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IS QUANTUM GRAVITY THE EQUATION OF GOD

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Abstract : Quantum Gravity tops the list of most soughted research stream in the field of theoretical physics and cosmology. Democritus explained the fundamental building block of our universe was atoms some 2000 years ago. Pythagoras interestingly but contrastingly stated that everything emerged from music and the universe is nothing but symphony of strings. There seems to exist a underlying regular pattern and symmetry in everything in the cosmos. Physicists and Mathematicians try to decode this information present in reality. A complete Theory of Everything which is also known as Quantum Gravity has to be deciphered. Two most suitable candidates of Quantum Gravity are string theory and the Loop Quantum Gravity theory. Recently physicists believe that both these theories are two sides of a same coin and synthesis of these will give the ultimate Theory of Everything. Philosophers like Sri Vethathiri Maharishi explain reality on the basis of their Intuition.

Key Words : Super symmetry – Multiverses – extra dimensions – Spin- Network – Causality – non-determinism – space time – singular – Eternal space

INTRODUCTION

Science is an organized study regarding the physical reality in the form of predictions and subjecting it to experimental proof. It is an systematic and logical analysis of the happenings around us. The human civilization have gone to its peak due to scientific development. Scientists have probed deep into the properties of Energy and Matter and came out with astonishing results. Physics specifically deals with the structure of the universe, structure of atom, magnetism, Electricity, heat and Dynamics. Many great physicists have contributed in enhancing the understanding of physical reality for the mankind. Many legends have sowed the seed of their knowledge and their successors in the field reaped the benefits. The field of Quantum Mechanics is one such subject for which many nobel dedicated individuals have contributed to its growth. Quantum physicist Max Planck introduced the most revolutionary idea that Energy was not continuous but energy was discrete and moved in packets called as Quanta. Neils Bohr framed the Atomic structure of the atom. Werner Heisenberg of Introduced the principle of uncertainty which drastically changed the perceptive of the reality. Erwin Shrodinger gave the wave equation or the probability theory of the wave. Wolfgang Pauli gave the exclusion principle. The General theory of relativity and the special theory of relativity discovered by Sir Albert Einstein gave clear picture of Gravity and its large scale effects on the universe. Many new revolutionary concepts were introduced in these two great theories. The special theory of relativity explained and proved that the speed of light is a constant and the General theory of relativity proved that space and time separately are relative terms and they exist as space time continuum. Earlier the science community believed that space and time are universal entities, but Albert Einstein proved they are relative terms and different to different observers. The Nobel prize was given to him for photo electric effect and not for his two great theories. Einstein believed in the static universe and explained that the universe was neither expanding or contracting. The field equations of general relativity gave rise to universe which was expanding. But to overcome this result Albert Einstein added a new constant known as the cosmological constant λ to his field equations in order to balance the inequality in the equations. But later when Edwin Hubble discovered that the universe was expanding in an accelerating rate, Einstein stated that he had done a great blunder of his life in introducing the constant.

Albert Einstein who was initially instrumental in the development of Quantum Mechanics through his photo electric effect, was not comfortable with the concepts and ideas of Quantum Mechanics because of its introduction of randomness in every events. He gave his famous quote that “God does not play dice”, in answer to the probability nature of events. The great personality George Bernard Shaw has once wisely stated that science never solves a problem without creating ten more problems. This statement holds good in the case of Quantum Mechanics. In spite of so many contradictions in the theory, even today it is valid because of its accuracy in the experimental evidences. So theoretical physicists have no other choice than to unify both the pillars of physics namely the General theory of relativity and Quantum mechanics. It is proved that both these theories are perfect and accurate in their own respective areas of application. In the macroscopic level of the cosmos relativity holds good and at the subatomic realm or microscopic level of particles Quantum Mechanics holds good and Quantum theory also accurately gives account for the structure, charge, mass and angular momentum of the subatomic particles.

