs.

This Time Traveler will continue to be an alien entity in that parallel Universe in which he was not supposed at all to be born, but this will not have any effect on his original Universe.

In his original Universe his grandmother was not killed, his mother was born, and he was born and entered his Time Travel ship, and vanished from his original Universe, when he started his Time Travel to the past.

Thus, no paradox exists, because this Time Traveler will continue to exist as an alien entity, in a parallel Universe, in which he was never supposed to be born.

Deutch did not present the above just as an idea of a science fiction.

Instead, he supported the above by scientific papers, in which he tried to prove that the flow of the data in a quantum computer enables Closed Time Loops (CTCs), which are paths in the Space-Time fabric which twist, and turn back to the past.

According to his models the quantum states of the particles do succeed to be consistently arranged over different Universes, such that the possibility to create logical paradoxes, or physical inconsistencies, is eliminated.

It should be also added that the Multiverse approach to resolve the Grandmother Paradox also bypasses the problem of violating the Energy Conservation Principle, in a scenario of a Time Travel to the past.

In a scenario in which there exists only one single Universe, a body (Energy) that travels back to its own past must enter its own Space-Time in a previous (past) moment, in the only single Universe that exists.

This will create a surplus of Energy at that moment in the past, because it adds the body's current Energy to the Energy that already existed in that moment before that body entered into its own past.

This violates the Energy Conservation principle, in such a closed system, which is not able to emit this Energy surplus, because the multi-Universes option does not exist.

If, on the other hand, the multi-Universes option does exist, in the above scenario, there is no violation of the Energy Conservation Principle, because the Time Traveler to the past does not have to return to its own past in his original Universe.

Instead, this Time Traveler will enter into the past in a parallel Universe via a Time line in that parallel Universe, which is not his original Universe in which he started his Time Travel to the past.

And, his Energy, which disappeared from his original Universe, appears in the parallel Universe, in which he enters, which implies, that no Energy loss or creation occurs.

Actually, Deutch tried to solve the famous Grandmother Paradox, by a combination of Einstein's GRT and Quantum Mechanics.

In his famous paper from Nov. 15th, 1991, (10) Deutch showed that if we introduce Quantum Mechanics elements, into the GRT CTCs, Nature will always find a stable, consistent solution, which inhibits paradoxes.

Because in the Classic Physics, as already presented above, CTCs create paradoxes, as the Grandmother Paradox, Deutch tried to solve this by a transfer from a Deterministic Physics to a probabilistic Physics:

A particle that enters a CTC does not have to be in a definite state, 0 or 1.

Instead, the particle can be in a Quantum Superposition.

Deutch tried to prove mathematically, that for each Quantum CTC there is at least one Fixed Point, or "definite state", which enables the system to remain continuously consistent without logic paradoxes and inconsistencies.

However, Deutch ideas did create significant resistance in the scientific community, and although Deutch ideas were very influential in establishing the discipline of the Quantum Computing Technology, his ideas are not yet established as the ultimate resolution for the Grandmother Paradox.

And, all the above-presented explanations by Hawking, Deutch and all other trials to resolve the Grandmother Paradox, did not include a real, physical experiment, that might provide validity to the statement, that Time Travel to the past is indeed impossible.

2. Space-Time Nature might provide leads for bridging between incompatible branches of Physics

This chapter focuses on proposed leads for bridging between incompatible branches of Physics, which might be also related, as presented in a next chapter, to an alternate resolution to the Grandmother Paradox.

In several additional papers, by the author of this paper, significant and reasonable arguments were presented, which argue that the nowadays branch of the Classic Physics might be misleading in how it presents the concept of the Space-Time.

By presenting an alternative view of how the Science of Physics should refer to the concept of the Space-Time, possible bridging between incompatible branches of the nowadays Science of Physics might be achieved, and also, a resolution to the famous Grandmother Paradox, might be presented.

