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The Mathematical Model of the Fundamental Particle

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ABSTRACT *In this paper , we present a mathematical model of the theory related to the "fundamental particle", which was published earlier. In this model, the variables are determined as speed, mass, energy, and frequency and the functional relationships between these variables are also identified. According to this study, all kinds of energy and force are a special case of a particle or a particle group, and are the effects of the energy, power or the forces that are seen, not seen, measured, or unmeasured.*

1. INTRODUCTION

No result of observation that will be considered a real experiment has been obtained so far on dark matter, dark energy, the presence and structures of black and white holes [1-11]. However, theoretical ideas and opinions were adopted regarding their existence. Therefore, it is believed that as we find out the traces believed to be the remains of the past, the events in the past will be shed light on [12-16]. The hot and cold cosmic microwave backgrounds that will support these remains are reported to be observed on NASA's Web page.

Various ideas, opinions, comments, and theories have been put forward on the structure and formation of cosmic bodies, and the expansion of the universe [17-34]. There are different opinions on the Big Bang explosion on the NASA's Web page [30-31]. There are also very different views explaining that the item speed at the time of this explosion were 10^{30}km/s and 10^{99}km/s and that the temperature was between $1x10^{12}$K-$1x10^{32}$K [17]. It is also claimed that unusual information has been obtained on the galaxy formation [35]. It is also observed in the NASA's images (cosmology history, WMAP image) that there are small particles at the beginning of time.

According to Hubble constant expansion, the expansion of the universe is claimed to be between 70-500 Mpc. If the universe is expanding at this rate, this means that it varies between $2,11x10^{21}$-$1,5x10^{22}$ Km/s. The formation and the structure of the substance are then bound thereto. The formation and the structure of matter have occurred at a much higher speed than this speed, and this speed is now stable. Therefore, the formation of the universe as well as the matter has occurred in the previous conditions. If more powerful conditions occur compared to the previous ones, a new formation should be expected in the building blocks of a matter. Alternatively, in the other spaces, rather than the one that we are observing, it may appear in a form different from the known structure of the matter. However, we do not know it yet. The only thing that we know is that we find and analyze the similar matters in the space based on the ones that we have on the Earth. If this speed multiplies the aforementioned speeds that are believed to exist, then new formations unlike the current ones may occur. Then the question is whether there are other matters that are believed to exist but cannot be observed. In several resources, it is stated that the Hadron life span of several particles believed to exist in the matter structure is $1\square 10^{-24}s$ [36]. In this case, why should not the speed of the particle be $1x10^{24}$ m/s (hadrons)?

"A universal rule in Particle Physics is stated as the following: When particles gradually collide with each other, the impact of this collision is determined by the smallest structures in space-time. The standard model is a mathematical structure. When particles collide at extremely high energies, we see that the standard model becomes obsolete. The standard model is just a mathematical approach compatible with the events that are observed" [36]. In this case, it is the smallest fundamental particle that forms the matter. There are several studies on the fundamental particle and the structure of light [37-38], the existence of masses moving faster than light (tachyons) as well as the infinite speed of light [39-41]. Thus, it may not be appropriate to consider the speed of light as the reference considering the structure of matters.

The fundamental particle also exists in the formation of particles in the structure of all models. As these fundamental particles come together with more than one particle, they compose a larger upper particle. Likewise, when these upper particles combine, larger and new upper particles are formed. This formation reaches the final structure when matters, galaxies, or stars become stable. In other words, the matters or the general structures that we see and measure in our world are the stable and the atomic and molecular structures in the current conditions. It is possible to see the same structures in any place of the universe where the same conditions exist. However, the existence of the fundamental particle cannot be measured using current technological measurement instruments under normal conditions; the fission of large structures occur more in the deep structure. It is not possible to achieve under today's conditions since the big energy and the speed that existed at the beginning of time are not achievable.

2. PRINCIPLE OF FUNDEMENTAL PARTICLE

The physical and chemical events in the nearby universe and on our Earth occur at the atomic dimension of matter. There are many known and unknown particles that compose this atom, and there are various different theorems aiming to describe these particles. In fact, the events in the big bang occurred at the "fundamental particle" level of the matter. In the subsequent events, the fundamental particles compose new particles by combining with each

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other. This upper particle formation continued in a chain. Finally, the atomic structure of the matter that we know or believe to know today was formed. This structure is the stable structure of the matter in the form of tranquility. The conditions to disrupt this structure are only possible at the initial or greater conditions. In another perspective, when access to the small particles is ensured, their binding energy appears to increase. As a result, when greater energy than the binding energy is given to the system, the system is disturbed. Since this energy is very great, the large particles in atomic size are naturally affected.

