The Theory of existences

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Abstract: Some new concepts on the perception of physical existences, based on new interpretations of quantum mechanical wave functions are presented. These new concepts remove the earlier imbalance in the notion towards the physical existences. A new understanding about Gravity is also presented. This understanding explains why gravity does not have a force-carrying particle. These concepts also lead to decipher the cosmological concepts, dark matter and dark energy. Further, It is found that time can exist even before the "big bang".

Preface

It is true that the existence of the physical universe is real. If asked whether the existence of the physical universe is positive, negative or both, one may reply that it is positive. However, every physical existence in the universe is composed of two components, of which one is a positive existence and the other is a negative existence. This may sound startling. However, after reading the reasoning discussed below, one may get convinced. Moreover, this understanding leads to a clue on the cosmological observations, dark matter and dark energy.

One interprets negative quantities mostly in a simple sense. For example, by declaring a distance to be negative, one means that its direction is opposite to that of a distance that is taken to be positive. There is nothing fundamentally different between these positive and negative distances. Similarly, a negative time would mean the past with reference to a point of time, if positive time means future. Arithmetic sum of these positive and negative quantities simply means a shift in the corresponding ray of distance, time or any other quantity concerned. This indicates the obsession with existence that it is eternal and concrete while its origin is not understood. One normally takes the existence of everything physical, for granted, to be positive. There is a problem in this assumption. If the physical existences are positive, where did they come from? If they came from nothing, what happen to the conservation? This is an imbalance or asymmetry in the common notion of existence. I present my solution to this problem, below.

The norm of a complex quantity, $x + iy$ is represented as $x^2 + y^2$. The square of real part is x^2 and the square of imaginary part is $(iy)^2 = -y^2$. However, we expect something 'positive definite' as the norm of

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the complex quantity. The definition of the norm as the product of itself with its complex conjugate satisfies this expectation. This change of the sign of the square of the imaginary part in the norm is factitious in the case of quantum wave functions and it conceals many facts.

Quantum Wave Functions

The norm of a wave function represents the probability of existence of the system that it represents. However, why should the norm be obtained by the combination of the absolute squares of the real and imaginary parts? I posit that the squares of the two parts should be considered separately to interpret the existences and that the two parts describe independently, the existences of two components of the system that the wave function represents. The squares of the real and imaginary parts are positive and negative respectively. This means that the existences that they represent are positive and negative existences. Positive and negative existences mean that they are opposite to each other in all aspects, like the mass, space, charge etc attributed to them. This concept should be understood carefully. This is very fundamental to the other discussions in the article. One would commonly think of positive existence as a normal existence and a negative existence as something weird. However, a new picture is presented here. According to this, both the existences are equivalent, however, not the same; neither of these two existences is more privileged by any means than the other is. From the concepts introduced here, one cannot identify any priority given to either of the existences. Any privilege identified with the positive existence could be because of a biased thought. In fact, the two existences are similar. One does *not* have to attribute the positive existence that is mentioned here to some *normal* existence and the negative existence that is mentioned here to something *imaginary*. Both are equivalent. In other words, **the existences are bipolar and the two polarities of existences are equivalent**, in contrast to the conventional notion of mono-polar existences. The advantages exclusive to this bipolar-existence interpretation are discussed next.

Merits of the interpretation

There are many advantages from this interpretation, some of which are discussed in the following.

Understanding spin

The conventional interpretation says that spin is an intrinsic property of elementary particles [1], which comes as an outcome of quantum mechanical analysis. However, it does not give any physical interpretation for spin and warns that one cannot imagine spin as the revolution of elementary particle. Neither is it advocated here, to interpret it so. A new interpretation is presented here that according to the bipolar-existence picture, the spin is the time dependent cycling between the two polarities of the existence-states. This interpretation also leads to an interesting interpretation of time that is discussed later in the article. The spin of, say, an s-electron is the time dependent cycling of its existence-states with a period of π/ω. In general, **if $\psi(r, t)$ is the wave function of a particle spinning in a particular**

