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Rooting the biggest problems in physics

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Abstract

In the twentieth century, physics was divided into two major parts; classical physics and modern physics. Modern physics includes relativity and quantum mechanics. In recent decades, physics has encountered numerous problems and unanswered questions. The problems and unanswered questions are related to the particle physics and astrophysics. Since particle physics is beyond the classical mechanics and Newton's universal gravitational laws has replaced by general relativity, physicists are trying to solve the physics problems in the context of modern physics or to think the beyond of the modern physics while they have not cared classical physics. Some physicists believe that by combining general relativity and quantum mechanics, these problems may be resolved and the unanswered questions will be answered.

However, in all of these efforts, the classical physic has been ignored, while nature is unique and all physical phenomena, from the microscopic or the macroscopic ones are obeying the same law. Therefore to solve the contemporary physics problems, the basic concepts and relations of physics should be the foundation of classical mechanics which have to be reviewed and analyzed. Then, we have to combine these three theories of classical mechanics, quantum mechanics and relativity in order to reach to a unique physics. Eventually, by answering the unanswered questions, the physics problems will be solved.

In this paper, the stems of physics problems are expressed and the solution of them is presented by using of a combination of modern and classical physics.

Keywords: quantum gravity, QED, QCD, graviton, color charge, magnetic color, Big Bang, inflation, matter, antimatter, Dirac Sea

Introduction

Classical mechanics is the most familiar of the theories of physics. The concept of it covers, such as mass, acceleration, and force which are commonly used and known. After advent of the relativity and quantum mechanics theories, classical concepts such as mass and force have challenged. In the standard model, fermions are the fundamental particles of matter. Bosons, on the other hand, are considered to be the force carriers. Quantum mechanics is a very good set of mathematical models that show how many elementary forces (bosons) work, but it does not describe how they work.

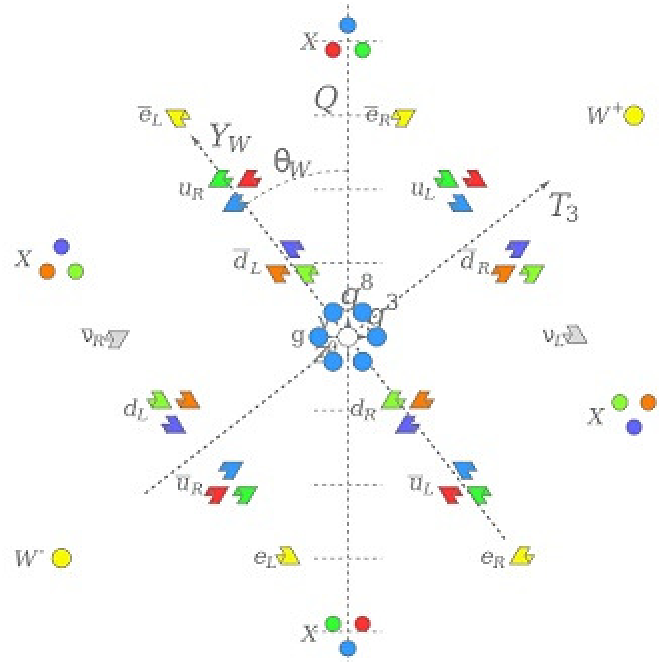
Something that has been paid attention and accepted by physicists is that elementary particles such as photon and electron are point-like and unstructured particle. Point-like particles are mathematical abstractions with zero size. However, even zero-size particles have an extended effect, due to the effect of the field surrounding them. Today Physics literature faces numerous problems and questions that without considering the internal structure of the particles, they may remain unanswered. The true understanding of physical entity of energy and the structure of photon, enable us to understand the structure of matter.

Attention to photon structure and using new definition for graviton and exchange particles, will change our perspective on modern physics. It also provides us with a new tool to be able to overcome physics problems in a better way.

In CPH theory (Creative Particles of Higgs theory), it has been attempted to scrutinize the interface between classical mechanics, relativity and quantum mechanics through a novel approach to the established physical events. In the following, physics problems are reviewed and according to CPH Theory their solutions are presented.

The roots of the problems and solutions

1- Is There a Theory of Everything?