The energy of fundamental particle is defined as $E=M \times e \times V^2 \times F_1 \times F_2 \times F_3$ [42]. In this equation, ***E*** is defined as the energy of fundamental particle, ***M*** as mass, ***F1, F2*** and ***F3*** as the particles of the three-dimensional non-uniform operating frequency, ***e*** as the mass binding energy of electron volt particle, and ***V*** as the speed , which is close to the speed at the initial conditions. The size related to this particle is the possible largest values. It is never possible to reference values for the systems in tranquility. In other words, these are theoretically the highest possible values. The analysis of the equation is provided as follows:

1. For the special case of $F_1 = F_2 = F_3 = M = e = 1$, the energy is $E = V^2$. In other words, the frequency, due to the speed of the particle, becomes closer to $F_1 = F_2 = F_3 \approx 0$, and while the mass reaches smallest form, it also comes close to $E \approx e$. This is a special condition case as the particle does not vibrate in its space. While the particle reaches its highest speed, the mass has the smallest volume by shrinking. In the opposite case, when the speed gets slower, the particle swell at the same rate. That is, as the matters accelerate, their volume gets smaller, and their frequencies are reduced. The negative gravity force of the speed first leads the matter to shrink, and as the speed increases, so does the density of the matter. Then, the mobility of the particle decreases, which might then turn into the fundamental particle.

2. When the case is $V=1$, $M \approx e \approx 1$, the matter in in tranquility. $F_1 = F_2 = F_3 \approx 0$ is valid in this case. The frequency value obtains the maximum value, and the speed is stable and creates the suitable environment for the formation of atomic structure. The mass speed now becomes the stable case speed, and the mass is in the form of the possible largest structure and volume. In this case, the atomic and molecular system is formed, and the matter has now its system. If there is no stable system, the system continues its activities in order to become balanced and stable. The variables in the energy equitation never achieve the accepted values except the initial conditions since the system is stable for the fundamental particle. The functional energy equitation applies for the other cases. This case is shown as below:

The formation of the fundamental particle is only possible at the expected maximum speed. This occurs due to the highest speed and pressure. In other cases, the atomic particle structures of an upper level are formed. When the speed is $1x10^{94}$ *Km/s*, there exists only the fundamental particle. At this speed, the frequency, theoretically, has the value of zero as a special case with no space in the structure, and the density has reached its maximum value. In our opinion, masses shrink when their speed increases, and when the speed becomes close to the initial speed, their volume shrinks to the dimension of the fundamental particle and their density increases. They never develop completely into energy. These compressed matters, with the speed decreasing, tend to swell. If their speed is slow enough, then the matter takes the atomic and molecular form.

What we really know is the current form of the matter. Going through various stages, the matter has its current structure. There are various theorems in Physics on the structure of matter. Some of them have been accepted and partially confirmed through experiments; however, they still fail to account for some cases. Therefore, it is aimed to explain these cases through different theorems.

3.THE MATHEMATICAL MODEL

The energy equation developed for the fundamental particle of matter *E* is

$$E = M \times V^2 \times e \times F_1 \times F_2 \times F_3 \quad (1)$$

in the absolute form of energy equation. (x) in the equity represents the simple arithmetic multiplication. From this equation, dE/dt functional energy equation and the relationships between the other variables have been derived. These are defined as

Energy,

$$\frac{dE}{dt} = V^2 \times e \times F_1 \times F_2 \times F_3 \frac{dM}{dt} + 2 \times V \times M \times e \times F_1 \times F_2 \times F_3 \frac{dV}{dt} + M \times V^2 \times F_1 \times F_2 \times F_3 \frac{de}{dt} + M \times V^2 \times e \times F_2 \times F_3 \frac{dF_1}{dt} + M \times V^2 \times e \times F_1 \times F_3 \frac{dF_2}{dt} + M \times V^2 \times e \times F_1 \times F_2 \frac{dF_3}{dt} \quad (2)$$

Mass,

$$\frac{dM}{dt} = \frac{1}{V^2 \times e \times F_1 \times F_2 \times F_3} \left[\frac{dE}{dt} - A \right] \quad (3)$$