And as also already presented, these additional papers also propose real and physical experiments, which if implemented successfully, might provide additional validity for the resolution suggested to the Grandmother Paradox, and to the proposed leads for bridging between incompatible branches of Physics

One of the above-mentioned additional papers is the paper: "Implications if the Electric Field will be recognized as a form of Acceleration." (4).

Another additional paper is the paper: "Tentative Additional Explanations to Why Electric Charges Attract and Repel Each Other" (5).

Still another additional paper is the paper: "Space-Time Nature might be used to bridge between the Quantum and the Classic Physics" (6).

The above-mentioned alternative view of how the Science of Physics should refer to the concept of the Space-Time, initially tried to provide a bridge between the Gravity and the Electromagnetism, which as was already stated, are still two branches of the nowadays Classic Physics, which are still not fully compatible.

Newton's Universal Gravitational Law (7) defined the magnitude of the force of the attraction between two massive bodies.

But Newton could not provide a satisfactory explanation to what is the *origin* of this attraction force, or what causes this attraction.

By introducing the concept of the four-dimensional Interwoven Space-Time Einstein succeeded to explain the *origin* of this attraction force, based on the recognition that Gravity is a form of Acceleration, which was already an accepted agreement by the Classic Physics when the GRT was introduced.

Actually, Einstein succeeded to explain the *origin* of the attraction between massive bodies, by actually converting this attraction from a force into the geometry represented by that four-dimensional Interwoven Space-Time Entity.

An example of the incompatibility between the Gravity and the Electromagnetism is the fact that despite the explanation that Einstein's General Relativity Theory already provided to the *origin* of the attraction between massive bodies, the *origin* of the attraction or the repulsion between Electrically Charged bodies is still a mystery.

The above-mentioned papers argue, that from the fact that the *structure* of the Coulomb's Law (8), is identical to the *structure* of the Newton's Universal Gravitational Law (7), it might be reasonable to conclude, that the Electric and the Magnetic Fields should be also recognized as a form of Acceleration, similarly to why Gravity is already recognized as a form of Acceleration.

The nowadays branch of the Classic Physics do not accept the above, and do not recognize the Electric and the Magnetic Fields as a form of Acceleration.

Thus, the initial step in introducing the above-mentioned alternative view of how the Science of Physics should refer to the concept of the Space-Time, were the arguments provided, in the above-mentioned additional papers, that the Electric and the Magnetic Fields should be also recognized as a form of Acceleration, similarly to why Gravity is already recognized as a form of Acceleration.

And, similarly to Einstein's General Relativity Theory, which explained the *origin* of the attraction between massive bodies, based on the recognition that Gravity is a form of Acceleration, the above-mentioned additional papers present the assumption, that the *origin* of the attraction or the repulsion between Electrically Charged bodies can be explained based on the assumption that the Electric and the Magnetic Fields should be also recognized as a form of Acceleration, and this also might provide a significant lead for the Unification between the Gravity and the Electromagnetism, which nowadays are still considered as incompatible branches of the nowadays Classic Physics.

And, similarly to how Einstein's General Relativity Theory explain the *origin* of the attraction between massive bodies, by actually converting it from a force into the geometry represented by Einstein's four-dimensional Interwoven Space-Time Entity, the above-mentioned additional papers explain the *origin* of the attraction or the repulsion between Electrically Charged bodies also by actually converting these attractions or repulsions from forces, into a geometry represented by a form of a four-dimensional Interwoven Space-Time Entity.

As already mentioned above, the above-mentioned additional papers, also propose experiments, which if implemented successfully, will provide additional validity to the argument presented, that the Electric and the Magnetic Fields should be also recognized as a form of Acceleration, similarly to why Gravity is already recognized as a form of Acceleration.

One of these experiments is presented in the paper: "Tentative Additional Explanations to Why Electric Charges Attract and Repel Each Other" (5).

Another, different experiment is presented in the paper: "Implications if the Electric Field will be recognized as a form of Acceleration." (4).

But, as also presented in the paper: "Space-Time Nature might be used to bridge between the Quantum and the Classic Physics" (6), the experiment presented in the paper: "Implications if the Electric Field will be recognized as a form of Acceleration." (4) might also support an additional conclusion which argues that the Universe does not embed just *one, single* Space-Time, as Einstein's GRT states.