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A Grand Unified Theory (GUT) unifies the three forces described by the Standard Model of particle physics - the electromagnetic, weak, and strong force - into a single force that breaks into the other three at low energies. The electromagnetic and weak forces are already unified into one force, the electroweak force, so all that remains is to unify the third (strong) force with the other two. However, we have not been successful in doing so thus far. For all we know, such a unification might not even be possible.

A Theory of Everything is literally a theory of everything, including the force of gravity (which is not described by the standard model or a GUT), and anything else in our universe that our current theories cannot explain. One of the main ingredients in a "theory of everything" is Quantum gravity, the unification of gravity (general relativity) with quantum mechanics (quantum field theory). We do not yet have a successful theory of quantum gravity. A GUT is also a necessary ingredient of a theory of everything, but only if a GUT exists[1].

[1] - What are- he Grand Unified Theory and the Theory of Everything and what is the difference between them? https://www.quora.com/What-are-the-Grand-Unified-Theory-and-the-Theory-of-Everything-and-what-is-the-difference-between-them

Solution the problems of GUT and a Theory of Everything:

It may be thought that these two problems are separate of each other, but both problems; GUT and the Theory of Everything has a common root. Therefore, the solution of each of them includes another solution as well.

A. The solution of GUT: if we describe the mechanism of the virtual photons production (electromagnetic force carrier) by charged particles, then we will see that electromagnetic repulsive force in a very short distance, turns to the attractive force, then the GUT problem can be solved. In this way we will reach to unify the electromagnetism and gravity that is the Theory of Everything.

B. The solution of the Theory of Everything: to get understand the Theory of Everything, we must re-define fundamental particles. In CPH Theory, mass/energy and the amount of speed of fundamental particle must be constant and not turn into other particles. While in the Standard Model, fundamental particles have variable mass and speed, so they are not fundamental particles. To find fundamental particle we must reconsider and analyzed the interaction between photon and the graviton. In this way the GUT problem can be solved, too.

Both of the above methods have been given in CPH Theory.

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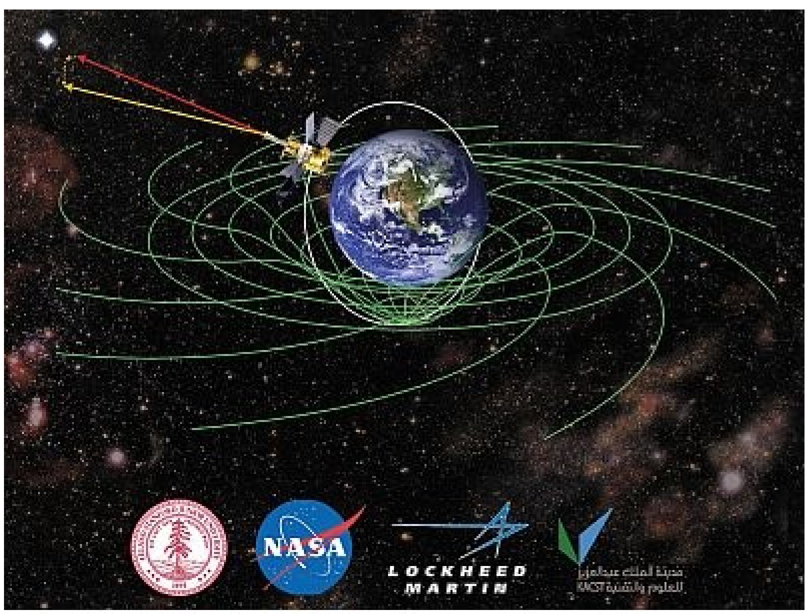
2- Quantum Gravity



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Quantum Gravity The biggest unsolved problem in fundamental physics is how gravity and the quantum will be made to coexist within the same theory. Quantum Gravity is required to make the whole of physics logically consistent. The problem is that quantum physics and general relativity already overlap each other's domains, but do not fit together. The biggest challenge with quantum gravity, from a scientific point of view, is that we cannot do the experiments required. For example, a particle accelerator based on present technology would have to be larger than our whole galaxy in order to directly test the effects. This means that quantum gravity today is not yet science in the strict sense. No experimental input exists that can inspire and control theoretical ideas, and historically we know that theoretical "progress" then usually occurs in completely wrong directions. Einstein's dream was to describe the whole of nature in a single theory. That dream is still not realized[2].

