The Meaning of the Singularity:
1. A Single Particle Universe

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Abstract

We examine the basic term 'particle'. We start by exploring a universe that contains a single particle. In such a universe there is no meaning for motion, energy, space and time. Only for a two particles universe the physical quantities can be measured. However, the determination of the physical quantities implies that the particles are not separated from each other! We thus propose that all particles are interconnected. This novel perception naturally explains the two well known paradoxes: the twin-electrons experiment and Schrödinger's cat. In fact, we argue that the twin-electrons experiment is an actual proof for global non-detachment. We state that it cannot be shown that a particle is elementary. If one is divided by two numerous times, zero is never reached. There must be a jump into zero - the singularity. The sought Higgs particle is simply the singularity itself, which cannot be found, having no properties.

1. Introduction

This work is the first in a set of papers that suggest novel ideas in Physics and Astrophysics. In this paper the basic term 'particle' is examined. An elementary particle is a particle that its possible substructure has not been found - it is not known to be made up of a few smaller particles. Elementary particles are regarded as the basic building blocks of the universe, from which all other particles are made. The idea that all matter is composed of elementary particles dates to a few centuries BC. The philosophical doctrine of the atom and the nature of elementary particles were investigated by several ancient Greek philosophers. The term 'atom' itself comes from Greek. It means uncuttable, indivisible, something that cannot be further divided.

The modern description of the atom was established about one century ago with experiments conducted by Ernest Rutherford and co-workers [1]. It is now accepted that the central nucleus of the atom consists of neutral particles, neutrons, and positive particles known as protons. The nucleus is surrounded by a cloud of negatively charged electrons. The electron is still considered an elementary particle today. Experiments have shown, however, that the nucleus particles can be further divided. In these high energy experiments, particles are accelerated by very strong magnetic fields. The nucleus particles are bombarded by the accelerated particles, and the products are carefully investigated by computers. It was found that the neutrons and protons can be further divided into sub-nuclear high energy particles, which were termed quarks [2-3]. This research still continues in huge accelerators. In the recent experiment in Cern [4], scientists are looking for the Higgs particle [5]. This particle is believed to be the elementary particle that gave the masses to the other particles a fraction of a minute after the Big Bang – the initial explosion of the universe. The Higgs particle is also nicknamed the 'God Particle'.

2. Basic Particle Universes Characterization

2.1 A Single Particle Universe

Consider a universe with a single particle, which is found somewhere in a three dimensional space. Obviously, there is no meaning for the location of the particle. If the particle is shifted to a different location, the universe is still the same. Distances are irrelevant, because it is a relative property quality. Now let's give the particle some velocity, v. In the particle own co-ordinates system, nothing moves and the universe is seen the same. Thus, since the location is irrelevant, there is no meaning for the velocity. Consequently, temperature, which reflects the motion of the particles, cannot be defined. Mass, m, can neither be specified, because there is just a sole particle, so there is no other particle that can exerts any gravitational force on the single particle. Therefore, the particle does not have any momentum, p=m*v, nor kinetic energy, $E_k = 0.5 * m * v^2$, nor gravitational energy, $E_g = G * m_1 * m_2 / r^2$, where $G= 6.67 * 10^{-8}\, m^3\, g^{-1}\, s^{-2}$. Thus, there is no concept such as energy in a single particle universe. More than a single particle is required to determine this quantity. It follows that in this universe, there is no change and everything is always the same – just a single particle in space. Thus time, t, has no meaning. Note that all these non-properties do not depend on the nature of the particle. In the single particle universe there is no expansion, nor contraction, and red-shift or blue-shift due to Doppler Effect cannot be observed. In fact, a single particle universe has no reference point and cannot be referred to.