Instead, the experiment presented in the paper: "Implications if the Electric Field will be recognized as a form of Acceleration." (4) might also support the conclusion, that the Space-Time concept should *not be* viewed as a real existing entity in the Universe.

Instead, the Space-Time concept should be viewed only as attributes, or facets, attributed to forms of Energy, such that each Energy embeds its own attribute, or facet, of Space-Time.

For example, Einstein's four-dimensional Interwoven Space-Time should be viewed only as a facet or an attribute, attributed to the Energy embedded in the Gravitational Field, and the Energy embedded in the Electromagnetic Fields should be attributed to *separate* attributes of Space and Time, or, a separate attribute of a four-dimensional Interwoven Space-Time attribute,

separate, different and independent from Einstein's four-dimensional Interwoven Space-Time attribute, attributed to the Energy embedded in Gravity.

The paper: "Space-Time Nature might be used to bridge between the Quantum and the Classic Physics" (6) also argue that the Quantum branch of Physics also implies that the concept of Space might not be a real entity, because it might be viewed as being emergent from entanglements between particles.

And the above is also supported by the fact that Qubits, in modern Quantum Computers, exhibit the Quantum superposition phenomenon which implies that a single particle can be literally in *two different Locations at the same Time*.

And from the above presented Quantum Physics views, many physicists believe that Space doesn't actually exists in its own. They argue that Space is emergent, meaning it's a high-level "illusion", created by the way Quantum particles are linked (entangled) with each other.

Thus, if there were no particles and no relationships between them, then, there would be no "Space".

Thus, because the experiment proposed in the paper: "Space-Time Nature might be used to bridge between the Quantum and the Classic Physics" (6), is based on arguments that belong *only to the Classic Physics*, then, this might provide also a lead to start the bridging between the Classic Physics and the Quantum Physics, which as was also already presented, are still two incompatible branches of Physics.

Thus, from the above follows, that by introducing the above-mentioned alternative view of how the Science of Physics should refer to the concept of the Space-Time, which might be also supported by proposed experiments, which are real and physical experiments, several leads for bridging between incompatible branches of Physics will also be provided.

One such lead might provide a lead for bridging between the Gravity and the Electromagnetism, which both are branches of the Classic Physics, and the second lead might provide a lead for bridging between the Classic Physics and Quantum Physics, which are also two branches of Physics which are still incompatible branches of Physics.

But an additional significant result that might be also provided from the proposed alternative view of how the Science of Physics should refer to the concept of the Space-Time, might be a resolution of the famous Grandmother Paradox, a resolution which seems to be a more reasonable and logical resolution, as compared to the existing trials to solve the Grandmother Paradox, and a resolution that might be also supported by a real, physical experiment, as presented in a next chapter.

3. Elaborations on how Einstein's GRT relates to the Space-Time concept.

As presented already before, in this paper, if the Existence embeds only one, single Universe, and not the multi-Universes, or the Multiverse, presented, for example, by David Deutch, then, Time Travel to the past should be an impossible occurrence, because, as was also already

presented before, in this paper, a Time Travel to the past will violate the Energy Conservation Principle.

Because, as already presented before, in this paper, in a scenario in which there exists only one single Universe, a body (Energy) that travels back to its own past must enter its own Space-Time in a previous (past) moment, in the only single Universe that exists.

This will create a surplus of Energy at that moment in the past, because it adds the body's current Energy to the Energy that already existed in that moment before that body entered into its own past.

This violates the Energy Conservation principle, in such a closed system, which is not able to emit this Energy surplus, because the multi-Universes option does not exist.

However, modern Physics already discovered, that there might be certain issues which might imply, that, on a cosmic scale, the GRT might not comply fully, with the Energy Conservation Principle.

One such example might be the expansion of the Universe.

When the Universe expands, Light radiation is shifted to the red and loses Energy. On the other hand, the expansion of the Universe itself is often explained by what is denoted as the Dark Energy.

