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Chapter

What Is "Wrong" with Current Theoretical Physicists?

Francis T.S. Yu

Abstract

Theoretical physics uses amazing mathematical paradigm and added with fantastic computer animation provides very convincing results. But mathematical modeling and computer animation are virtual and fictitious, for which many of their analytical solutions are not physically real. What is wrong with current theoretical physicists is that they have used mostly a timeless ($t = 0$) mathematical subspace for their analyses that does not exist within our temporal ($t > 0$) universe. The reason is it is not how rigorous and fancies the mathematics (or computer simulation) are; it is the essence of a physical realizable paradigm. For instance, timeless ($t = 0$) model has been used since the beginning of science; although it has produced uncountable excellent results, it has also produced many solutions that are timeless ($t = 0$) or nonexistent solutions within our temporal ($t > 0$) universe. In this article, I will show a few evidences that the theoretical analyses have done to physics, which includes some of the world-renowned theoretical scientists, past and present. Yet, theoretical physicists were and still are the creators for all the fundamental laws and principles of physics; it is their "responsibility" to take us back to the physical realizable world of science; otherwise we will be still trapped within a virtual timeless ($t = 0$) land of mathematics. In short, I anticipate that Temporal ($t > 0$) Physics will be a mainstream realizable physics in the years to come.

Keywords: theoretical physics, temporal space, timeless space, virtual space, Newtonian space, physical realizable, quantum mechanics, cosmology, relativity

1. Introduction

In mathematics, every postulation needs a proof it exists—a solution before searching for the solution. Yet in science, it seems to me it does not have a criterion as mathematics does, to prove first a hypothesis exists within our temporal ($t > 0$) universe. Without such a criterion, fictitious science emerges, as already have been happening in every day's event. And this is one the objectives for writing this article, in which I will show what is wrong with theoretical physicists, although they were the creators of science. Yet, all laws of physics were made to be broken and to be revised, which includes the paradoxes and principles; this is all about science. Since all the physical laws, principles, and paradigms have been working well in the past, it is by no means that they are still assumed applicable, as space is getting larger and particles are becoming smaller. As more and more sophisticated physics are discovered, the need for updating the laws and paradigms is inevitable. Otherwise virtual and fictitious solution emerges, since theoretical physics is an applied mathematics.

Theoretical physicists were the creators of modern science and still are; it is their responsibility in part to correct what they have done to the physics recently. However, they seem to know precisely that some of their analytical solutions were irrational and spooky as have been noted by Einstein, a century ago. Yet they have not tried hard enough to find out the cause, continuingly producing those dysfunctional solutions and pretending there are real and existing within our universe, for which we have seen scores of fictitious sciences emerged as orchestrated by their ambition; that has become the mainstream of scientific research topics, for example, quantum supremacy in computing, granular time variable, curving time–space, repeated cyclic universal, and so on, in which none of them, as will be shown in subsequent discussion, actually existed with our temporal ($t > 0$) universe.

2. Evidences

The fact is that it is not how rigorous the mathematics (or computer simulation) is; it is the essence of a physical realizable paradigm. For instance, virtual empty space model (i.e., a mathematical space) has been used over centuries by a score of world-renowned scientists and theoretical physicists at the dawn of science. And the empty space paradigm is still used today by the theoretical physicists, "inadvertently" not knowing it is a virtual subspace not existing within our universe. As we have seen, empty space paradigm has provided not just for theoretical physicists and all of us with an impressive account of viable solutions. Since the virtual emptiness subspace comes very naturally on a piece of scratched paper but not knowing the physics behind the shadow of mathematical model is a physically unreal subspace suppose "not" to be used, but unintentionally we have been using it since the beginning of science, because science is also mathematics.

Until recently, I have discovered a nonphysical solution had been derived from an atomic model that had been drawn on a piece of scratch paper over a century ago [1] of which a paradox of Schrödinger's cat [2, 3] emerged. Although empty space paradigm has given scores of applicable results, it has also produced many solutions that are irrational and strange that Einstein called them spooky. And these must be the physical evidential results that have been suggested; something is very wrong in view of all the illogical consequences, as in contrast with the physical reality. But to remedy the spookiness comments from one of the world's most prestigious scientists at that time, theoretical physicists come up a very convincing answer; particles behave strangely in micro space as in contrast within macro space environment, although micro particles have been successfully applied in macro space. And this must be the powerful and convincing justifiable reason, discouraging for further investigation, although intensive debates have been started by Einstein, Bohr, Schrödinger, and many others in a scientific forum at Copenhagen in 1935 [3], and the paradox of Schrödinger's cat is still lingering today. Late Richard Feynman has said that: "After you have learned quantum mechanics, you really do not understand quantum mechanics" [4]. But most of the theoretical physicists still believe their solutions are physically real, since a score of their solutions have been successfully applied in practice.

Although I am not a physicist, I have found a score of solutions as obtained from an empty space paradigm are timeless ($t = 0$) recently [5, 6]; strictly speaking one should not implement timeless ($t = 0$) solutions directly within our temporal ($t > 0$) space, such as superposition principle of quantum mechanics [2, 3]. Nevertheless, some timeless ($t = 0$) solutions can be used, but not directly plunged, into our temporal ($t > 0$) universe, such as Einstein energy equation [7] as I will show later.

Since theoretical physicists need mathematics, but mathematics is not physics, unless her analytical solution is complied within the boundary condition of our universe, causality ($t > 0$) and dimensionality, then her analytical solution is a physical realizable solution that can be applied directly within our universe.

3. Burden of theoretical analysis

As we know, physics is physically real and mathematics is abstractly virtual. However, it is not how fancy mathematics is compared to physics that guarantees her analytical solution is physically real. It is her physical realizable paradigm that determines her solution is physical realizable. In other words, if one uses an empty subspace model to evaluate a physical problem, then very likely her analytical solution will be timeless ($t = 0$). For example, using Schrödinger wave equation to analyze the quantum dynamic behavior of a particle, then the particle dynamic solution will be timeless ($t = 0$) with respect to the empty space of the model, since empty space is a timeless space.

For instances; in view of all the sophisticated mathematics such as; Hilbert space, Banach space, Riemann surface, topological spaces, group theory and others have been used by theoretical physicists, but without any physical evidence to support the solutions are physical real. Besides all those fancy mathematics were not originated by theoretical physicists but by a group of abstract mathematicians, in which we see that theoretical physics is actually an "applied" mathematics or simply mathematics.

Since theoretical physics is mathematics, the burden on their shoulders is to provide us with physically real solutions for practical implementation. Yet they have been persistently giving us the virtual fictitious solutions, even though they knew some of their results are irrational and spooky as noted by Einstein a century ago!

It seems to me it is kind of out of control; we have seen fictitious sciences added with very convincing computer animations becoming the mainstream of current topics of science. Therefore it is an urgent responsibility for the theoretical physicists to bring back the theoretical physics to reality, since the origin of physics was started by theoretical physicists.

3.1 Subspaces

Before illustrating the consequences as will be used for analytical solution, such as from virtual mathematical empty space paradigm, I would introduce several subspaces that have been used by the theoretical physicists in the past and present, as depicted in **Figure 1**.