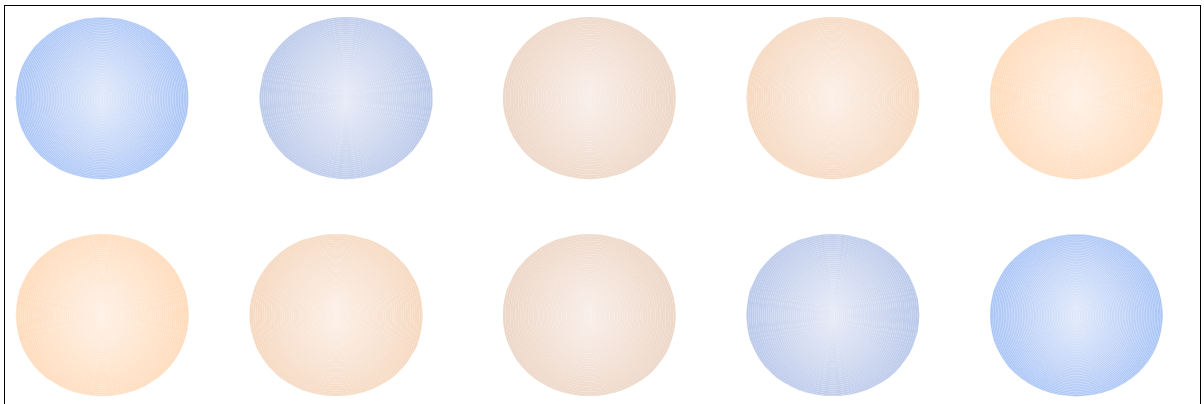

Illustration 1: Stages of two s-electrons spinning in opposite directions

direction, then, ψ(r, t)exp(iπ/2) is the wave function of an identical particle spinning in the opposite direction. Illustration 1 shows the different stages of two s-electrons spinning in opposite directions. The two colors, light blue and orange represent the two existence-states. The gradual change of colors in the illustration represents the gradual transformation of the states from purely positive to purely negative state and vice versa, the intermediate ones being mixtures of both states. It is to be remembered that either of the two existences can be taken as either positive or negative; there is no preference for one polarity over the other. Thus, a negative mass, for example, is present all over the universe, in contrast to the normal anticipation that it could be in some remote space. In fact, there is no preference in any respect, including the abundance, for positive or negative existence over the other. Both are equivalently present.

The old interpretation of wave functions allows the arithmetic summation of the squares of the two parts of the wave function, of course, after making both as positive. As a result, we get monotonously time independent pictures of, for example, the s-orbitals and p-orbitals as static, spherical and ring-like shells. On the other hand, since we deal the two parts separately in the bipolar picture presented here, we are able to see the dynamism called as spin.

Angular motion of electrons in atoms

Similar interpretation on a p-electron with a non-zero value for the quantum number 'm' gives rise to a more interesting scene. The electron in an atom, with a non-zero value for ‘m’ has a magnetic moment as if it has an angular motion. However, our old quantum mechanical interpretations impose that orbital motion also, like the spin, is an inherent property of the electron, nothing is moving in the classical sense and one should not interpret an angular motion of the electron. However, one logically expects an angular motion since the electron is having a magnetic moment. According to the bipolar interpretation, the angular motion is evident, as shown by the factors $\cos^2(m\phi+\omega t)$ and $-\sin^2(m\phi+\omega t)$ in the squares of the real and imaginary parts of the wave function of a p-electron. Illustration 2 shows a few stages of two p-electrons spinning in opposite directions and revolving in the same direction because of the same 'm' value. The revolution appears to be a consequential effect of spinning.