2.2 A Dual Universe

Let assume a universe with two particles. In such case there is certainly a meaning to the distance, d – it is the three dimensional interval between the two particles. The impact of one particle on the other particle decreases with distance. So, in this universe, space is meaningful. Now, if one particle has a certain linear velocity, the distance between the two particles changes, so the velocity, v, can be determined. The mass can also be defined. The low mass particle has a higher velocity in the presence of the other more massive particle. Therefore, the kinetic energy, E_k, can be determined as well. The Gravitational energy, E_g, can also be specified. It depends on the masses and its absolute value decreases with the distance between the pair. Different particles lead to different gravitational energy at the same distance. Now time can be determined for a change in the universe state. In summary, unlike the single particle case, the basic physical concepts are meaningful in a universe that is comprised of two particles. It is noted that if there is no interaction at all between the two particles, then none is aware of the other, and the only possibility is that the two particles are found in two different universes. If a single particle universe cannot be referred to and has no meaning then physical meaning is not in the particle but in the relationship. Meaning is in the ability to relate.

2.3. A Non-Duality Universe

Since it was demonstrated above that one particle has no meaning by itself, we conclude that particles do not exist in the conservative sense. We argue that particles are not really detached from each other. They are an unseparated part of the whole. They are only concepts, means to relate, to refer. At this context, it is interesting to mention the physical term field. A charged particle such as the electron or proton induces an electric field around it. When another particle is located in some distance from the first particle, the second particle 'senses' the field of the first particle. The common explanation of this phenomenon is that the first particle sends 'unseen probes' to all directions and only when they hit another particle an interaction occurs. We suggest instead that the particles are not really separated, so one particle instantly 'knows' about the presence of the other because they are actually connected.

We conclude that particles are not really detached from each other. In fact, all particles are part of a whole, of one, which we call the singularity. The singularity is an expression of oneness. One cannot see itself nor can interact with itself. Two are required for the show. Only when there are two, the singularity can be aware of itself through this alleged separation, but we argue that all particles in the universe are connected with each other and are not separated. We state that it is not a universe of particles, rather a universal field. All particles in the universe are interconnected with each other creating a net of reference points.

3. Explaining known experimental results

3.1 The Twin Particles Experiment and the EPR Paradox

When two electrons are entangled, the state of one electron is determined by the other. The spin of an electron can either be up, which we mark as state A, or down, aliased as B. When there are two entangled particles, if one is A, the other must be B, and vice versa. However, until at least one of them is observed, the state of each electron is unknown. Now suppose that two entangled electrons are formed in some process that gives opposite velocities to the pair. If one electron is observed and is found to be in state A, the state of the other is determined as B at the very instant the observation takes place, no matter how far apart the two electrons are. This implies that information can be instantaneously transmitted from one electron to its twin - faster than the speed of light!

This amazing behavior of entangled electrons can be explained using the uncertainty principle in quantum mechanics, which means that not all classical physical observables of a system can be simultaneously known with unlimited precision, even in principle. Instead, there may be several sets of observables which give qualitatively different, but nonetheless complete (maximal possible) descriptions of a quantum mechanical system. A well known example is position (x) and momentum ($p=m*v$ – mass multiply by velocity). You can put a subatomic particle into a state of well-defined momentum, but then you cannot know where exactly it is. This is known as the Heisenberg uncertainty principle.

Albert Einstein, Boris Podolsky and Nathan Rosen were, however, skeptical about this theory [6]. They developed a thought experiment to demonstrate what they felt was a lack of completeness in quantum mechanics. They believed that the determination of the state of the electrons would be fixed at the instant of their creation. This suggestion was named the EPR Paradox, and it stood in forthright opposition to quantum mechanics.

Are the states determined to A or B in advance as EPR contended? In the 1960s, the Irish physicist, John Stewart Bell, put forward a proposal for a groundbreaking method to investigate this question [7-8]. Successful experiments using photons were performed [9-11], and the results showed a victory for quantum mechanics! The amazing relationship of entanglement really does occur and EPR were wrong. The debate was terminated. Yet, it is not fully understood as it seems to imply that information can be passed faster than the speed of light.

We propose a simple explanation of the results of the twin particles experiments and to the entanglement problem. According to the ideas presented in Section 2, there is no separation at all. The twin particles are interconnected with each other as all particles in the universe are. The information does not need to pass faster than the speed of light because actually the two particles are not detached. We note that one could actually reverse the logic, and argue that the twin-electrons experiment actually proves that the particles in the universe are not detached at all.