Velocity

$$\frac{dV}{dt} = \frac{1}{2 \times M \times e \times F_1 \times F_2 \times F_3} \left[\frac{dE}{dt} - B \right] \quad (4)$$

The binding energy

$$\frac{de}{dt} = \frac{1}{M \times V^2 \times F_1 \times F_2 \times F_3} \left[\frac{dE}{dt} - C \right] \quad (5)$$

Frequencies

$$\frac{dF_1}{dt} = \frac{1}{M \times V^2 \times e \times F_2 \times F_3} \left[\frac{dE}{dt} - D \right] \quad (6)$$

$$\frac{dF_2}{dt} = \frac{1}{M \times V^2 \times e \times F_1 \times F_3} \left[\frac{dE}{dt} - G \right] \quad (7)$$

$$\frac{dF_3}{dt} = \frac{1}{M \times V^2 \times e \times F_1 \times F_2} \left[\frac{dE}{dt} - H \right] \quad (8)$$

Three-dimensional functional frequency movements

$$\frac{dF_1}{dt} = \iiint F_1(t)\, dx_{1,2,3}\, dy_{1,2,3}\, dz_{1,2,3}\, dt \quad (9)$$

$$\frac{dF_2}{dt} = \iiint F_2(t)\, dx_{1,2,3}\, dy_{1,2,3}\, dz_{1,2,3}\, dt \quad (10)$$

$$\frac{dF_3}{dt} = \iiint F_3(t)\, dx_{1,2,3}\, dy_{1,2,3}\, dz_{1,2,3}\, dt \quad (11)$$

and the axial resonance frequency of the particle,

$$f_{x,y,z} = \sqrt{\left(\iiint F_i(t) dx_{x,y,z} dy_{x,y,z} dz_{x,y,z} dt \right)^2 + \left(\iiint F_i(t) dx_{x,y,z} dy_{x,y,z} dz_{x,y,z} dt \right)^2 + \left(\iiint F_i(t) dx_{x,y,z} dy_{x,y,z} dz_{x,y,z} dt \right)^2} \quad (12)$$

and in the equation, they represent the cases of combined frequency at the axis of $i = 0,1,2,3$ and x, y, z. When frequencies are matched with the other variables, it can be defined as

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$$\frac{df_1}{dt} = \iiint F_1(t)\,dx_{1,2,3}\,dy_{1,2,3}\,dz_{1,2,3}\,dt + \frac{1}{M \times V^2 \times e \times F_1 \times F_2}\left[\frac{dE}{dt} - D\right] \quad (13)$$

$$\frac{df_2}{dt} = \iiint F_2(t)\,dx_{1,2,3}\,dy_{1,2,3}\,dz_{1,2,3}\,dt + \frac{1}{M \times V^2 \times e \times F_1 \times F_2}\left[\frac{dE}{dt} - G\right] \quad (14)$$

$$\frac{df_3}{dt} = \iiint F_3(t)\,dx_{1,2,3}\,dy_{1,2,3}\,dz_{1,2,3}\,dt + \frac{1}{M \times V^2 \times e \times F_1 \times F_2}\left[\frac{dE}{dt} - H\right] \quad (15)$$

and resonance frequency is

$$\frac{df_r}{dt} = \sqrt{\left(\frac{df_1}{dt}\right)^2 + \left(\frac{df_2}{dt}\right)^2 + \left(\frac{df_3}{dt}\right)^2} \quad (16)$$

obtained. It is obtained through writing the expressions of Equation at Equation (16), (13), (14), and (15) and doing the calculations. The frequency of the particle based on its movements is, on the other hand is defined as, $df_{(x,y,z)}/dt$,

$$\frac{df_{(x,y,z)}}{dt} = \iiint F_1(t)\,dx_{1,2,3}\,dy_{1,2,3}\,dz_{1,2,3}\,dt \quad (17)$$

$$\frac{df_{(x,y,z)}}{dt} = \iiint F_2(t)\,dx_{1,2,3}\,dy_{1,2,3}\,dz_{1,2,3}\,dt \quad (18)$$

$$\frac{df_{(x,y,z)}}{dt} = \iiint F_3(t)\,dx_{1,2,3}\,dy_{1,2,3}\,dz_{1,2,3}\,dt \quad (19)$$

In this case, the resonance frequency,

$$\frac{df_{(x,y,z)}}{dt} = \sqrt{\left(\iiint F_1(t)\,dx_{1,2,3}\,dy_{1,2,3}\,dz_{1,2,3}\,dt\right)^2 + \left(\iiint F_2(t)\,dx_{1,2,3}\,dy_{1,2,3}\,dz_{1,2,3}\,dt\right)^2 + \left(\iiint F_3(t)\,dx_{1,2,3}\,dy_{1,2,3}\,dz_{1,2,3}\,dt\right)^2} \quad (20)$$

has been defined. In other words, the frequency of the particle changes relative to the axis of x,y,z.