In this figure we see an absolute-empty space, a mathematical virtual space, a Newtonian's space, and a temporal ($t > 0$) space. An absolute-empty space or just empty space has no substance and has no time. A mathematical virtual space is an empty space which has no substance in it, but a mathematician can assume coordinates in it, since mathematics is a virtual space. Although this virtual mathematical space has been extensively used by scientists, theoretical physicists, and others since the birth of science, it is an abstract space that does not exist within our temporal (i.e., $t > 0$) space. The next subspace is known as Newtonian space [8]; it has substance and coordinates in it but treated time as an "independent" variable. But Newtonian space does not actually exist within our temporal ($t > 0$) space, since time and substance are mutually coexisting within our temporal ($t > 0$) universe. The last subspace is known as temporal ($t > 0$) space [5, 6], where time and substance are interdependent or coexisting, in which we note that time is a forward

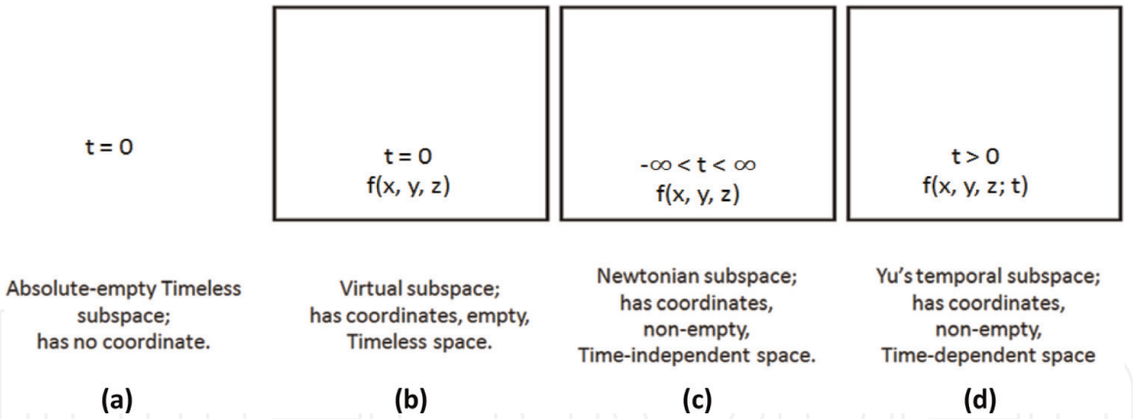

Figure 1.
(a) An absolute-empty space, (b) a virtual mathematical space, (c) a Newtonian space, and (d) a temporal (t > 0) space.

"independent" variable moving at a constant speed dictated by the speed of light. I stress that this temporal (t > 0) subspace is the "only" viable physical realizable space at this time, of which temporal (t > 0) space is created by the current laws of physics as derived from Einstein's theory of relativity [7].

A physical fact is that any analytical solution that deviates away from the constraints as imposed by our temporal (t > 0) universe is not a physically real solution. But this does not mean that the virtual mathematical empty space and Newtonian space are useless. On the contrary, they have been the cornerstones of physics, giving us the wisdom of science, from virtual space, Newtonian space, to temporal universe as presented in **Figure 1(b)–(d),** respectively.

There is however a difference in context between timeless (t = 0) space and time-independent variable Newtonian space. Timeless (t = 0) space means that a virtual subspace existed with no time (i.e., t = 0) where time is "not" a variable, while Newtonian space means that a space existed at any time where time is an independent variable. And again, temporal (t > 0) space means that a space coexisted with time, where time is a constant forward variable and its velocity is already settled by the speed of light.

3.2 Virtual mathematical spaces

Since virtual space has caused fictitious solution in science, I will take this opportunity to show what a mathematical virtual space is, as depicted in **Figure 2**. Firstly, theoretical physicists are applied mathematicians; they can draw or implant coordinate systems within an empty space they wish, despite the model being physically unrealizable.

In **Figure 2(a)**, we see that a singularity approximated atomic model is embedded within an empty subspace, which has no dimension, no size, and no time. The difference of **Figure 2(b)** is that there is a virtual coordinate system that has been added in, by particle physicists, since physicists are mathematicians.

Once the coordinate system is implanted, mathematically speaking, dimension as well the sizes for all the subatomic particles cannot be ignored. But for simplicity, we can ignore the size for the time being, but not the separation between particles, since distance is time and time is distance. I have also found that with the coordinate system, we have "inadvertently" assumed time is an "independent variable" as contrasted with temporal space, where time is a "dependent" variable.

We note that since the beginning of science, we have virtually used these two mathematical paradigms for analyses, not knowing the empty space that we have used is "not" a physically realizable subspace.

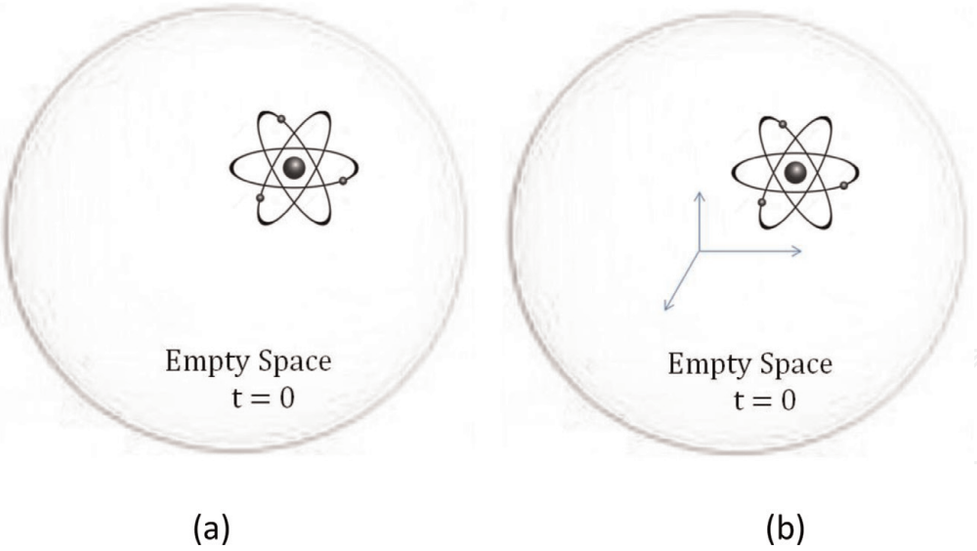

Figure 2.
A set of atomic models embedded within virtual empty subspaces (a) shows a singularity approximated atomic model is situated within an empty space, which has no coordinate system, and (b) shows an atomic model is embedded within an empty space that has a coordinate system drawn into it.

In subsequent sections, I will show severe adverse consequences have been done in the theoretical physics, for which I will show that many of their solutions and conjectures "only" exist within a timeless (t = 0) virtual space, which does not exist within our temporal (t > 0) universe.

3.3 Timeless (t = 0) solution

As from my knowledge, theoretical physics was built from a mathematical empty subspace, in which we had assumed the deep space within our universe is absolutely empty, which includes time. Since we have had experienced the existence of gravitational fields and electromagnetic wave, it tells us the deep space within our universe is "not" an empty space. In fact every subspace within our universe is temporal (t > 0), which includes substances not the particle like.

Yet, emptiness within the deep space is still lingering, which causes serious problems as science moves on to a finer scale of particle size and higher level of abstraction, such as quantum mechanics, particle physics, and cosmology. Over a century of modern physics, yet we have "inadvertently" been using the same mathematical virtual paradigm for solution, not knowing the shadow background (e.g., a piece of white scratch paper) model is timeless (t = 0), although "all" the laws of science practically were developed from an empty virtual space.

Let me illustrate what a timeless (t = 0) physical law is, for which I take two of the most famous equations in modern physics, Einstein's energy equation [7] and the Schrödinger equation [2, 7], for examples. One has been used for the creation of our temporal (t > 0) universe [5, 9], and the other has many practical applications in high-speed Internet communication and computing as given by, respectively,

$$\mathrm{E} = \mathrm{mc}^2 \tag{1}$$

where m is the rest mass and c is the velocity of light.

$$\frac{\partial^2 \psi}{\partial x^2} + \frac{8\pi^2 \mathrm{m}}{h^2}\,(E - V)\psi = 0 \tag{2}$$

where ψ is the Schrödinger wave function (or Eigen function), *m* is the mass, *E* is the energy, *V* is the potential energy, and *h* is the Planck 's constant.