Schrödinger's cat 3.2

Schrödinger's cat is a thought experiment that was devised by Austrian physicist Erwin Schrödinger in 1935 [12]. A cat, along with a poisonous flask, is placed in a sealed box shielded against environmentally induced quantum de-coherence. If an internal Geiger counter detects radiation then the flask is shattered, releasing the poison which kills the cat. Quantum mechanics suggests that the cat is simultaneously alive and dead. Its wave function is a combination of 'alive' and 'dead' states. Yet, when we look inside the box we see the cat either alive or dead, not a mixture of both. This is known as the Schrödinger's paradox.

According to our suggestion, if the box is sealed and we have no idea what is going on inside it, then it is like a particle in a different universe, which is completely separated from us. However, if there is no separation at all in the universe, as we propose, there is no paradox. There is still information about the status of the cat even if the box is sealed. One cannot take a cat, which is in our world and move it into a different universe because it ceases to exist, completely erased from consciousness. Then there is no information about it and nor about his co-ordinates. The solution to the paradox is similar to that of the twin particles experiments. The cat and the observers are not separated, and the information is not really divided.

The search for the Higgs particle .4

In Cern there is a huge project, which involves thousands of scientists, to look for the primary particle, the Higgs particle. This theoretical extremely high energy particle was also aliased the 'God particle', because it is believed that it gave the other particles their mass during the very early time of the universe [13]. Our work implies that there is no such particle. A single-particle universe does not make any sense, and the basic physical quantities cannot be defined in such a universe. A universe that is built with particles cannot have an elementary particle. In fact, it cannot be proven that there is an elementary particle at all, because maybe an energy beam higher than the present limit can divide it into two. Diving by two or any other number numerous times never reaches zero. One just gets smaller numbers. There must be a jump to reach zero – the singularity.

5. Summary and conclusions

1. In this work, we first discussed the single particle case. We showed that in such a universe, the basic physical quantities have no meaning. Only when two particles are introduced, the physical definitions can be determined. We argued that particles in the conservative sense do not really exist by themselves. Particles cannot be separated from each other. There is a general entanglement in the whole universe. Detachment is an optical illusion, which will be further discussed in the next papers of the series. If particles do really exist as separated things, then a single particle universe should make sense, but it does not. A particle cannot be an independent entity. Even in a dual system it is not really separated. Only the relationship between the particles forms the basic physical quantities and the observed universe. The universe is not of energy and matter but a relational field. Matter has a meaning only in a comparative system.

2. Our ideas supply a simple solution to two well known problems in physics: the EPR paradox and Schrödinger's cat. We believe that twin particles are not really separated from each other and that the information does not need to pass faster than the speed of light. We argue that the twin particles experiment actually shows that there is no detachment at all – there is a conceptual separation and not an actual one. Conceptual separation is the means of relating to the world of phenomena. If we have no information on Schrödinger's cat then it is in a completely different and detached universe, so we have no knowledge about it, and from our point of view it does not really exist! Alternatively, if it is in our universe, then it is not separated from the observer, and there is some information about its status. It is not both alive and dead.

3. We speculate that the search for the so-called primary particle, the Higgs particle in Cern, will not be fruitful. Instead, it should bring more riddles. According to our ideas there cannot be a single elementary particle that gave the other particles their masses. Our work implies that a single particle cannot exist by its own. More particles are required for the definition of the basic physical quantities. A universe that is built with particles cannot have an elementary particle. In fact, we argue that it cannot be confirmed at all that any particle is elementary. To reach the singularity, the zero, one has to leap over the numbers. By dividing the particle size again and again, smaller and smaller numbers are obtained, but not zero. The singularity does not have any dimension, so it cannot be reached by the matter – by particles.

4. In this paper we argued that there is no detachment at all in the universe. This philosophical idea has strong observational implications. Indeed, in the second paper of the series we find many striking similarities between the human society and the stars. In other works we further discuss light, space, time, offer an explanation of dark matter and dark energy that requires no new particles, suggest reviving the supposedly 'dead' white holes and propose a new meaning for the term 'singularity'.

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