This question sits on the fence between cosmology and particle physics: How can we merge quantum theory and general relativity to create a quantum theory of gravity? How can we test this theory? The answer to this question will necessarily rely upon, and at the same time may be a large part of, the answers to many of the other questions[3].

Solution of quantum gravity problem:

The root of the quantum gravity problem is that physicists want to solve the quantum gravity problem regardless to the relativistic Newton's second law. While these two laws (universal gravitational law and relativistic Newton's second law) are closely related to each other. In CPH Theory, according to reconsidering the relativistic Newton's second law quantum gravity is discussed and analyzed.

In spite of publishing many articles about graviton, but it has not been done any considerable work about mechanism of graviton exchange between bodies/particles. The reason is that the old graviton definition in modern physics, is unable to describe this mechanism and also it is impossible to get the theory of the quantum gravity.

In CPH theory, after reconsidering and analyzing the behavior of photon in the gravitational field, a new definition of graviton based on carrying the gravity force is given. By using this definition, graviton exchange mechanism between bodies/objects is described. As the purpose of quantum gravity is describing the force of gravity by using the principles of quantum mechanics, all the large bodies such as stars and galaxies which are made up of atoms and elementary particles, quantum gravity should explain the graviton exchange mechanism between atoms and elementary particles, too.

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[2] - Johan Hansson, "The 10 Biggest Unsolved Problems in Physics" http://ltu.diva-portal.org/smash/get/diva2:996740/FULLTEXT01.pdf

[3] - Baez, John C. (March 2006). "Open Questions in Physics". http://math.ucr.edu/home/baez/physics/General/open_questions.html

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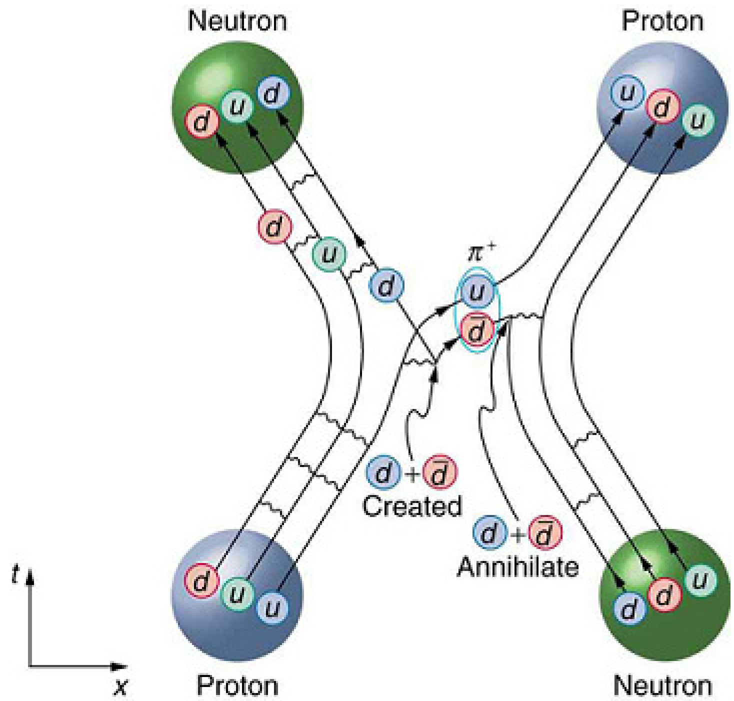
3- We need to understand quark and gluon confinement in chromodynamics



http://philschatz.com/physics-book/resources/Figure_34_06_03.jpg

Quarks, like protons and neutrons, are bound together. Within Quantum Chromodynamics (QCD), the theory that explains nuclear energy, it is believed that sub-particles are permanently confined. This may sound straightforward, but it is not conclusive. Scientists have yet to prove that these sub-particles can never escape. This is derived from the fact that as force grows stronger, the further the particle is pulled outward. These ideas also give credibility to the particles containing mass. As mass is needed to create such a strong resistance[4].