In view of these equations, we see that they are timeless (t = 0) since they are not time domain equations. In addition we also see that these equations are point-singularity approximated; dimensionless and have no coordinate. But, a question may be asked: Why are these equations timeless (t = 0)? Apparently these equations were derived from a virtual subspace, which has no time (t = 0).

By the way, practically all the fundamental laws and principles of science were developed on a piece of scratch paper (or on a blackboard), as shown in **Figure 3**.

We see a couple of equations with an atomic model drawn in it. This is a typical example of solving a particle physics problem: a scratch paper, a pencil, a model, and mathematics. Yet, if I tell you that solution as will be obtained from this configuration will be mathematically correct, but is physically "wrong," would you believe me? And this is precisely the major wrong part as I will discuss in this article.

Since we have never in our wildest nightmare that the background of a piece of scratch paper represents an empty timeless (t = 0) space; it is a virtual subspace that have been "inadvertently" using since the beginning of science. For which we see that; practically all the laws of physical were developed on the top of a piece of scratch paper that represents a virtual empty subspace. And I have recently found it is not a real physical subspace that supposes to be used within our universe. In fact, practically all the laws of science were obtained from this virtual subspace.

In the following, I will show consequences that have been from the use of a piece of scratch paper. Let me start with our universe, which is a time–space interdependent space as described by the following symbolic representation [5, 9]:

$$f\,[r(t)], t > 0 \text{ and } r = c \cdot t \tag{3}$$

where r is the radius of a subspace, c is the velocity of light, and t > 0 denotes time as a forward dependent variable moving at a constant speed, for which we

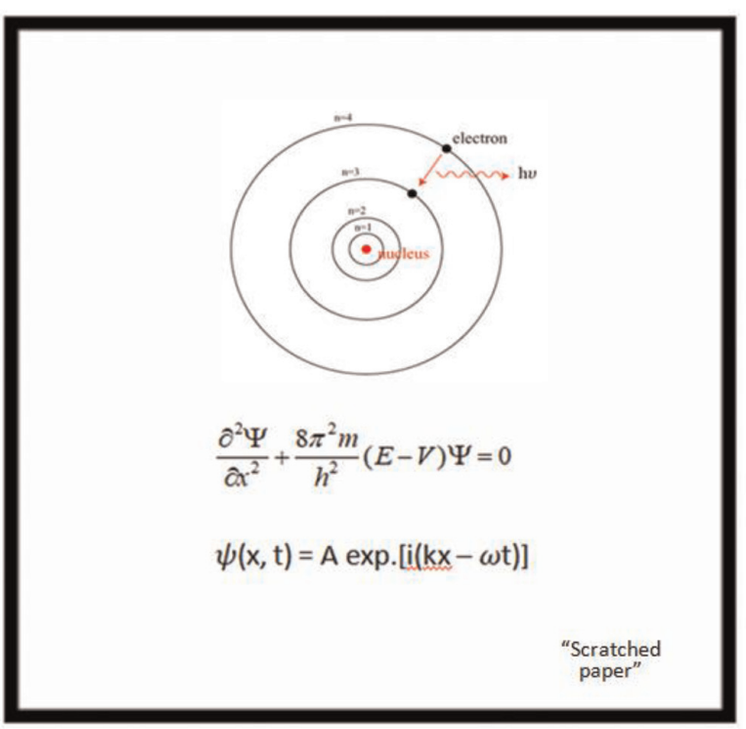

Figure 3.
A sample piece of "scratch paper" shows an atomic model with a couple of equations in it.

see that any mathematical solution (or principle) has to comply with our universal boundary condition: causality and dimensionality. Otherwise the solution (or principle) cannot be directly implemented within our temporal (t > 0) universe.

In view of Eq. (1) and Eq. (2), we see that they are timeless (t = 0) equations; strictly speaking they cannot be directly applied into our temporal (t > 0) universe, unless a temporal component is introduced with these equations. For example, let us take the timeless Einstein energy equation as our example. If the equation is appropriately converted into a partial differential form as given by [5, 9]

$$\frac{\partial E}{\partial \mathrm{t}} = -c^2 \frac{\partial m}{\partial \mathrm{t}} = \nabla \cdot \mathrm{S}, \mathrm{t} > 0 \tag{4}$$

we see that the equation has transformed from a timeless (t = 0) dimensionless equation into a time-dependent equation with spatial representation, where a partial derivative of energy with respect to time ($\frac{\partial E}{\partial \mathrm{t}}$) is the rate of energy increase, the term ($\frac{\partial m}{\partial \mathrm{t}}$) represents corresponding rate of reduction in mass, ∇ represents the divergent operator, · denotes the dot product operation, S is an energy vector, and t > 0 denotes time as a dependent forward variable after excitation t = 0.

From Eq. (4) we see that a dimensionless and timeless equation has been transformed into a time variable function that can be applied directly within our temporal (t > 0) universe. Notice that an equation is not just a symbolic representation, it is also a description, in which we can visualize that the converted energy diverges at speed of light into a dimensional space as time moves forward. This is precisely how our universe was created, in which we see that "every" subspace, within our temporal (t > 0) universe, can be described by the following expression as given by

$$\nabla \cdot S = \mathrm{f}[\mathrm{r}(\mathrm{t})] = \mathrm{f}\left[\mathrm{x}(\mathrm{t}), \mathrm{y}(\mathrm{t}), \mathrm{z}(\mathrm{t})\right], \mathrm{t} > 0 \tag{5}$$

where r is the radius of a spherical subspace and [x(t), y(t),z(t)] represents a rectangular coordinate system. Note that any particle regardless of their size, very large or very small, can be represented by Eq. (5), which includes all the elementary particles, in which we see that all particles are temporal (t > 0) particles that include substances, not particle size. Nevertheless Eq. (5) can be further extended as given by [5, 10]

$$[\nabla \cdot S(v)] = -\frac{\partial}{\partial t}\left[\frac{1}{2}\epsilon \mathrm{o} E^2(v) + \frac{1}{2}\mu \mathrm{o} H^2(v)\right], \mathrm{t} > 0 \tag{6}$$

where (ϵ_o, μ_o) denotes the permittivity and permeability medium within the free space; (E, H) represent the electric and magnetic field vectors, respectively; and v is the frequency of the electromagnetic wave. From this extended representation, we see that the boundary of our universe is expanding at a speed of light within an even larger space well beyond our current observation, as depicted in **Figure 4.**

Since the speed of electromagnetic wave is limited by $1/\ [\epsilon\mu)]^{1/2}$, we see that our universe is "not empty," which includes the space beyond our universal boundary; otherwise our universe will "not" be a bounded subspace. The non-emptiness universal space is an interesting aspect of a greater universe, as I will discuss briefly when we meet at the Big Bang creation.