Thus, the expansion of the Universe might imply that on a cosmic scale, the Energy embedded in the Universe is not fully conserved, which also complies with the Noether's Theorem (13) which states that the Energy is fully conserved only in systems with Time symmetry, which means that the system's laws and its space do not change between the present time and the future. Because the Universe does expand and thus, changes its geometry, this symmetry might be broken, which might imply that the Energy Conservation Principle might not be fully maintained on the cosmic scale.

Thus, because of the above presented issues, relating to how the GRT fully complies, on the cosmic level, with the Energy Conservation Principle, the possibility of a Time Travel to the past, and, thus, also the occurrence of the Grandmother Paradox, is assumed to be a low possibility, but not a Null possibility, even though, the GRT model presents only one, single Universe, and not the Multi-Universes, or the Multiverse possibility.

But, in addition to the above, Einstein's GRT does leave an additional mathematical theoretical "breach", for enabling the Time Travel to the past, via CTCs or Worm Holes, and it does that without violating the Energy Conservation Principle at all, it does that by redefining the concept of "Past".

The GRT considers the Space-Time as a permanent four-dimensional "Block", in which the past, present and future exist simultaneously.

In such a scenario, the Time Traveler is not added suddenly to the one single Universe that exists.

Instead, he was always in this past moment, and he always vanished from this future, and the total Energy amount of this fixed "Block" always remains the same.

If we do treat Time as a dynamic flow, in which the past does not exist any more, and the future was not yet created, then, in such a view, a scenario without the Multiverse, or multi-Universes, does not enable a Time Travel to the past, because this scenario will violate the Energy Conservation Principle.

But the GRT the model of the Universe as a "Block Universe" (11) does not exclude Time Travel to the past, and in such a scenario, Time Travel to the past does not violate the Energy Conservation Principle at all because in such a scenario the past, the present and the future exist simultaneously.

In such a scenario, Time is not a flowing river in which the past vanishes and the future was not yet created.

Instead, the Universe is a static four-dimensional "Block", in which the three Space dimensions and the Time dimension are interweaved together into one, single, four-dimensional Interwoven Space-Time fabric.

This view can be compared to a physical movie film.

For the figures inside the film, the events occur one after the other, which provides a linear Time experience.

For an external viewer, which holds the physical reel of this film in his hands, the start of this movie, its intermediate portions, and its end exist simultaneously.

Einstein himself described this in his allegedly quote: "For us, believers in Physics, the distinction between past, present and future is only a stubbornly persistent illusion".

The above-mentioned model of a "Block Universe" changes our normal perception, in which, the Energy Conservation Principle assumes that the Universe changes from moment to moment, and at each present moment, the amount of Energy should be constant.

The "Block Universe" model changes this significantly.

In the "Block Universe" model the Energy Conservation Principle is not measured by how much Energy exists in the Universe, at an exact specific moment, because the Universe is not divided into separate moments.

Instead, the Energy Conservation Principle becomes a *Global principle*, the total Energy embedded in the whole four-dimensional "Block" is *always constant*.

Thus, the above model of a "Block Universe" does enable Time Travel to the past via CTCs, or Worm Hole, without violating the Energy Conservation Principle at all.

But it also presents a Universe with a complete Determinism, or as an "Eternalism"(12),

And thus, in this "Block Universe" there is not at all any *Free Choice*, which also seems to be a significant issue related to this "Block Model" presented by the GRT.

And the above should also provide an additional support to the assumption, presented in this paper, that the Classic Physics might be misleading in how it presents the concept of the Space-Time, which might also imply, that the GRT concept of the Space-Time is indeed problematic, and should be amended, maybe by its replacement with the proposal presented in this paper, of the multi-Space-Times, each related to a different Energy.

It should be also added that in a model of a "Block Universe", as presented by the GRT, a Time Traveler to the past cannot change anything, because also this Time Travel to the past is part of an history which *always happened*.