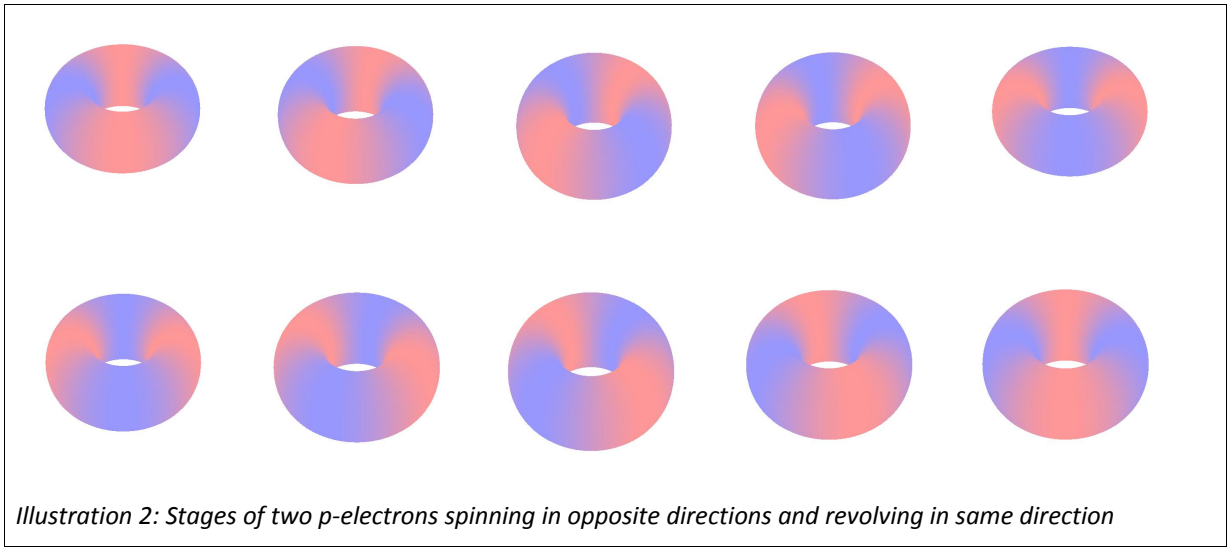

Illustration 2: Stages of two p-electrons spinning in opposite directions and revolving in same direction

From this simple case, where the spin of a p-electron manifests as a physical motion, I deduce that all the physical motions including macroscopic motions are the results of coordinated spins (polarity transformations) of all the particles involved in that motion.

In the old picture, where the norm is taken as the product of the wave function with its complex conjugate, these factors are summed up with suitable change of sign to get unity independent of time and hence, these physical interpretations are missed.

Pauli Exclusion Principle

According to the bipolar-existence picture, an electron is always in a state that is a combination of the two mutually opposite existence-states. Whatever the state this electron is in, the state complementary to it is available for another identical electron to occupy. However, its own state cannot be occupied by the second electron. This understanding provides the insight into the Pauli Exclusion Principle, which states that no two identical fermions can occupy the same quantum state simultaneously.

The compliance of this picture with the more rigorous statement of the Pauli exclusion principle that the total of the wave functions of two identical fermions is anti-symmetric with respect to the exchange of the particles, can be verified as follows. According to the bipolar-existence, the flip of spin is achieved by multiplying the wave function by the phase factor $\exp(i\pi/2)$. The exchange of particles in Pauli Exclusion Principle involves flipping of the spins of the two particles considered. This dual flipping amounts to multiplying the wave function by the factor $\exp(i\pi)$. Multiplying by $\exp(i\pi)$ causes rotation of the wave function in the complex plane through π, which means that the resulting wave function is anti-symmetric with respect to the original function. Thus, the bipolar-existence picture and the Pauli Exclusion Principle comply with each other.

Source of the creations

There are both physical and subtle creations in the world. Physical matter is an example of physical existence. Mind is an example of subtle existence. Creation of physical existence is discussed in this article. Is the source of all creations some 'nothing'? How can the source of the universe be nothing while something from nothing means violation of conservation? **I propose that the source of all creations is a subtle thing, it contains all the creations within it in a subtle form and all the physical creations are brought in to physical existence from this subtle source during the time of creation.** This subtle source is found to correspond to the 'Mayai' or Maya described in Indian scripture. My interpretation of wave functions discussed above avoids the violation of conservation during creation, since it tells that every physical creation is composed of two mutually opposite existences. These two opposite existences together can be assumed to amount to null since their polarities are opposite. *However, these two opposite existences are REAL although their source of creation is subtle.* This idea is discussed, next.

The origin of universe

Before “the big bang”, there was no space, mass etc, in short, no physical universe. However, the subtle source always exists. The 'big bang' marks the start of creation from the subtle source. The subtle source 'does not have' any physical dimension since these dimensions are the properties of its creations. The subtle source gives birth to space, particles (mass charge, etc), etc. and **exists** with the creations. This means that the subtle source is spreading with the creations created from it. This can be visualized as analogous to expanding water gel crystals. This is not an exact analogy since the crystal has some initial physical dimensions. There is a speck of subtle source at the center of every physical particle or a region of space created from it. The order of creation may be that the subtle source gives birth to space first and then the other creations since all other physical creations have to be held in the space created. This order of creation is described in the Indian scripture.

Here, we have to remember that each of these creations is constituted by the two mutually opposite components of existences as discussed above. Thus, the creation maintains conservation. If the wave function of a created particle is $x(\mathbf{r}, t)+iy(\mathbf{r}, t)$, then $x^2(\mathbf{r}, t)$ represents one existence-state of the particle and $-y^2(\mathbf{r}, t)$ represents the other existence-state of the particle. However, these two terms should not be simply summed together, since it means counteracting the creation with a result that the particle's very existence grows and vanishes with time. The conventional interpretation does sum up the two terms, however by changing the sign of the second term, to get a positive definite quantity. Because of this, we get a function for existence that may be dependent on space and monotonously independent of time. It preserves the 'reality of existence', however, monotonously. However, it fails in explaining the conservation during the creation of everything. The bipolar interpretation also preserves the reality of existence, however, in a dynamic manner that it provides an insight into what spin is, which consequently demonstrates orbital revolution.