As we have accepted the deep space of our universe is non-empty, any excitation within our temporal (t > 0) universe "cannot" be instant (t = 0) responded, but it

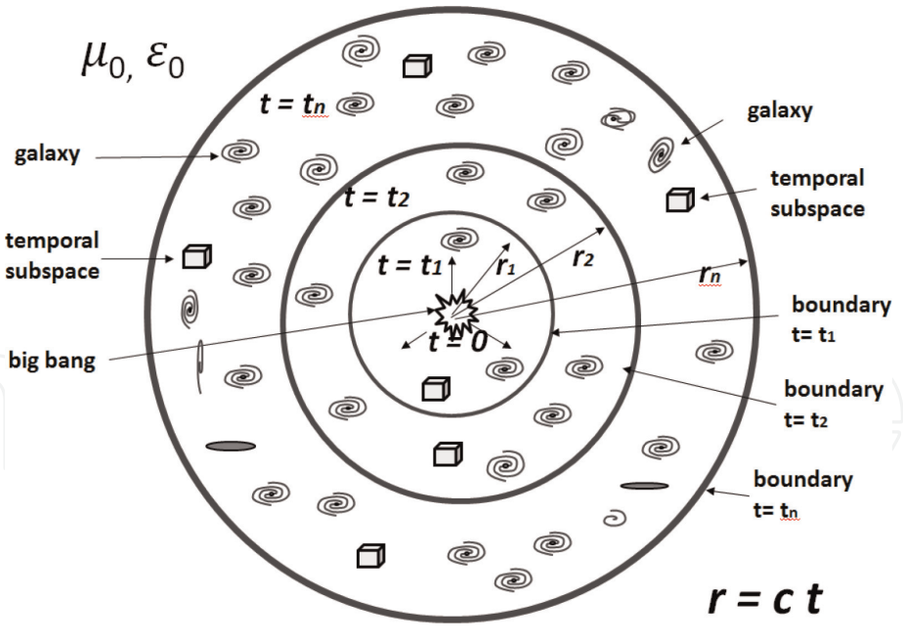

Figure 4.
A composite temporal space universe diagrams. r = ct, r is the radius of our universe, t is time, c is the velocity of light, and ϵ_o and μ_o are the permittivity and permeability mediums within the deep space.

will be responded at a later instance (i.e., t > 0). This is the well-known causality condition, a well-accepted principle in science.

Moreover, Eq. (6) shows that time and subspace are mutually coexisting within our universe by which time and space are interdependent. That is, time is a "dependent" variable with respect to the existence of the subspace, and space is a dependent substance with respect to time, in which we see that, within our universe, time is space and space is time, for which we see that it may be possible to transform a timeless (t = 0) equation into a time domain equation, to comply with the causality (t > 0) condition of our universe, as will be shown in the following:

For example, **Figure 5** shows a timeless solution which can be transformed and reconfigured into a temporal (t > 0) domain solution. Let me assume a Fourier domain solution F(ω) is depicted in **Figure 5(a)**, where ω is an angular frequency variable, in which we see that it is a timeless (t = 0) equation (i.e., not a time domain equation) which cannot be used within our temporal universe. By simply inverse-transforming F(ω) into a time-domain solution [i.e., f(t)] shown in **Figure 5(b)**, we see that it is still not a physical realizable solution, since a portion of f(t) exists in the negative time domain (i.e., t < 0). However if we add a negative linear phase distribution [i.e., exp. (−idω)] with F(ω), together we have [F(ω) exp. (−idω)]; again it is still not a time domain solution. If this complex Fourier domain solution is inversely transformed into a time domain equation of f(t − d) as depicted in **Figure 5(f)**, we see that f(t − d) exists only within the positive time domain which can be directly applied within our temporal subspace, since it satisfies the causality (t > 0) condition of our universe.

In this example, we have shown, in principle, it is possible to reconfigure a temporal solution to comply with the causality (t > 0) condition of our universe. But there is always a price to pay (i.e., in time d); by appropriately delaying a nonphysical realizable time domain solution, it is possible to make a time domain solution causal (i.e., t > 0).

This example also shows an important aspect within our temporal universe; we cannot get something from nothing; there is always a price to pay, an amount of energy with a section of time (i.e., ΔE and Δt). This means that every subspace within our temporal (t > 0) universe responds after the excitation. In other words

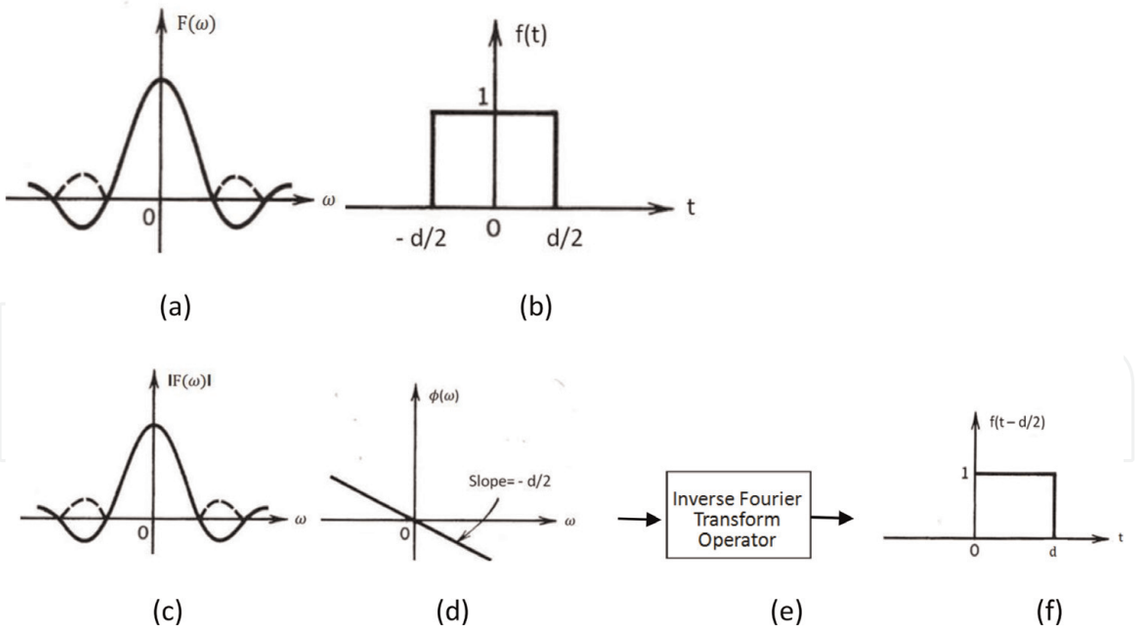

Figure 5.
(a) A Fourier domain solution; (b) the corresponding time domain solution; (c) magnitude of a Fourier distribution; (d) a Fourier domain linear phase factor; (e) an inverse Fourier transformer; and (f) the corresponding time domain solution existing in the time domain (i.e., t > 0).

temporal (t > 0) space behaves as a passive time-dependent system; it responds after the excitation but neither instant (i.e., at t = 0) nor before time (i.e., t < 0).

The essence of this illustration is that it tells us, in principle, is possible to transform an arbitrary solution to become a time domain solution. Any analytic solution as obtained from those fancy mathematics (e.g., Hilbert space, topological space, and others) in principle can be converted first into a time domain solution and then reconfigures it into a temporal (t > 0) solution to satisfy the causality (t > 0) condition of our universe.

