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The Fundamental Problems of the Unified Field Theory.

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***Abstract**: In this paper the problem of the unified field theory had explained, and in the field of cosmology. By painstaking comparing the two greatest different theories, like wise in nature we often see the left hand and the right hand they work in synchronization, in terms of the universe we have the world of the very small (Quantum theory) and the world of the very big (theory of relativity).The problem is, and this is the fundamental problem in all physics, the left hand and the right hand don't like each other, they are based on different physical principle and mathematics. They are not comfortable. The paper had explained the different physical principle and mathematics of the two theories and discuss the problem of string theory (theory of everything) which rely from the outcome of large hadron collider (LHC) located outside Geneva Switzerland, which predicted the existence of tiny rubber form of matter (string) and extra dimensions which is yet up to now untestable.*

Keywords: Fundamental problem, Unified field theory, Quantum mechanics, General relativity, string theory.

I. Introduction

At the beginning of the 19th century there was a crisis in physics ,because new phenomena where been discovered which violate the laws of physics, that means the law of conservation of energy for example madam curie refine radium. Radium has a magical properties energy comes from nothing ,this violate the law of physics, at the same time also in 19th century max Planck a German physicist discovered that the energy of an electron which comes in packet is quantized that means is discrete or indivisible, what he means by that if you assume that the energy of an electron comes in packet, you can explain all the Bizarre phenomena such as spectral lines of hydrogen atom and all the properties of an atom just by assuming the angular momentum of an electron is an integral multiple of Planck constant. This is the initial state of the birth of quantum physics. Quantum mechanics is the theory of an electrons, protons, neutrons and atoms, i.e. the theory of atomic and the subatomic level, it is the theory of the microscopic scales, it is the theory of the very small and it is the counterpart of general relativity. Albert Einstein is one of the icons of the 19th century theoretical physicist his contribution to physics made him remarkable as one of the fruitful undisputed father of modern physics. In 1905 he published his paper on the special theory of relativity to the Physics community few years later he then republished another paper on general theory of relativity which overthrown or change the landscape of Newtonian physics which held sway for over 250 years. General relativity is a scientific theory is the theory of the macroscopic world or level; it is the theory of Big bang, black hole, galaxies, stars, planets. In fact it is the theory of very big. These two great theories of science the major problem facing any theoretical physicist today is to try to unite or fit them together in to a single elegant theory like Stephen hawking who try to apply quantum mechanics to gravity near the event Horizon of the black hole but the theory blows off at his face what he got was hawking radiation this means that black hole can evaporate that's emits particles such as photon and graviton known as virtual particles or hawking radiations.

Classical physics or Newtonian has to do with determinism i.e objective reality, Newtonian physics by knowing some arbitrary parameters you can predict precisely where event in future take place to a 100% degree of accuracy i.e tell me what happen now and I can use my equation to predict what will happen in the next one hour or future. But this is not the way how nature works in quantum mechanics because they reject determinism or objective reality. According to quantum mechanics you will never know exactly whether an electron is coming or going, here or there simply nowhere the universe is governing under probability you can only say an electron will be here at that percent and will be there at this percent i.e why whether prediction is very difficult that's how our computers and our electronic devices normally how to use.

String theory is the mathematical theory where by the fundamental constituents of matter is tiny little vibrating string vibrate at some certain mode, if it vibrate it change into neutrino vibrate again change into quarks if you plug it hard enough you can explain all the bizarre particles and the subatomic particles that we have, string theory predict that this tiny string vibrate in eleven dimensional hyperspace and is billions times billions billions smaller than the proton. This theory is the only theory that can unite the two greatest theories that we have i.e the world of the very big and the world of the very small meaning to say that it is the only game in town.

II. Physical Principle Of The Two Theories.

I. Quantum mechanics

The Dirac- von Newmann axioms provide a neat mathematical foundation of quantum mechanics, but their apriori justification is not very compelling, their main support, as stressed by Dirac, being the aposteriori success of the theory they lead to the dramatic departure from the general philosophy and ideas of classical physics may explain the many attempts of obtaining quantum by a deformation of classical mechanics or by so called geometric quantization. The seminal papers by Heisenberg (1925) and by Schrödinger (1926) mark the birth of quantum mechanics (QM) apparently different points of view. Heisenberg setting emphasizes the Non-commutative operator matrix structure, whereas Schrödinger wave mechanics relies on analogies with optical phenomena, the need of unifying such philosophically different approaches is at the basis of Dirac formulation (1930) of the principles of QM, whose mathematical consistency and refinement is due to Von- Neumann (1932).The resulting principles became known as the Dirac-Von Newmann (DvN) axioms of Quantum mechanics.

AXIOM I. The states w of quantum mechanical systems are described by the rays $\Psi_w = \{\lambda\ \Psi_w, | \lambda | = 1\}$, identified by the normalized state vectors Ψ_w, of a separable Hilbert space Ḥ.

AXIOM II. Observables, the observables of a quantum mechanical system, i.e the quantities which can be measured, are described by the set of bounded self-ad joint operators in a Hilbert space Ḥ.

