

# New hypotheses: From cosmos to particles

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*Abstract: I like to have a discussion in Physics. I present a few hypotheses that I have in physics. I request the readers to review and comment upon them. The hypotheses start from cosmological concepts to concepts at particle scale.*

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## Origin of the universe

First, let us discuss about the origin of the universe. The 'Big bang' model says that the universe started with the 'Big bang' event; however, it assumes that the universe was concentrated as an infinitely dense and hot point, which is a singularity; what existed before this event is not known.

I start presenting the hypotheses below. The hypotheses are numbered so that they can be referenced by their numbers during discussion.

1. The universe existed before the big bang event also, however, not in the physical form but in a form that is subtle. It was residing in a subtle source in this subtle form. This source does not have any physical dimension, since the dimensions are the properties of the physical creations.
2. Every entity of the physical universe like a particle or a quantum of space that is created from this subtle source has a speck of this subtle source at its core.
3. Gravity is the force of attraction between these specks of subtle source. Matter exerts gravity because of the specks of the specks of subtle source at their core. This complies with Newton's law. In addition, space also can exert gravity because the quanta of space having specks of this subtle source at their core.
4. Since space can exert gravity, the gravity, the observation of which led to the hypothesis of dark matter could be the gravity exerted by the huge cosmic space. In other words, dark matter could be nothing but space.

This picture of space may have to be understood well to interpret the map of dark matter constructed by cosmologists.

Since both space and matter exert gravity, mass could also be the common attribute to both matter and space. This could probably be the solution to the problem of origin of mass. If this is so, either Higg's field and

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particles are not required to explain mass or the specks of subtle source can be considered as the Higg's particles (and dark matter particles too).

### **Conservation during creation:**

The physical universe comes into existence with big bang from the subtle state. What is the conservation during this process? While each physical entity is created, it is created with two mutually opposite components. For example, when an electron is created, it is created with two components, which are mutually opposite to each other in all respects. This implies that its net existence is conserved to nil since the two parts if combined will cancel each other. However, once created, they are physically present with the two mutually opposite physical parts. They are sustained without recombination.

*What are these two parts?*

5. These two parts of each created physical entity are mathematically represented by the real and imaginary parts of the quantum mechanical wave function of that entity. For example, if we consider the wave function of a free particle, the square of the real part,  $\cos^2(k.r-w.t)$  represents the existence of one of these components and the square of the imaginary part,  $-\sin^2(k.r-w.t)$  represents the existence of the other component. The opposite signs in the two expressions mean the mutually opposite nature of the two components that they represent. These two components are opposite to each other bay all respects.

Here, I would like to emphasize that the imaginary part does not mean any non-physical or abstract component and the real part alone means the familiar entities. If  $\psi$  is the wave function of an entity,  $i\psi$  is also a solution for the wave function of that entity. In  $i\psi$ , the real and imaginary parts of  $\psi$  appear interchanged. Hence, either of the two components of a wave function can be taken to represent the positive part of the entity and the other component can be taken to represent the negative part. This means that either part of the entity can be taken as positive one and the other as negative one. Although there are two components, we have been used to missing the discernment between them. Since both are physical we are able to get most of the results even with the absence of this discernment. Moreover, the observed, the observer and the tools used to observe, all are constituted by both these components, equivalently. Hence, we have missed to distinguish between them. However, there are certain aspects that are explainable only by discerning them; An example is the interpretation on spin of a particle, which I discuss below.

Let us now analyse the time-dependence of these two parts. Let us consider the wave functions of a hydrogen atom. Considering the ground state electron, whose real and imaginary parts are isotropic, the wave function transforms isotropically between real and imaginary states with time as implied by the factor,  $\exp(iwt)$ . If we consider the wave function of higher energy states with  $l > 0$ , the two parts have  $\langle \phi \rangle$  dependence also. This provides the insight of revolution of the electron by the factor,  $\exp[i(kx+wt)]$ . In a similar way, the squares of the real and imaginary parts of a free-particle wave function also retains the time dependence event after squaring them to find their probability of existence, separately; This is not available when we define the probability as the norm of the wave function, where we square the real and imaginary parts separately and then add them together after reversing the sign of the square of the imaginary part. This is how the norm is defined. Here, the negative sign of the square of the imaginary part is made positive. This is done to get a positive definite result. This is accepted when we consider both components as the same and positive, not just equivalent. Moreover, if we do not change the sign, the two parts would tend to cancel each

other mathematically. However, physically, they represent two components that are sustained without recombination. Hence, the mathematical cancellation is not allowed which means recombination.

6. Spin of a particle, which is considered as an intrinsic property of a particle, is the transformation with time, of the two parts of the particle between the real and imaginary states; or more precisely, between the two mutually opposite states.

What is the difference between the two opposite spins?

Obviously, if we consider the transformation from positive to negative state as 'spin-up', the transformation in the opposite direction should be considered as 'spin-down'. However, these transformations are continuously changing directions with every half cycle. This cannot be taken as the spin continuously flipping, which is not the fact. A particle transforming in one direction will take, after half a cycle, the current direction of transformation of a particle currently transforming in the opposite direction. The only difference between these two transformations is in the time at which they happen. This paradox can be resolved by considering the fact that time is also a created quantity.

7. Time being a created entity, it should also have two mutually opposite components for the purpose of conservation during its creation. This means that time also has two mutually opposite components; we also expect that it also transforms between these two states continuously.

All creations other than time spin or transform with respect to time. However, what could be the meaning of spinning of time? A 'change' or 'transformation' is always meant with respect to time. How can we understand the transformation of time itself between its two components? It is mystic. I heard that even scripture mention somewhere that time is the most complex to comprehend. It is evident that two components of time exist. However, it is not very clear how it 'spins'. I think that the (two components of) time drive the other entities to spin. The scripture talk about the time-wheel or in other words, spinning of time. This is probably the spinning that we are trying to comprehend, here.

The link between the single time (with its two components) and the spinning of all other entities that are in multitude is expected to imply some principles of relativity, probably, the existing theories of relativity.

8. The direction of transformation of every entity need not be taken to change with every half a cycle since this happens together with the 'change' in time. The directions of spins of these entities remain unaltered because of their congruence with time.

As told in the beginning, all the physical entities other than time have a subtle source and each instance of these entities has a speck of this source at its core. Now, we find that time is an entity that is common to all these other entities. Hence, time is of higher subtlety and its subtle source should be different from and subtler than the subtle source of these other entities.

Consequently, the creation of time need not coincide with the creation of other entities, which started with 'Big bang'.

9. Hence, time is 'eternal'. It exists even before the creation of other entities like space and particles.

Moreover, how can there be a time without time?

The physical laws that our physical sciences explore are the laws created for the physical universe. However, physical sciences do not know why and how the entities and the laws for them are created. In other words, they do not know the law(s) of creation. Dark energy is an example for this.

The accelerated expansion of the universe that is dubbed as dark energy could just mean the creation of space happening at this accelerated pace, which creation started with big bang. As told earlier, this is according to some law of creation and shows an act of creation. The energy involved is the energy of creation, not the energy created. We are trying to treat it as created and physical energy and find perplexed that it forms about 75% of the mass-energy of the universe including the dark matter. Since the physical meaning of this energy is not understood, it is termed as dark energy. It can also be called so since we do not know the energy of creation. Alternatively, it could be aptly named as creation energy, if these hypotheses are verified to be true.