Again, practically all the fundamental laws of physics are timeless (t = 0) and singularity approximated. In principle a causality (t > 0) constraint can be added with those laws, as to signify the imposition upon time is a forward dependent variable (i.e., t > 0). A sample set of well-known equations that can be constrained by t > 0 is given by

$$\nabla \times E = -\frac{\partial B}{\partial t}, \quad t > 0 \tag{7}$$

$$\nabla \times B = \mu_0 J + \mu_0 \varepsilon_0 \frac{\partial E}{\partial t}, \quad t > 0 \tag{8}$$

$$\frac{\partial \varepsilon}{\partial t} = -c^2 \frac{\partial m}{\partial t}, \quad t > 0 \tag{9}$$

$$\psi(x, t) = \exp .[i(kx - \omega t)], \, t > 0 \tag{10}$$

in which we see these equations as well as their solutions are and will be subjected to the causality (t > 0) constraint. By reconfiguring their solutions to comply with the causality (t > 0) condition, all solutions can be applied within our universe. For example, without the causality (i.e., t > 0) constraint, wave equation of Eq. (10) is not a physical realizable time domain solution that can be directly applied into our universe, although it is a time-domain solution. With the imposition of t > 0, her solution can be shown approximately as given by [10]:

$$\psi\left[(t-t_0) = \exp.[-\alpha\,(t-t_0)^2\,\cos\,[\omega\,(t)\right], t-t_0 > 0 \tag{11}$$

in which we see that the wave equation existed within the positive time domain, as long as $t - t_0 > 0$ and t_0 is a time delay factor.

4. Virtual paradigm

Science is based at different levels of physical abstraction, in which the foundation of theoretical physics is supported by mathematics with physical realizable paradigms. As earlier as the discovery of gravitational field, to Newtonian mechanics, to statistical mechanics, to electromagnetic field, to relativistic theory, to particle physics, and to quantum mechanics, each level of physical discovery was based on an assumed physical realizable paradigm, in which their analytical solutions were assumed physically real, with a high degree of certainty.

But as science progresses, the demand for more-defined physical paradigms is needed. The fact is we have "inadvertently" overlooked and continuously used an old virtual subspace which is no longer viable for sophisticated modern physics. Although irrational and fictitious solutions emerged, which have been pointed to us that something is wrong with our solutions, ambition and fantasy have driven us to quick success, for overlooking what is wrong with the theoretical analysis, since theoretical physics was and still is the core of modern physics. But the problem of theoretical physicists is that they have used sophisticated mathematics to substitute the physical reality, inadvertently or intentionally not finding out what is wrong with their irrational solutions, which have been known as spooky solutions.

In the following I will show a few typical examples without quotation, since there are a bunch of evidences which are difficult to single out for references, for which the readers can find those materials either published in various scientific journals or in the YouTube links as well as in various social media posted by well-known theoretical physicists from prestigious universities and national research institutes that include some Nobel laureates in physics.

5. Big Bang hypothesis

Although Big Bang creation is a well-accepted hypothesis, it was assumed the explosion started from a singularity explosion within an "empty space" as depicted in **Figure 5(a)**.

Since empty space cannot have non-empty subspace in it, we see that paradigm of **Figure 6(a)** is "not" a physical realizable model. Strictly speaking any nonphysical realizable paradigm as **Figure 6(a)** should not be used; otherwise unsupported virtual solution may emerge such as cyclic universe creation, single universe theory, and others.

Even though we assumed Big Bang explosion occurs within an empty space, as cosmologists often do, the velocity of electromagnetic radiation will be infinitely large, by virtue of electromagnetic wave velocity as given by

$$v = 1/(\epsilon\mu)^{1/2} \tag{12}$$

where (ϵ,μ) are the permittivity and permeability medium. Within an empty space, we see that $\epsilon = 0$ and $\mu = 0$.

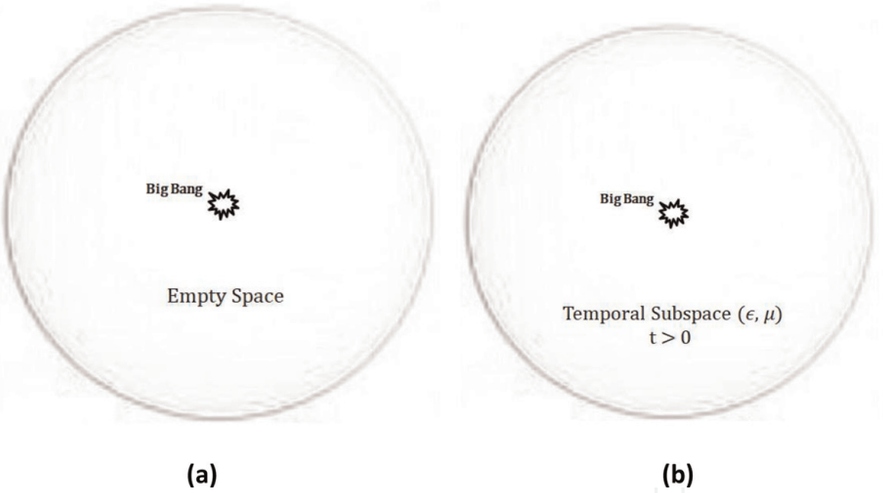

Figure 6.
(a) Big Bang explosion started within an empty space, a generally accepted paradigm. (b) Big Bang explosion within a temporal (t > 0) subspace; (ϵ, μ) represents the space which already has substance in it.

On the other hand, if the solution comes out from a Big Bang explosion situated within a temporal (t > 0) space, as depicted in **Figure 6(b)**, we see that the explosion started within a non-empty subspace where time has already coexisted with the "media"(e.g., ϵ and μ) within the subspace, in which we see that our universe is a "bounded" temporal (t > 0) subspace and her boundary is expanding at the speed of light, which is consistent with the observation reported by the Hubble Space Telescope [11].

6. Timeless quantum world

Two of the most important pillars in modern physics must be Einstein's relativity theory [7] and Schrodinger's quantum mechanics [2], in which one is dealing with very large objects and the other is dealing with very small particles. Yet they were connected by means of Heisenberg's uncertainty principle [12]; every subspace within our temporal (t > 0) universe is limited by energy (i.e., ΔE) and time (i.e., Δt), which is equaled to a "quantum unit" of Heisenberg's principle [13] as given by

$$\Delta E \cdot \Delta t = h \tag{13}$$

where h is the Planck's constant.

And each quantum unit is equivalent to an information cell, as shown by Dennis Gabor in 1946 [14], in which it tells us that every bit of information takes an amount of energy (ΔE) and section of time (Δt) to produce, to transmit, to store, and to destroy, and it is "not" free (i.e., in terms of ΔE and Δt). In other words; within our universe everything has a price tag; namely ΔE and Δt.

Since Schrodinger's quantum mechanics was constructed within a timeless (t = 0) subspace, his whole quantum world is timeless [15]. And this is the "same error" that all of us, past and present, have committed, by a paradigm which was drawn into a scratch paper and not knowing it actually represents a timeless (t = 0) subspace.

In view of **Figure 7(a)**, I sincerely "believed" that Schrödinger was not aware the background of a scratch paper presented as a virtual empty subspace; otherwise he would not have had the paradox of his cat.

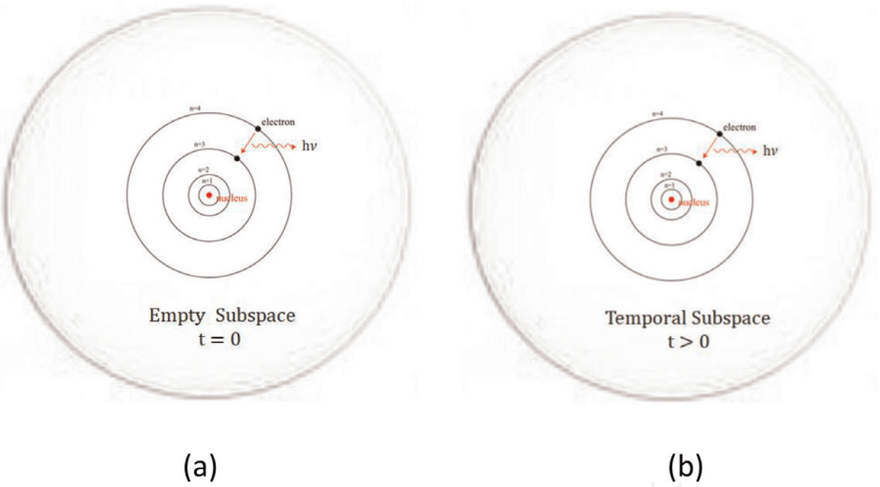

Figure 7.
Physical realizable paradigm (a) shows a Bohr atom situated within an empty space, which is "not" a physical realizable model, and (b) shows a Bohr atom situated within a temporal subspace, which is a physical realizable model.