AXIOM III. Expectations, if the state w is represented by the vector $\Psi_{w,} \in$ Ḥ, then for any observable A, the experimental expectation $<A>_W$ is given by the Hilbert space matrix element $<A>_{W =}(\Psi_{w,}, A\ \Psi_{w,})$.

AXIOM IV. Dirac canonical quantization, the operators which describe the canonical coordinates, q_i and momenta P_i i=I,……..s quantum system with 2s degree of freedom, obey the canonical commutation relations $\{ q_{i,} q_j\} = 0 = \{p_i p_j\}$, $\{q_i p_j\} = i\hbar\partial_{ij}$ .....(1)

AXIOM V. Schrödinger representation, the commutation relations (1) are represented by the following operators in the Hilbert space $Ḥ = L^2 (R^{S,}dx)$:

$q_i\Psi(x) = x_i\Psi(x)$, $P_j\ \Psi(x) = -i\partial\Psi/\partial x_j\ (x)$.

II. General relativity

The physical principle of general relativity is that general theory of relativity is the theory of space and time; the theory had several immediate observational successes. First it implied a small correction to the orbit of the planet mercury that accounted for a small discrepancy between the orbit implied by Newtonian theory and the observed orbit. (The effect is too small to be observed for the other planets.)Second, it predicted that from distance star passing near to the limb of sun would be bent by a small but measurable angle. Another physical principle of general relativity is based on differential geometry (specifically, Riemannian geometry) and tensor calculus. The idea is that gravity is the manifestation of the space time curvature. Also, the geometry of space - time is determined by the distribution of energy and momentum. The basic equation of motion is $G_{\mu\upsilon =} 8\pi G T_{\mu\upsilon ,}$ While $G_{\mu\upsilon}$ describes the space-time Geometry, G is the Newton's constant characterizing the strength of graviton ant $T_{\mu\upsilon}$ describes the distribution of energy momentum.

III. Mathematics

Mathematics is the shining language that can illuminate the dark corner of reality in the universe which can't be access directly. Therefore to many people, mathematics present a significant barrier to the understanding of science and the world around us, certainly mathematics has been the language of physics for hundred years and more, and it is difficult to make any progress in understanding the physical world without it. Why is this case? One reason is that physical world appears to be largely governed by the laws of cause and effect (although these break down to some extent in the quantum context. Mathematics is commonly used to analyze such causal relationships as a very simple example. The mathematics statement two plus two equals to four implies that if we take any two physical objects and combine them with any two others, we will end up with four objects, to be a little more sophisticated if an apple falls from a tree to the ground classically, we can use mathematics to calculate the time it will take to reach the ground provided we know the initial height of the apple and strength of the force of gravity acting on it. This example is allowed in the Newtonian physics and is the importance of mathematics to science because latter aims to make predictions about the future behaviour of a physical system and to compare these with the results of the measurement which is contrary to quantum mechanics which operates at the atomic scales an always under probability.

In Newtonian physics kinetic energy is always positive $E_k = ½Mv^2$, this means that in Newtonian physics kinetic energy will never be negative but in quantum mechanics kinetic energy of a particle will be negative, This

means that an electron can penetrate through a barrier i.e we can see this in quantum tunneling or potential barrier and one of the application of this, is universal serial bus drive or flash and obey Schrödinger equation. This also means that in classical physics the state of motion of a particle is specified by giving particle position and velocity, while in quantum mechanics the state of motion of a particle is specified by the wave function

$\Psi(x,t)$ Even though Newton second law of motion that's F=Ma is analogous to Schrödinger equation, but to apply the equation to a moving particle or electron is just running a program in different operating system. Because is only Schrödinger equation we can use to apply it for an electron, we don't use F=Ma because it doesn't make sense, just like Einstein equation is only apply to the speed of light we don't use Newton equation for a moving particle moving at the light speed. Suppose you've given Coulomb's law describing how electric charges experience a force, $F= {}^{Q1Q2}/_{4\pi\varepsilon or^2}$ you can either to think in the classical frame work, which means that we plug this in to F=Ma. But if you choose quantum frame work, which means that you plug this in to Schrödinger equation it's like running a program on different operating system and the operating system of the universe is quantum mechanics.

IV. Problems Of The Unified Field Theory

One major criticism of string theory to day is that it is untestable, it would take atom smasher the size of the galaxy to test this theory, and furthermore many untestable theories ultimately became testable. It took two thousand years to prove the existence of atoms after they were first proposed by Democritus, but today we know that if you can dig go deep inside the atom it consist of proton and neutron and there are other stuff inside the proton and neutron that's quarks but to know what is inside the quarks looking a fundamental rubber form of matter one object such that if it vibrate it can create all physical object around us that's the battle of the string theory.