Solution the (QCD) problem:

The root of the problem can be attributed to the left side of the $E = mc^2$ relation. This means that this property is attributed to sub-particle rather than quantum of energy, too and the problem is generally discussed up to finding its solution. The Dirac's Equation is usually limited to the high energy photons and the pair production and decay of a particle – antiparticle, while Dirac's Sea can be used for all quanta of energies. With the generalization the Dirac's Equation and Sea, the similarity between QCD and photon can be resulted. In other words, there are color properties not only of in quarks, but the existences of their properties are acceptable in photon structure and even in a gravitational field, too.

[4] - http://www.learning-mind.com/top-10-unsolved-mysteries-in-physics/

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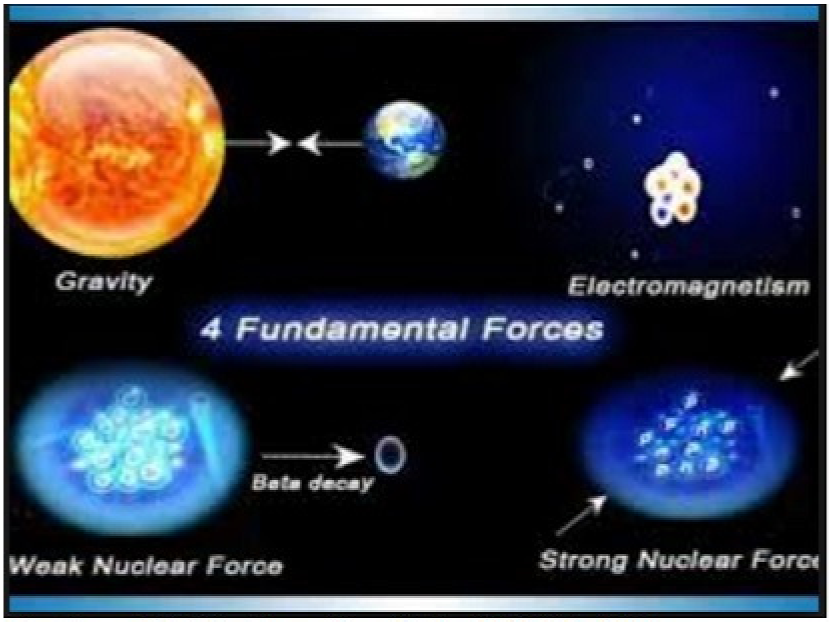
4- Why is gravity so much weaker than the other forces, like electromagnetism?



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For instance, a magnet can pick up a paper clip even though the gravity of the whole earth is pulling back on the other end. According to one recent proposal, gravity is actually much stronger. It just seems weak because most of it is trapped in one of those extra dimensions.

If its full force could be tapped using high-powered particle accelerators, it might be possible to create miniature black holes. Though the black holes would probably evaporate almost as soon as they were formed[5].

Solution of why is gravity so much weaker problem:

The root of this problem can be seen in unsuccessful unifying of electromagnetism and gravity. While in CPH Theory, according to the behavior of photon in the gravitational field and generation of electric fields by the charged particles, unifying of the electromagnetic and gravity is well provable. Virtual photons which carrying electromagnetic force carrier, is made up of a large number of gravitons, therefore it is explainable why gravity force is so much weaker than electromagnetic force.

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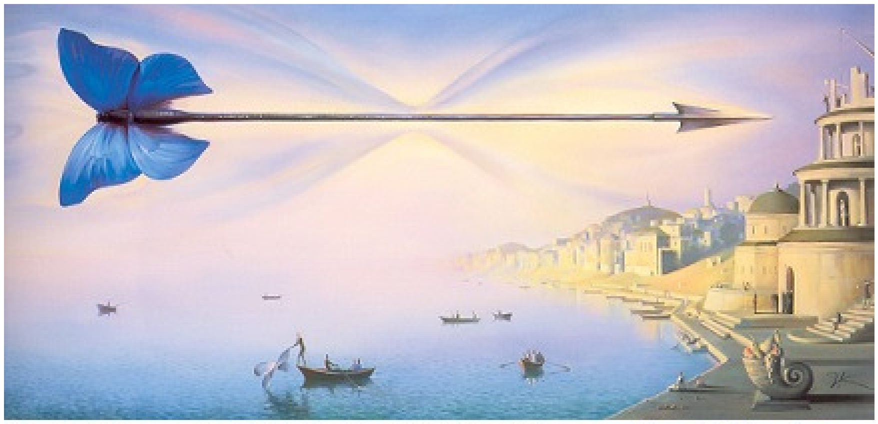
[5] - https://www.quora.com/What-are-some-unsolved-problems-in-physics