Why we have missed the timeless (t = 0) subspace paradigm issue is very "natural," since we are all human, imperfect and simple as it is. And we have "inadvertently" treated the shadow background of a scratch paper as a physical space, and it has never been in our minds that the background represents a virtual empty space. And this is precisely the reason that Schrödinger's quantum mechanics did.

Nevertheless, it is possible to build a "temporal (t > 0)" quantum machine [10] similar to the one that Schrödinger has built. Instead, the quantum machine is built with a Bohr atomic embedded within a temporal (t > 0) subspace, as depicted in **Figure 7(b)**, in which we see that any analytical solution that emerges from this physical realizable paradigm will be temporal (t > 0), for which I note that if one is searching a new particle in a timeless (t = 0) quantum world, it is "very likely" the newly discovered (i.e., analytical) particle is timeless (t = 0), since every particle is also a temporal particle within our universe, no matter how small it is; otherwise the particle cannot exist within our temporal universe. In case one "insists" that a timeless particle can coexist within our universe, it is equivalent of searching for a timeless (t = 0) particle within our temporal universe.

7. Granular universe

As from the particle physics perspective, every substance within our universe is built by particles, of which our universe is compacted with particles, for which we see that our universe is granular instead of smooth and continuous. And it is a very convincing argument from a particle physicist's point of view: our universe is not continuous and smooth.

Since particle is temporal (t > 0) no matter how small they are, empty space cannot coexist within a temporal (t > 0) space, in which we see that there should be "temporal" substances between particles. And this is precisely why there are existent temporal substances throughout the entire universe, beyond particle forms. Otherwise gravitation fields, electric fields, magnetic fields, as well electromagnetic waves cannot exist within our universe.

With all these physical evidences, we see that there is a new branch of physics beyond the particle physics that is waiting for us to explore, for which the "micro limit" of physics should not have to be limited to the particle physics point of view,

in which we see that time is not as granular as predicted by particle physicists. As we accepted particle and time coexist, we see that every particle within our universe has the same instance of time with the same time speed but has a relativistic time between particles, in which time is a dependent variable with respect to particle and it is as smooth and continuous.

7.1 Symmetric principle

Symmetric principle has been used in theoretical physics for searching new particles and others, since the dawn of modern physics. Mathematically speaking those imaged properties of particles exist, but they are from an abstract mathematical standpoint.

Symmetric principle is based on a virtual empty space where time is treated as an independent variable as a Newtonian subspace. And this is precisely why the symmetric principle of science behaves as a mirror perception, such as positive versus negative or as groups in group theory, for example, positive time versus negative time, positive energy versus negative energy, matter versus anti-matter, and others. It is physical real versus mathematical virtual. But the fact is that all the mirror images such as negative time, negative energy, and anti-matter do not exist within our temporal ($t > 0$) universe. The fact is that those conjectures were derived from a mathematical or a Newtonian space standpoint; which is not existed within our temporal ($t > 0$) universe that has had or has had not!

Since time and space coexist, matter (i.e., subspace) is time, and time is matter. Without time we have no matter, and without matter it has no time, in which we see that there is an "asymmetric principle" in science with respect to physical real versus mathematical virtual, instead of the mirror image of mathematics.

Samples of asymmetric principle are:

Have time ($t > 0$) vs. no time ($t = 0$)

Having energy vs. no energy

Having matter vs. no matter

Physical real vs. virtually fictitious

Therefore we see that searching for any new particle, it is more reasonable to use the "asymmetric principle" instead of symmetric principle. It will be more "likely" found within our physical world, since timeless particles do not exist within our temporal ($t > 0$) universe.

7.2 Curving time–space

Within our temporal ($t > 0$) universe, every subspace takes an amount of energy ΔE and a section of time Δt to create, and it is not free, for which time is subspace and subspace is time, and we see that time is a "dependent" variable with the existence of space. Since we are still having a vague idea of interaction between gravity with time and knowing that gravitational field is produced by masses, gravitational field has to be embedded in a non-empty space which coexists with time. It is therefore "incorrect" to assume time as an "independent" variable, as we often do, for which I have a hard time to accept curving time–space dynamics, as based on a virtual mathematical space.

Since speed of time is settled by the velocity of light as our universe was created by a Big Bang explosion (a well-accepted paradigm) from the theory of relativity [5, 9], we have shown time is a dependent variable, instead of an independent variable, as within a Newtonian subspace, where time traveling is possible.

And this is the reason why space "cannot" be curved by time, since time is a "dependent" variable, of which we see that time is "physical real" since time and

subspace coexist, in which we see that time is certainly "not" an illusion as some scientists claimed.

7.3 Entropy and information

Aside from the virtual empty space paradigm, there are some serious mistakes that have been made on entropy theory of information by some theoretical physicists. Since information theory was developed by a group of mathematically oriented engineers, it was hardly appreciated by the physicists until it is connected with Boltzmann's second law of thermodynamics as given by

$$I = \log_2 N \text{ bits} \tag{14}$$

and

$$S = k \ln N \text{ joules per Kelvin} \tag{15}$$

where k is the Boltzmann constant, in which we see that information and entropy can be exchanged or traded, as given by the following symbolic representation:

$$I \leftrightarrow S \tag{16}$$

Without this connection, information would be very difficult to be applied in physics, since entropy is a well-accepted quantity in science.

However, the relationship of Eq. (16) does not mean that quantity of entropy (or equivalent amount of information in bits) is equaled to the information. It is the "cost" in bits (or equivalent amount of entropy in joules/kelvin) needed to generate the information, for example, a book of 1000 bits of information content (i.e., the cost), which means that there are 2^{1000} possible copies of books having the same 1000 bits of information. There are also many objects available having the same bits of information, but not books.

As for quantum entanglement communication, it seems to me they have missed the essence of information transmission. For "efficient" information transmission, the sender (i.e., information source) is required to provide a highest information content (i.e., equip-probable state) of the source. For example, the more equal-probable or "uncertain" the ensemble signal is provided by the sender, the higher the information content from the source. For example, information content provided by the source (i.e., the sender) is given by

$$I = -\log_2 p(a_i) \tag{17}$$

where $p(a_i)$ is the probability of an event a_i from the source (i.e., sender) provider ensembles $A = \{a_i\}$, $I = 1, 2, \ldots, N$, in which we see that the largest information content provided by the source is $P = 1/N$ (i.e., equal probability state).

As for a "binary" information source (i.e., 0, 1), for $N = 2$ it is the maximum entropy-coded binary source as given by

$$I = -\log_2 p(1/2) = 1 \text{ bit} \tag{18}$$

in which we see that binary source information is the "lowest" information capacity for transmissions per unit time Δt, if we used digital transmission. Yet, the major advantage for using binary-digital transmission is for noise immunization,

such that the corrupted digital signal (e.g., by noise) can be refreshed, since digital signal can be repeated. For example, a compact disk (i.e., CD) can copy for thousands of time, and we have experienced that the latest copy is just as good as the original copy, while an analog magnetic tape cannot.