String theory is the fable theory which eluded Einstein for the last thirty years of his life, string theory is the theory of everything, it made prediction of extra dimension and the fundamental rubber form of matter that's tiny little vibrating string which resonate in eleven dimensional hyperspace, this tiny little vibrating string is billions times billions billions smaller than the proton, the theory rely on the outcome from large hadron collider (LHC) located outside Geneva Switzerland. But if the string theory is now untestable those that mean the theory is not correct, the answer simply NO. If we can't prove the predictions string theory we can't simply say the theory is not correct because if we think back to two thousand years ago the Greek philosopher Democritus predict the existence of atom but today we now know that the existence of atom is the real and even there are some stuffs which is smaller than the Atom we now believed them they are real. So if we can't prove the existence of this tiny string and the extra dimensions may be one day we may prove them. Because something which is impossible for us may be possible for next decades, century or even next civilization because of the crude of our experimental device and our weakness. The physical effects of extra-dimensions depend on the sizes and shapes, and what kinds of matter or forces can penetrate them, the size of the extra dimensions are unknown, but they should be related to fundamental energy scales of particle physics, the cosmological scale, the density of dark energy, or the ultimate scale of unification. It may be possible to infer extra dimensions of microscopic size from inconsistencies in cosmological observations. More likely the extra dimension are microscopic, in which case high-energy particle accelerators and cosmic ray experiments are the only ways to detect their physical effects. The LHC and linear collider will address many questions about extra dimensions: How many extra dimensions are there? What are their shapes? How are they hidden? What are the new particles associated with extra dimensions? Through the production of new particles that move in the extra space, the LHC will have direct sensitivity to extra dimensions 10 billion times smaller than the size of an atom. A linear collider would determine the number, size and shape of extra dimensions through their small effects on particle masses and interactions, there is also chances due to the existence of extra dimensions, microscopic black holes may be detected at the LHC or in the highest energy cosmic rays.

Another significant problem of the unified field theory is that string theory predicted that our universe is one of many universes floating in eleven dimensional hyperspace called the multiverse or mega verse and the wormholes. The question is how can we test theory? How can we test the existence of many worlds and worm-holes? Given the current technological advancement we physicists believe that one day the destiny of all intelligent life will hinge on the string theory, trillions of years from now we physicists believe that the universe will end not in fire but in ice (Big free).So when we reach the end of the universe we will simply take the unified field theory and create the life bulb, a baby universe on our dying universe we leave the mother universe to go perhaps another universe warmer, younger universe. So in some sense the unified field theory is the salvation of all intelligent life in the universe which doesn't have to die when the universe died.

Cosmology:

Quantum mechanics combine with relativity tells us that empty space can actually contains energy, intact the empty space in the proton inside our body are exactly where most of the mass our body came from when we do the same calculation to try understand how much energy within empty space outside our body truly in space we came out with an answer which is of by hundred and twenty order of magnitude it is the biggest mysteries in science to try to understand where do the energy of universe came from. Another fundamental problem of the unified field theory is when we try to understand the fundamental mechanism behind the energy in empty space and where the energy of the universe come from, does it arise from nothing or something. When we try to understand the mechanism behind the energy in empty space no particle no radiation that's no nothing, even nothing is weight by something, it is inexplicable so that fundamental but accidental it is what it is that even the laws of physics may just be accidental by quantum mechanical effects. Gravity is the theory of space likewise quantum mechanics is the theory of space and time, so when we combine quantum mechanics to gravity even space its self can be created from nothing by quantum mechanical effects.

One of the most amazing realization of 21st century is that quantum mechanics combine with relativity allows something to comes from nothing, intact nothing is unstable, there is revolutionary in cosmology in the last twenty five years, we now understand the dominant energy in the universe reside in empty space and that change everything and that it help unambiguously to the possibility the universe arouse from nothing. When we apply quantum mechanics to gravity empty space is not quite empty at all but a complicated bubbling boiling blow of virtual particle popping in and out of existence, the virtual particles they only live in Short fraction of second that's quintillionth, it change our picture of nothing and also something, giving our current understanding even the laws of physics are not beautiful they can be recent spontaneously and be different in different universe, in that sense even the laws of physics could be in accident. The far future of the universe will be very different than it is now, all the evidence of the big bang expansion will be disappear in fact all the galaxies and the night stars will be gone and we won't reappear we live long nothing will once spread, it is called dark empty universe, everything we see in our universe dominated by dark matter and dark energy everything we see in the night sky the galaxies the stars, planet and the universe will be largely the same.

V. Conclusion

The fundamental problem of the unified field theory is from their prediction of untestable to testable that's tiny rubber form of matter, wormhole's, extra dimensions and the many worlds (multiverse). String theory is very successful for predicting extra dimensions because we can detect them with the help of LHC by sending two beams of proton in opposite direction that's head-to-head collision and we can look at the deviation from Newton's famed inverse square law at millimeters scale (if there is a fourth spatial dimension, then gravity should fall by the inverse cube, not the inverse square).Despite of its challenges of those predictions the theory is the theory of everything meaning to say that string theory is the only candidate and game in town that can unite the theory of the very big (Relativity) and the theory of the very small (quantum mechanics).

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