5- Why is there an arrow of time?



http://thirddime.com/media/3/vladimir-kush/vladimir-kush_arrow-of-time_thirddime.jpg

Time moves forward because a property of the universe called "entropy," roughly defined as the level of disorder, only increases, and so there is no way to reverse a rise in entropy after it has occurred. The fact that entropy increases is a matter of logic: There are more disordered arrangements of particles than there are ordered arrangements, and so as things change, they tend to fall into disarray. But the underlying question here is, why was entropy so low in the past? Put differently, why was the universe so ordered at its beginning, when a huge amount of energy was crammed together in a small amount of space?[6]

It seems that even microscopically there is a very small asymmetry between time forwards and backwards, because of the measured CP-violation in the weak nuclear interaction. But this symmetry breaking is far too weak to explain the time arrow and also only operates on extremely short length scales, mainly inside atomic nuclei. Maybe even time, as we so far have described it in our theories, is really just an illusion? [7]

Solution the arrow of time problem:

The root of this problem is related to human view and feeling to the time. In fact, this is not a problem of physics, but it is referred to the thermodynamic approach to the time. While in physics, every theory has its own time definition. In classical mechanics, time is absolute. In special relativity ticking of a clock is a function of speed which is relative to the inertial frame. In general

[6] - Natalie Wolchover, 2016
http://www.livescience.com/34052-unsolved-mysteries-physics.html

[7] - Johan Hansson, "The 10 Biggest Unsolved Problems in Physics"
http://ltu.diva-portal.org/smash/get/diva2:996740/FULLTEXT01.pdf

relativity, as having higher gravitational potential as the clock runs slower. In quantum mechanics, photon does not experience the passing of time. In thermodynamics, considering the entropy, time has only one direction from past to future.

But in CPH Theory which has been studying the origin of time accepts reasonably the relativistic time in special and general relativity and also thermodynamical time, but it generalizes the results of the quantum mechanics. In CPH Theory, photon is experiencing the passing of time which actually the quantum mechanical approaching to time is not right, but, the fundamental particle whose mass and the amount speed are constant, does not decay into other particles, and does not experience the passing time.

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6- Do neutrinos have mass?

New experimental data, which show that neutrinos have mass, are forcing theorists to revise the Standard Model of particle physics. Nobel-winning discovery of neutrino oscillations, proving that neutrinos have mass[8].

[8] - http://phys.org/news/2015-12-nobel-winning-discovery-neutrino-oscillations-neutrinos.html

https://encrypted-tbn0.gstatic.com/images?
q=tbn:ANd9GcRyUZ9CbGHPWZJj1Gj0IpmglcgnUsBM0ZNnmymm9lw_Jz2X3F3y

Also, researchers working with Super-Kamiokande found that muon neutrinos, which are produced as high-energy particles from space strike the atmosphere, change identity as they travel[9].

Do gravitons identity change?

The new view on graviton shows, identities of graviton changes, in fact it has mass with changeable spin. Gravitons convert to three types positive and negative color charges and magnetic color. These three types of gravitons make electric and magnetic fields of photon.

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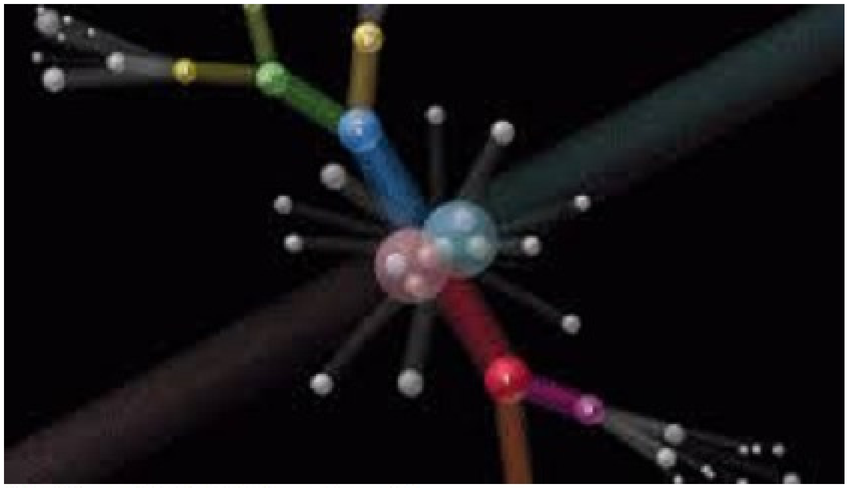
9 - http://www.sciencemag.org/news/2015/10/proof-neutrinos-change-identity-bags-physics-nobel