STRING THEORY

The four forces of nature are explained by science, but there are two segments in it. The gravitational force is elaborately defined by the General theory of Relativity. The other forces of nature namely the strong nuclear force, the weak nuclear force and the electromagnetic force are explained by the Quantum theory. The theory of Gravity of Einstein does not apply at the Quantum level and the principles of Quantum theory cannot be applied to the huge celestial objects of the universe. The standard model has particles corresponding to each force except gravity. Today physicists are facing the great challenge of unifying all the four forces of nature. And this field which strives to achieve this mission is termed as the Quantum Gravity. The aim of this theory is to quantize gravity, there are many theories which are trying to solve this problem. The most prominent and suitable candidates are the string theory and the Loop Quantum Gravity theory. The string theory assumes that the building blocks of the entire universe are strings which are vibrating. On the other hand the Loop Quantum gravity theory assumes to quantize space itself, according to this theory space is Granular and not continuous as mentioned in the general theory of relativity. The theoretical framework of string theory replaces the particles of particle physics into one-dimensional strings. These strings interact with each other, they vibrate and propagate through space. The vibrations of the strings correspond to particles in the standard model and one such vibrational state of the string give rise to gravitons. Gravitons are considered as the particle responsible for carrying gravitational force in the universe. The string theory apart from trying to quantize gravity, it also tries to unify all the four forces of nature. It states that in the early universe all the force forces of nature are not separate and cannot be distinguished between each other. In the initial state of the early universe the temperature and energy were incredibly high to unimaginable scale, these four forces are all described by strings interacting with each other. A phenomenon called super symmetry is explained by string theory it states that there exists a connection between two types of particles namely Bosons and Fermions.

For every Fermion there must exist a boson and vice versa, but super symmetry is not proved through experiments. The string theory claims that there are six more spatial dimensions present in nature. Parallel universes, multiverses and holographic principles are explained in the string theory.

LOOP QUANTUM GRAVITY

Loop Quantum Gravity theory is also an candidate of Quantum gravity. It also tries to merge general theory of relativity with Quantum mechanics. This theory accepts the notion of Albert Einstein that gravity is not a force but it is the property of space-time continuum. It envisions gravity as a geometry of space-time. Loop Quantum gravity theory explains that space is not continuous but it is discrete and granular. This idea is very innovative and revolutionary because it quantizes the very fabric of space. Space is viewed as an extremely fine fabric or network made of finite loops. These networks of loops are called as spin networks. The evolution of spin network over time is called a spin foam. The predicted size of this structure is the Planck length which is 10^{-35} meters.

So according to Loop Quantum gravity not only matter has an atomic structure, space also as a structure to it in Planck scale the physicist who are leading in the field of Loop Quantum gravity are Prof. Abhay Ashtekar and Prof. Lee Smolin. The theoretical physicist who work extensively on the subject of string theory are Prof. Brian Green, Prof. Michio Kakoo and Prof. Lenoard Susskind and others. Physicist of both the stream of string theory and Loop Quantum gravity suggest some of the characters for Quantum Gravity. Information being one of the main ingredient, because reality is made up of information. Non-determinism which means everything cannot be predetermined. The flow of causality might not be regular in the sense, the cause will not always precede the effect. In daily experience we turn on the switch and the bulb glows, but in a causality loop the effect may precede the cause. Consciousness or observation is essential for reality to exist. Philosophers also try to answer the questions pertaining to reality and the universe by introducing the concept of Divine intervention or super being termed as god.

Sri Vethathiri Maharishi a great spiritual philosopher has explained in his books regarding eternal space or gravity. He envisions gravity as Nature, Almighty, Singular, All –Penetrative, Permeable, highly transparent, Self compressive, inexhaustible surrounding pressure and unified force. Swamiji explains gravity as Omnipotent and omniscient entity. His theory highlights how the universe originated and came into existence. The theory propounded by Sri Vethathiri Maharishi is self transformation theory of the eternal space.

CONCLUSION

To understand the ultimate Truth of nature, science must have philosophical foundations and philosophy must have a scientific approach. The discovery of the theory of everything will incorporate consciousness in it. The Quantum mechanics have proved very clearly that science will not be able to predict things accurately, the Heisenberg uncertainty principle is good example. All known laws of physics breakdown at singularity point of Black holes and Big Bang instances. The Quantum gravity theory might be the equation of God or Divinity.

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