Thus, in the "Block Universe" model, GRT does not seem to enable the occurrence of the Grandmother Paradox, because, even if a Time Travel to the past might be possible in this model, without violating the Energy Conservation Principle at all, still, as presented just above, such a Time Traveler to the past, will *not be able to change anything*.

Thus, to summarize what was presented in this chapter:

The possibility of the occurrence of the Grandmother Paradox, because of the CTCs, or the Worm Holes that the GRT might enable, seems to be a low possibility, but not a Null one.

If the "Block Universe" presented above, is indeed how the GRT should present the concept of Space-Time, then, in such a scenario, Time Travel to the past might be a possible occurrence, because it will not violate the Energy Conservation Principle at all, but such a Time Traveler cannot change the past at all, which implies, that the occurrence of the Grandmother Paradox is also inhibited.

But if the "Block Universe" should not be assumed to present how the GRT should present the concept of Space-Time, maybe because of the issues it presents, such as eliminating any Free Choice, then, Time Travel to the past might be inhibited, because such a Time Travel might violate the Energy Conservation Concept, because the GRT presents only one, single Universe, and not the Multi-Universes, or Multiverse possibility.

But because the modern Physics already discovered, that there might be certain issues which might imply, that, on a cosmic scale, the GRT might not comply fully, with the Energy Conservation Principle, then, this leaves us with a low possibility that the GRT might enable the occurrence of the Grandmother Paradox, after all, because the GRT does enable CTCs or Worm Holes.

4. An alternate resolution to the famous Grandmother Paradox

This chapter focuses on presenting an alternate resolution to the famous Grandmother Paradox, which might be a more logical resolution of this Paradox, without issues such as the assumption of the Chronology Protection Conjecture, or a *Universe Conspiracy* to prevent Time Travels to the past, as Hawking proposed, or the possibility of Muti-Universes, or the Multiverse as

proposed by David Deutch, or the "Block Universe" and the Eternalism which also inhibits any Free Choice, as presented by the GRT.

And, contrary to the other proposed resolutions to the Grandmother Paradox, which none also propose real, physical experiments to validate their proposed resolution to the Grandmother Paradox, the alternate resolution presented for the Grandmother Paradox, in this chapter, might be also validated via proposed real, physical experiments, which are based only on arguments from the Classic Physics.

In previous sections of this paper an alternative view of how the Science of Physics should refer to the concept of the Space-Time was presented.

And, in this chapter, this alternate view will be used to also provide an alternate resolution to the famous Grandmother Paradox.

This alternate view argues that the Universe does not embed just the one, single Space-Time as presented by Einstein's GRT.

Instead, this alternate view argues that each Energy might embeds its own Space-Time, separate from the Space-Time embedded in a different Energy.

And as such, these multi-Space-Times might not be viewed as real existing entities.

Instead, these multi-Space-Times should be viewed only as attributes or facets of the Energies which embed these multi-Space-Times.

In such a model of the Universe, Time stops being an axis which events move on it.

In such a model of the Universe, if each Energy embeds its own facet, or attribute, of Space-Time, and if the model also assumes only one, single Universe, and not a multi-Universes, or the Multiverse possibility, then in such a model, Time turns to be an internal feature of each matter, or Energy (such as Mass or Electric Charge).

In such a model of the Universe, "exit" from the Time, or "return" to it, should be impossible, because Time *is* the matter, or Energy.

In order to succeed in a Time Travel back, a particle must cancel itself, or drastically change its internal character, which is physically impossible.

In such a model, instead of a Universe which might be described as a big playground, in which everything exists (as Einstein's Relativity Theories present), the Universe is an immense collection of separate Space-Times which interact with each other.

In modern Thermodynamics, Time always moves forward because of the Entropy Law, which states that the level of disorder in the Universe increases continuously.

In the proposed model of the Universe, proposed in this paper, this Law turns to be *absolute*, which also provides an explanation to why Humans feel that Time only moves forward.

Without the multi-Universes, or the Multiverse possibility, which can "absorb" Energy or changes from the future, each occurring event, is engraved in the Space-Time facet, or attribute, of its Energy, forever, without any physical means to change it or revisit it.