7 - Why is there more matter than antimatter?



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The question of why there is so much more matter than its oppositely-charged and oppositely-spinning twin, antimatter, is actually a question of why anything exists at all. One assumes the universe would treat matter and antimatter symmetrically, and thus that, at the moment of the Big Bang, equal amounts of matter and antimatter should have been produced. But if that had happened, there would have been a total annihilation of both: Protons would have canceled with antiprotons, electrons with anti-electrons (positrons), neutrons with antineutrons, and so on, leaving behind a dull sea of photons in a matterless expanse[10]. For some reason, there was excess matter that didn't get annihilated, and here we are. For this, there is no accepted explanation.

This has not yet any explanation. Because what we mean by matter is only a definition, we see that we could just as well have obtained a universe dominated by antimatter[11].

Solution of the matter than antimatter problem:

The subject of existence of matter - antimatter was raised by Dirac's Equation and Sea and later it was confirmed experimentally. But what has been ignored here, is that photon/energy converts to particle - antiparticle and this is the property of energy that can be converted into matter and

[10] - Natalie Wolchover, 2016 http://www.livescience.com/34052-unsolved-mysteries-physics.html

[11] - Johan Hansson, "The 10 Biggest Unsolved Problems in Physics" http://ltu.diva-portal.org/smash/get/diva2:996740/FULLTEXT01.pdf

antimatter, and the reason of this property can be found in the structure of photon. In CPH Theory, any real photon is made up of two positive and negative virtual photons. Even in generation of a pair electron - positron, positive virtual photon converts to positron according to negative energy in the Dirac's Sea, and negative virtual photon converts to electron. Any positive virtual photon is formed of a number of positive sub quantum energies, and any negative virtual photon is formed of a number of negative sub quantum energies, too. With the generalization of the Dirac's Equation and Sea, in any physical process equality the number of positive and negative sub quantum energies is provable, and there is no need to equality of matter and energy.

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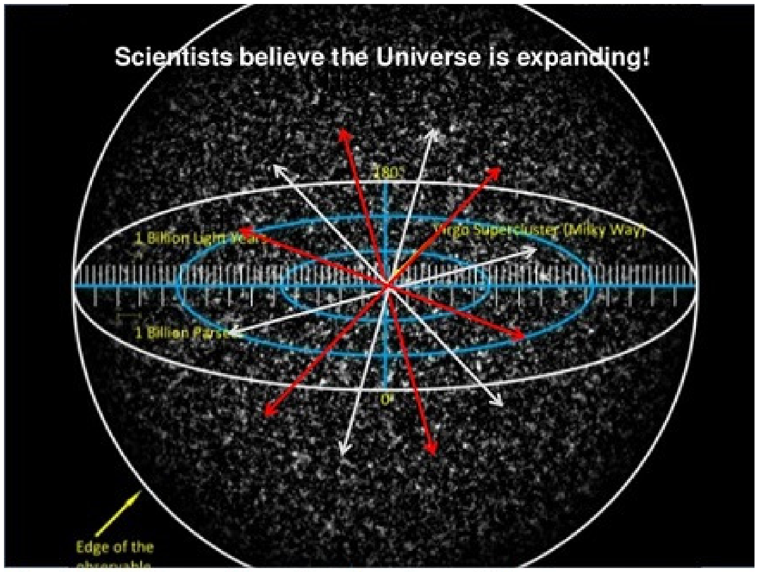
8- What existed before the big bang?