Thus, the conventional interpretation does well as long as the reality of existences is concerned without concerning the origin of the existences since it deals with both the polarities of the existences not only equivalently but also as one and the same. However, the new bipolar-existence interpretation is necessary to demystify the concepts like conservation during creation, quantum spin and more aspects to be discussed further.

Creation of time

The spinning of a particle is defined above as its transformation between its two states of existences. At a given time, the transformations of existence-states of two particles spinning in opposite directions, are opposite in direction. However, the only difference between them is in a shift in time by $\pi/(2\omega)$. The existence-states and the transformation of existence-states of two similar particles spinning in opposite directions, one considered at time t and the other considered at time $t + \pi/(2\omega)$ are the same. Then, what is unique about a particular direction of spin? Since the difference between the two transformations corresponding to the two directions of spins is in time, the time at which a transformation happens has to be unique. From this requirement and the requirement for the conservation during the creation of all physical quantities, I understand that time also, being a creation, has two mutually opposite existence-states. With this understanding about the time, the uniqueness of the direction of spin of other creations becomes evident. The transformations of existence-states of all other physical creations are 'synchronized with' or 'rooted at' the transformation of existence-states of time. The direction of the spin of a particle means the similarity or dissimilarity between the directions of transformation of its existence-states and the direction of transformation of existence-state of time. In the first instance, this disparity, between the two directions of spins with respect to the direction of transformation of time, may appear to contradict my earlier proclamation that the two existence-states are very similar. However, this is not a contradiction since we have the freedom to consider the polarity of either of the existence-states of time as either positive or negative so that either of the spins can be viewed to be similar or dissimilar with respect to the spin of time. This brings back the equal stature between the two spins as well as the existence-states.

From these discussions, it follows that time is a creation that is connected with all the instances of all other physical creations like space, mass etc, whereas each instance of those other creations (space etc) are individualistic, being connected with their corresponding quantum of subtle source. This indicates that the subtle source of time is something different from and subtler than the subtle source of the other physical creations. Time, being common to all other creations and having a subtler source of creation, time can exist before the “big bang” that marks the start of this universe. Hence, time is the first creation and the subtle source of time should be subtler than the subtle source from which the other physical existences are created. Thus, time is always ticking.

This picture of time resembles the clock pulse in a digital computer. In a digital computer, an event/command is executed in synchronization with every clock pulse. Similarly, in Nature, in synchronization with every spin of time, the other creations spin. Recall the hypothesis from the section,

'Angular motion of electrons in atoms' above, that spin is the fundamental entity responsible for the dynamics that are also more complex than the angular revolution of an electron.

The fact that time, being a single entity, shows different periods of its spin to the spins of different other existences, appears to imply some theory of relativity, probably the existing theories of relativity. This also indicates the subtlety of time and the inadequacy in our understanding about time.

Gravity

Gravity, according to me, is the force of attraction between the specks of subtle source and hence it is 'within the subtle source'. Hence, out of the four fundamental forces, gravity does not need a created particle to act as a carrier of force. Newton stated that the gravitational force exists between instances of physical mass. However, I infer that the gravitational force exists between the instances of subtle source (specks or quanta of subtle source). Is there any verification that gravitation is the force of attraction rather between the specks of subtle source from which physical creations are created than between the instances of mass that are creations? Yes, this can be verified by understanding the existence of “Dark matter”.

Dark Matter

Observational cosmologists have discovered Dark matter by the gravitational force that they exert [2], [3], [4] in the absence of any luminous matter (mass) at places where dark matter is envisaged.

The hypothesis

My hypothesis on gravitation agrees with Newton’s law of gravitation in the sense that every physical mass also has its subtle source with it. However, the latter is a special case of the former. The regions of space in the cosmos devoid of physical mass also have their portions of subtle source and hence should exert gravity, according to my hypothesis. This gravity is observed as caused by some matter called as 'dark matter'. According to the hypothesis, dark matter is just space and the gravitation observed is caused by the subtle source of that space. If this explanation is true, they need not be called as dark matter anymore since they are just the space. Cosmologists have mapped the distribution of dark matter. This actually could be the distribution of space in the physical universe.