One of the important aspects for information transmission is that "reliable" information can be transmitted, such that information can be reached to the receiver with high degree of certainty. Let me take two key equations from information theory, mutual information through a "passive additive noise channel" as given by [16]

$$I(A;B) = H(A) - H(A/B) \tag{19}$$

and

$$I(A;B) = H(B) - H(B/A) \tag{20}$$

where H(A) is the information provided by the sender, H(A/B) is the information loss (or equivocation) through transmission due to noise, H(B) is the information received by the receiver, and H(B/A) is the noise entropy of channel.

However there is a basic distinction between these two equations: one is for "reliable" information transmission to the receiver, and the other is for "retrievable" information from the source (i.e., sender). Although both equations represent the mutual information transmission between sender and receiver; but the objective for using Eq. (19) is that "sender" "carries" an "active" role in achieving a reliable information transmission to the receiver, while using Eq. (20) is that "receiver" plays a more active role to deal with information that has been received. In which we see that; as for "reliable" information transmission is to increase the signal-to-noise ratio (i.e., ΔE) at the transmitting end. While for "retrievable" information after it has been received. In other words, one is to be sure information will be reached to the receiver "before" information is transmitted, and the other is to retrieve the information "after" information has been received.

In communication theory, basically we have two types communication strategies: by Norbert Wiener [17, 18] and by Claude Shannon [19]. However there is a major distinction between them; Wiener's communication strategy is that, if the information is corrupted through transmission, it may be recovered at the receiving end, but with a "cost," mostly at the receiving end, while Shannon's communication strategy carries a step further by encoding the information before it is transmitted, such that information can be "reliably" transmitted, also with a "cost" but mostly at the transmitting end. In view of the Wiener and Shannon information transmission strategies, mutual information transfer of Eq. (19) is kind of Shannon type, while Eq. (20) is for Wiener type, in which we see that "reliable" information transmission is basically controlled by the sender. It is to "minimize" the noise entropy H(A/B) (or equivocation) of the channel, as shown by

$$I(A;B) \approx H(A) \tag{21}$$

One simple way to do it is by increasing the signal-to-noise ratio, with a "cost" of higher signal energy (i.e., ΔE).

On the other hand, to recover the transmitted information is to "maximize" H (B/A) (the channel noise). Since the entropy H(B) at the receiving end is larger than the entropy at the sending end, that is, $H(B) > H(A)$, we have

$$I(A;B) = H(B) - H(B/A) \approx H(A) \tag{22}$$

Equation (22) essentially shows us that information can be "recovered" after being received, again with a price: ΔE and Δt. In view of these strategies, we see that the cost paid for using Wiener type for information transmission is "much higher" than the Shannon type; aside from the cost of higher energy ΔE, it needs an extra amount of time Δt for "post processing." Thus we see that Wiener communication strategy is effective for a "noncooperating" sender, for example, applied to radar detection and others. On the other hand, Shannon type provides a more reliable information transmission, by simply increasing the signal-to-noise ratio so that every bit of information can be "reliably transmitted" to the receiver.

Therefore, we see that quantum entanglement communication is basically using Wiener communication strategy. The price will be "much higher and very inefficient," such as post processing. And it is "illogical" to require the received signal to be "more equivocal" (i.e., uncertain); the information recovery is better if it can be received at the receiving end, in which quantum entanglement communication is designed for extracting information as Wiener-type communication. However it is "not" the purpose for reliable information-transmission of Shannon.

7.4 Mathematics and physics

In view of all preceding evidences, we see that theoretical physics is mathematics, but mathematics is not physics since physics has to be physically real and should not be virtual as mathematics is. In other words, any analytical solution as obtained from any theoretical analysis has to comply with the boundary condition of our universe: causality (i.e., $t > 0$) and dimensionality; otherwise it is virtual as mathematics is. As we know that in mathematics; it needs to prove first that a mathematical postulation has a solution before searching for the solution. However, in theoretical physics it seems to me it does not have such a criterion, although theoretical physics is mathematics. Since now we have one criterion available, any solution emerging from theoretical analysis has to be shown "first" that it exists within the boundary condition of our universe. Otherwise it is a virtual solution as mathematics is.

When one is discussing the origin of science, it is inevitable not to talk about singularity approximation or singularity principle, in which sometime we underestimate the wisdoms of our predecessors. Practically all the laws of science are singularity approximated. Otherwise it is impossible mathematically to create a set of "simple and elegant" formulas for us to appreciate and to apply. Yet we tend to use the singularity approximated laws to interpret them as classical and deterministic, which undermines our predecessor's intelligence, in that they did not know there were approximated. And then we turn to using the singularity principle to evaluate the singularity approximated laws to obtain another singularity solution. It seems to me the ended singularity solution has the composition of two singularities' approximated results, for which I felt the solution will be even further deviated from the physical reality, aside from the nonphysical existing paradigm.

Let me pick a model for the illustration: the Bohr atomic model since we have used this model for over a century, shown in **Figure 8(a)**.

We see it is a typical singularity approximated paradigm, no coordinate, no dimension, and no mass, and the entire Bohr atom is point singularity approximated. The only viable information provided by this model is the quantum state energy $h\upsilon$, which is also singularity approximated, since υ has no bandwidth. However in practice every quantum state radiation has to be band and time limited.

Although mathematics can be regarded as entropy or information provider, my question is how much additional information from $h\upsilon$ Schrödinger can generate. In fact, he has had done an amazing task that nobody in quantum physics had done in the history of quantum mechanics, since all the viable information obtained by

DOI: http://dx.doi.org/10.5772/intechopen.90058

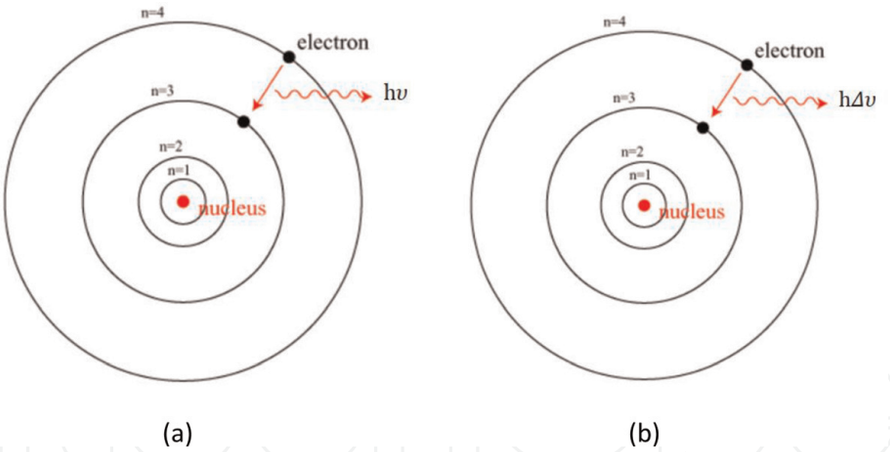

Figure 8.
(a) A conventional Bohr Atomic model and (b) the same Bohr model, except the quantum state energy is presented by a band-limited notation hΔυ.

Schrödinger is based on hυ. Although singularity hυ has led him to a timeless (t = 0) quantum world, which was not due to mathematics, it is due to the background empty space. In other words, if he has had treated hυ as a band-limited radiation hΔυ, as shown in **Figure 8(b)**, his "timeless" fundamental principle may not have emerged, in which I have shown that small changes from singularity bandwidth (i.e., υ) to band limited (i.e., Δυ) assumption could have altered the end results tremendously.

8. Timeless and temporal

Let me show a system analysis to illustrate the dynamic behavior when a timeless (t = 0) superimposing of wavelets (or particles) is plunging into a temporal (t > 0) subspace. For simplicity we assumed a set of two time-limited quantum state wavelets (or two particles) are plunging into a timeless (t = 0) space first, and then its output is submerging within a temporal (t > 0) subspace, as depicted in **Figure 9**.