It is difficult enough to imagine a time, roughly 13.7 billion years ago, when the entire universe existed as a singularity. According to the big bang theory, one of the main contenders vying to explain how the universe came to be, all the matter in the cosmos -- all of space itself -- existed in a form smaller than a subatomic particle.

Once you think about that, an even more difficult question arises: What existed just before the big bang occurred?[12] In trying to understand the universe, two major problems remained: the flatness problem and the horizon problem. To solve these, the big bang theory is modified by the inflation theory, which states that the universe expanded rapidly shortly after it was created[13].

[12] - http://science.howstuffworks.com/dictionary/astronomy-terms/before-big-bang.htm

[13] - http://www.dummies.com/education/science/physics/the-inflation-theory-solving-the-universes-problems-of-flatness-and-horizon/



phpapp01/95/electromagnetism-gravity-and-consciousness-is-there-a-connection-3-638.jpg?cb=1368363858

Solution of the Big Bang than Inflation problems:

For long time seemed the Friedmann equation is able to explain universe, but in recent years, the cosmological constant was of interest to cosmologists. However, these two equations are unable to explain before the Big Bang.

Our interpretation and understanding of the universe is dependent on the accepted theories. When a theory reaches unanswered questions, it will need to develop, like the Big Bang theory that developed by inflation.

In recent years, important aspects of inflationary cosmology have been borne out empirically. But the fields responsible for inflation cannot be Standard Model ones. Also the big bang cannot be described using any known equations of physics until 10^{-6} seconds had elapsed. In CPH Theory, three things are done.

1- According to reconsidering relativistic Newton's second law, the Big Bang is explained.
2- Regarding the sub quantum energy, the Friedmann equation is reviewed.
3- Using the sub quantum energy form of Friedmann equation, the inflationary Big Bang theory is reviewed.

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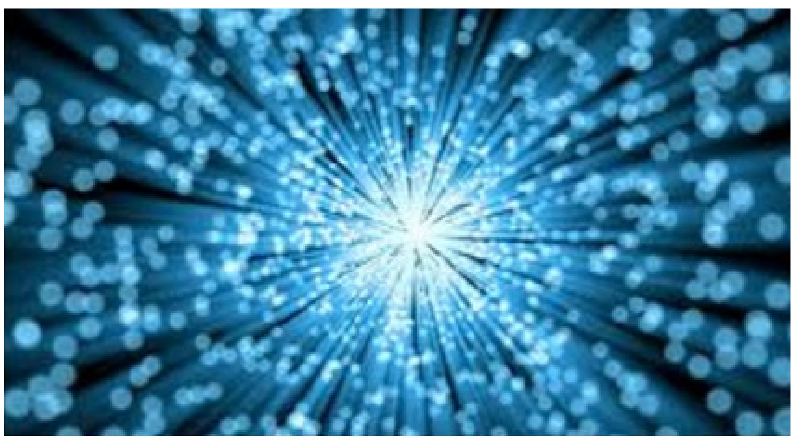
9- Why does light have a universal speed limit?



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The speed of light c, constant, is valued at 3×10^8 m/s. But why this figure and not, for example, 4×10^{20} m/s? Is it a random digit pulled out of a bag of numbers when a new universe explodes into existence? It's currently impossible to know why the speed of light is the speed that it is... all we know is that our universe couldn't exist without this limit[14].

Solution of the light speed problem:

Reviewing the special relativity postulates, always raises some questions like, "Does the constant speed of light (photon energy), result from a natural accident?" or "what is the

[14] - http://www.iflscience.com/physics/greatest-mysteries-physics/

difference between the characteristics of mass and energy while the speed rate of energy is constant; the speed of matter can change and cannot reach the speed of light?". Meanwhile when the physical and chemical processes occur, some amount of matter is converted into energy; what happens during this process that mass with non-constant speed is converted into energy with the constant speed?

In CPH Theory, what is important is the amount of speed, not linear (or non-linear) speed. Every sub atomic particle is made up of sub quantum energies.

In any physical process such as pair production and decay, radioactive decay...the amount speed of sub quantum energy remains constant, and only its transmission speed convert to its non-transmission speed and vice versa.

Thus, the constant speed of light is one of the most fundamental laws of nature.

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