In such a model, because the Space-Time of any Energy is the Energy itself, in order to Time Travel back, a particle, or body, will need to change the basic nature of its own Energy.

In such a model, a Time Travel back is an internal logical and physical contradiction.

For succeeding a Time Travel back, a particle will have to stop being itself.

Thus, because in the described model a Time Travel back is *inherently* impossible, this also completely resolves the Grandmother Paradox.

5. Summary and Conclusions

This paper initially points out that the nowadays Science of Physics does still embed paradoxes, such as the famous Grandmother Paradox, and incompatibilities, between branches of Physics, such as the incompatibility between the Gravity and the Electromagnetism, which both belong to the Classic Physics section, or the incompatibility between the Classic Physics and the Quantum Physics.

Then, this paper refers to additional papers, by the author of this paper, which present significant and reasonable arguments, which argue that the nowadays branch of the Classic Physics might be misleading in how it presents the concept of the Space-Time, and, these additional papers also propose an alternative possibility of how the concept of the Space-Time should be perceived, and also real, physical experiments, based only on the Classic Physics, which if implemented successfully, might also provide validity to the above-mentioned alternative possibility of how the concept of the Space-Time should be perceived.

This alternative possibility of how the concept of the Space-Time should be perceived, propose that the real, single Einstein's Interwoven Space-Time presented by Einstein's GRT should be replaced with a model of multi-Space-Times, each attributed to a different Energy, which also implies, that each of these multi-Space-Times should not be considered to be a real, existing entity in the Existence, instead, each of these multi-Space-Times should be viewed only as a facet, or an attribute, of the Energy which embeds this specific Space-Time.

And, as just presented above, this proposal might be also validated by a successful implementation of the real, physical experiments which are also proposed by the above-mentioned additional papers.

Then, this paper presents that this alternative possibility of how the concept of the Space-Time should be perceived, might also present leads for resolving the incompatibilities that still exists between the Gravity and the Electromagnetism, and between the Classic Physics and the Quantum Physics.

And this paper also presents that this alternative possibility of how the concept of the Space-Time should be perceived, might also provide an alternate resolution to the Grandmother Paradox, which might be a more logical resolution of this Paradox, without issues such as the assumption of the Chronology Protection Conjecture, or a *Universe Conspiracy* to prevent Time Travels to the past, as Hawking proposed, or the possibility of Muti-Universes, or the Multiverse as proposed by

David Deutch, or the "Block Universe" and the Eternalism which also inhibits any Free Choice, as presented by the GRT.

This paper also points out issues related to the "Block Universe" which is presented by the GRT, issues that inhibit any Free Choice and present the Universe as an Eternalism, and this paper argues that these issues might also provide additional support to the assumption, presented in this paper, that the Classic Physics might be misleading in how it presents the concept of the Space-Time, which might also imply, that the GRT concept of the Space-Time is indeed problematic, and should be amended, maybe by its replacement with the proposal presented in this paper, of the multi-Space-Times, each related to a different Energy.

It should be also emphasized, that the alternate resolution to the Grandmother Paradox, presented in this paper, might be also validated by the proposed real, physical experiments proposed by the above-mentioned additional papers, contrary to the fact, that all the other resolutions proposed, for the Grandmother Paradox, do not propose experiments which might validate their proposals.

And thus, an implementation of the above-mentioned experiments might be an important endeavor.

However, since the alternative possibility of how the concept of the Space-Time should be perceived, proposed in this paper, might contradict beliefs and statements held by the nowadays Science of Physics, it might also be possible, that the implementation of the proposed experiments might be a difficult endeavor, or might even turn out to not be fully successful.

But, because the alternative possibility of how the concept of the Space-Time should be perceived, proposed in this paper, do present leads for resolving incompatibilities between Physics branches, and a significant resolution for the Grandmother Paradox, it might be also important to seek additional experiments which might validate the alternate proposed view of how the concept of the Space-Time should be perceived, presented in this paper.

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