Mass-Energy conversion

Creation of mass from energy or energy from mass in mass-energy conversion events is not equivalent to the creation of mass and energy from the subtle source. The latter is the real creation while the former are transformations within the creations. However, subtle source also plays a role in the mass –

energy conversions. The hypothesis proposed is that when a gamma ray photon of sufficient energy intercepts a quantum of subtle source (for example, at the center of an atom), a particle-antiparticle pair is produced. Thus, subtle source transform energy into mass in addition to giving birth to both of them. By this way, pair production can happen even in 'empty' space since empty space also has its subtle source with it, which we have called as dark matter! The experimental observation of these 'antiparticles' as originating from cosmic space can be an experimental verification of this hypothesis.

Conservation between source and creation

Can there be conservation between the subtle source and the creation? The 'dark matter effect' of the subtle source indicates that there could be some sort of conservation between a speck or quantum of subtle source and the creation from it. The indication is by the following observation.

The local dark matter density in the milky way galaxy (the density of subtle source giving birth to only space) is estimated [5] to be less than the physical matter density (the density of subtle source giving birth to physical matter, probably in addition to space) by more than 20 orders of magnitude. This indicates that the source gives birth to more space when giving birth to only space than when giving birth to other creations, probably in addition to space. In other words, subtle source density is more with physical matter than with 'empty' space. This amounts to an inference that there could be conservation between the subtle source and its creations.

Curvature of space

It is interesting to conceive the curvature of space from this picture. Each physical entity like a particle and a quantum of space has its existence radiating out from the corresponding quantum of subtle source located at its center. Moreover, the quanta of subtle source maintain the link among them, gravity being the force of attraction between them. Since the density of subtle source, as discussed previously, is orders of magnitude higher in celestial objects like planets and stars than in the space between them, we observe the space curving towards these celestial objects.

Interweave between source and creation

How are the subtle source and its creations interwoven with each other? If the source also exists with the creation, how is the infusion between the source and the creations? Various possibilities are assumed:

1. There is no infusion between the source and the creations. The quantum of source remains as an ideal point without occupying the space created from it.

2. The source evenly infuses with the creation.

3. The source has a graded infusion with the creation. This is a core-shell model. This can be visualized for an atomic system by comparing with the planetary system. Because of the finite mass of the sun and the consequent pull by the orbiting planets, the sun as well as the planets can be modeled to be orbiting in spheroidal shells, the result being that the motion of planets relative to the sun is elliptical as in a spirograph. An atom can also be expected to have similar spheroidal shells for the nucleus and the electrons. The intensities of these atomic shells would be vanishing gradually towards the core as well as outwards. We could observe this if we solve the hydrogen atom problem as a literally two-body problem without invoking the reduced-mass concept that reduces the problem to a one-body problem. We can expect the subtle source to occupy this central core of these shells in an atom with its intensity complementing the intensity of the creation (the nucleus and electrons).

Cold fusion

The third model above proposes a model for the cold fusion [6]. When two atoms come so close that there is a critical overlap between the intensities of the subtle sources of the two nuclei, the sources coalesce leading to the 'cold fusion'. The dimensions of this core-shell model can be computed and the corresponding 'active-surface' potentials that can facilitate this mutual approach of nuclei causing the LENR (Low Energy Nuclear Reactions) [7] can be studied.

Dark Energy

The expansion of universe had been earlier understood to be simply inertial [8]. Recently, it is observed that the rate of expansion of the universe is increasing [2], [9]. Physicists, generally, imagine a physical energy causing this acceleration of expansion of the universe. Since the source of this energy is not known, it is called as 'dark energy'.

The interpretation

Many natural laws have been discovered so far. These are the laws created with the physical universe and for the physical universe. However, these laws do not bind why and how the physical universe and these laws themselves were created.

Let us consider the creation that started with the 'big bang'. Is it still continuing? The observed accelerated expansion of the universe suggests that the creation of space is continuing at this accelerated pace. Thus, this is not a form of physical energy, contrary to the common belief. It is the 'energy' of creation. Our science deals only with the created physical universe. The act of creation is beyond the physical laws since those laws are also amongst those created. Hence, it is not necessary to consider 'dark energy' as a physical energy.

Conclusions

A new interpretation of the quantum mechanical wave functions is proposed. This new interpretation leads to a new interpretation of the spin of elementary particles. This also enables one to 'observe' orbital motion of electrons in atoms and proposes that spin is the base event of any more complex dynamics too. Consequent to this interpretation, the concept of subtle source is introduced, which is the source for the creation of the universe. This leads to the new definition of Gravity and explains why gravity does not require a force-carrying particle. This also deciphers the problem of dark matter. This analysis suggests that time is created before the other physical existences were created. The problem of dark energy associated with the accelerated expansion of the universe is deciphered by discerning the physical laws from laws of creation.

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