Since empty space of **Figure 9(b)** is timeless, we see what its response does to the particles; all collapse at t = 0 within an empty space, which shows the behavior of superposition principle dose to particles. In other words, within a timeless environment all things existed at t = 0, and all things can also be found "simultaneously and instantly" anywhere within the timeless (t = 0) subspace.

Now, if we further plunge this timeless response into a temporal (t > 0) space of **Figure 9(d)**, we see that the response shows "no sign" of preserving the original wavelet (or particles) properties.

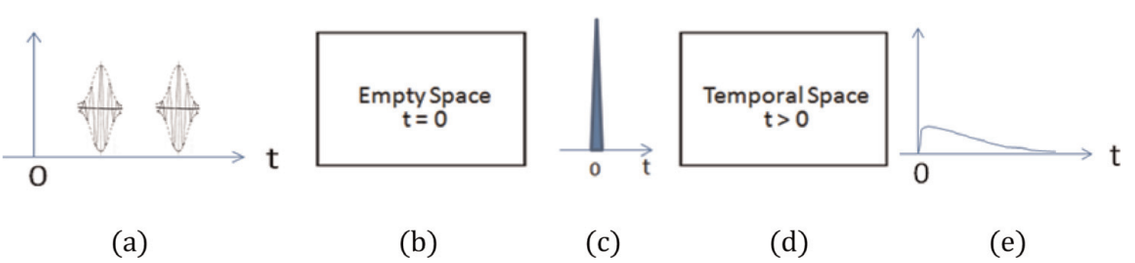

Figure 9.
A system simulation for timeless (t = 0) superposition within a temporal (t > 0) space (a) shows a set of time limited wavelets (or particles) plunge into a timeless space of (b); (c) shows the output response collapse at t = 0; (d) shows a temporal space representation; and (e) shows the corresponding response within a temporal space, in which we see that output loses all the original input personality.

8.1 Art of a virtual principle

Fundamental principle of superposition is the core of Schrödinger's quantum mechanics, which is an anchor foundation for the quantum supremacy on practically everything such as quantum gravity and others as well for quantum computing and for quantum entanglement communication.

Yet, it is my responsibility to show systematically what timeless superposition principle can do to the particles, as illustrated in **Figure 10**.

In which we note that; the proposed particles situated within a timeless ($t = 0$) is a non-physical realizable or mathematical virtual paradigm. Let me stress that within our universe, every substance is temporal ($t > 0$) which includes all the particles no matter how small they are. Strictly speaking all particles are "temporal particles," although singularity approximated for mathematical conveniences.

Besides the nonphysical realizable issue, the quantum mechanist can also add a coordinate system within the empty space, as can be seen in **Figure 10**, for which we can visualize the particles' locations with respect to the coordinate system that the quantum mechanist has implanted.

Since within an empty space it has "no time" or is timeless ($t = 0$), we see that all the particles are collapsed or "superimposing instantly" at $t = 0$, since time is distance and distance is time. The virtual coordinate system is assumed "as a Newtonian space in which the space is treated time as an "independent" variable. But in reality, a particle, no matter how small it is, is a "temporal ($t > 0$) particle." And this is precisely the fundamental principle of superposition, stating all particles are superimposing "instantly" at $t = 0$.

When we have treated a virtual empty space added with the coordinate system in it, then we have to accept distance is time and time is distance, within the virtual empty space. Then we see that every particles can exist anywhere "simultaneously" and "instantaneously" within the empty space, since it is a timeless ($t = 0$) space. And these are the "instantaneous" and "simultaneous" phenomena of Schrödinger's fundamental principle of superposition.

Nevertheless, aside from the temporal particle issue, a more crucial one is that timeless ($t = 0$) particles cannot exist within a temporal ($t > 0$) space. This is like asking all the timeless particles to perform the "simultaneous" computing and all "instantaneous" communication within our universe.

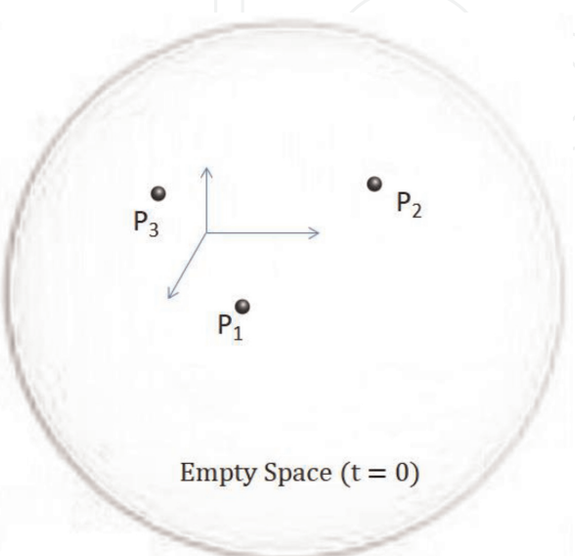

Figure 10.
Three separated particles are situated within an empty subspace in different locations. Notice it is a virtual paradigm since substance cannot exist within an empty space.

9. Remark

As science progresses with time, this is the moment to answer the question that I have had asked: what is "wrong" with current theoretical physicists? In view of the preceding facts of evidences, it is apparent that the part of wrongness is "not" due to mathematics; it is due to the analytical solution. Since mathematics was not invented by the theoretical physicists, it is the underneath empty subspace from a piece or pieces of scratch papers that led us to all the fictitious solutions in that it turns out a background subspace is not a physical realizable subspace! It was never in my wildest mind that a simple piece of scratch paper used in analysis can affect that extensively! For example, all the fundamental laws of science, principles, paradoxes, and others were produced by scores of scratch papers. Yet those scratch papers also produced numbers of virtual and fictitious solutions, although "inadvertently."

In short, theoretical physicists were and still are the creators of fundamental laws of physics; it is their "responsibility" to take us back to a physical realizable world of science; otherwise we will be still trapped within a virtual timeless ($t = 0$) land of mathematics!

10. Conclusion

I have stressed that it is not how rigorous mathematics is, it is a physical realizable solution. Theoretical physics uses amazing mathematical analyses and singularity paradigm as well with fantastic computer animation, providing very amazing and convincing arguments. But mathematical modeling and computer animation are virtual and fictitious, of which many of their analytical solutions are not physically real. What is wrong with current theoretical physicists is that they have used a timeless ($t = 0$) paradigm for their analyses, for which their solutions do not actually exist within our temporal ($t > 0$) universe. In this article I have singled out a few typical but very important evidences to reassess our science, although I am not a physicist. In this article we have shown that timeless ($t = 0$) paradigms have been used "inadvertently" as from a piece or pieces of scratch papers for scientific analyses, which is very natural for scientific calculation, at the beginning of science. Although it has produced scores of excellent results, at the same time it has also produced many fictitious solutions that are timeless ($t = 0$).

I have also given a few typical but very important evidences that the theoretical physicists have done to physics, which includes some of the world-renowned theoretical scientists: past and present. Since theoretical physicists were and "still" are the creators of fundamental laws and principles, it is their "responsibility" to take back the physical realizable science; otherwise we will be continuingly trapped within a timeless ($t = 0$) land of mathematics.

Finally I would comment that; since all the laws and principles of science were made to revise or to be broken, I would anticipate the trend of "Temporal ($t > 0$) Physics" is anticipated to emerge. For which I would predict more and more physically realizable analyses emerge in the first half of 21 century from the theoretical physicists; as well in the years to come.

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