The coefficients in the equation have been defined as the following:

$$A = 2 \times V \times M \times e \times F_1 \times F_2 \times F_3 \frac{dV}{dt} + M \times V^2 \times F_1 \times F_2 \times F_3 \frac{de}{dt} + M \times V^2 \times e \times F_2 \times F_3 \frac{dF_1}{dt} + M \times V^2 \times e \times F_1 \times F_3 \frac{dF_2}{dt} + M \times V^2 \times e \times F_1 \times F_2 \frac{dF_3}{dt} \quad (21)$$

$$B = V^2 \times e \times F_1 \times F_2 \times F_3 \frac{dM}{dt} + M \times V^2 \times F_1 \times F_2 \times F_3 \frac{de}{dt} + M \times V^2 \times e \times F_2 \times F_3 \frac{dF_1}{dt} + M \times V^2 \times e \times F_1 \times F_3 \frac{dF_2}{dt} + M \times V^2 \times e \times F_1 \times F_2 \frac{dF_3}{dt} \quad (22)$$

$$C = V^2 \times e \times F_1 \times F_2 \times F_3 \frac{dM}{dt} + 2 \times V \times M \times e \times F_1 \times F_2 \times F_3 \frac{dV}{dt} + M \times V^2 \times e \times F_2 \times F_3 \frac{dF_1}{dt} + M \times V^2 \times e \times F_1 \times F_3 \frac{dF_2}{dt} + M \times V^2 \times e \times F_1 \times F_2 \frac{dF_3}{dt} \quad (23)$$

$$D = V^2 \times e \times F_1 \times F_2 \times F_3 \frac{dM}{dt} + 2 \times V \times M \times e \times F_1 \times F_2 \times F_3 \frac{dV}{dt} + M \times V^2 \times F_1 \times F_2 \times F_3 \frac{de}{dt} + M \times V^2 \times e \times F_2 \times F_3 \frac{dF_1}{dt} + M \times V^2 \times e \times F_1 \times F_2 \frac{dF_3}{dt} \quad (24)$$

$$G = V^2 \times e \times F_1 \times F_2 \times F_3 \frac{dM}{dt} + 2 \times V \times M \times e \times F_1 \times F_2 \times F_3 \frac{dV}{dt} + M \times V^2 \times F_1 \times F_2 \times F_3 \frac{de}{dt} + M \times V^2 \times e \times F_2 \times F_3 \frac{dF_1}{dt} + M \times V^2 \times e \times F_1 \times F_3 \frac{dF_2}{dt} \quad (25)$$

$$H = V^2 \times e \times F_1 \times F_2 \times F_3 \frac{dM}{dt} + 2 \times V \times M \times e \times F_1 \times F_2 \times F_3 \frac{dV}{dt} + M \times V^2 \times F_1 \times F_2 \times F_3 \frac{de}{dt} + M \times V^2 \times e \times F_2 \times F_3 \frac{dF_1}{dt} + M \times V^2 \times e \times F_1 \times F_3 \frac{dF_2}{dt} \quad (26)$$

When masses speed up, their volume decreases. The mass is compressed; their density increases. The higher the speed is, the smaller the volume of the matter becomes. When the speed of the matter decreases, the volume of the matter begins to expand at the same rate. It is under these conditions that the structure of the matter is formed. If, due to any reason, the matter reaches a higher speed than its condition in tranquility, the volume of the matter continues expanding and returns to its previous state as it begins to slow down. Thus, volume shrinkage or mass volume change occurs due to the structure of the matter, rather than the recycle of mass energy.

We believe that it would be an appropriate approach to divide the space into two while analyzing it. The first one is the masses composed of elements and matters similar to the structure on Earth. The second one is the great masses of matter that are different from the structures of matter and element on Earth, that cannot be seen or measured through the existing technology or whose characteristics are unknown. It is not possible to know, see, and sense these masses through the technology that we have. However, we think that they can or should theoretically exist.

A standard structure may not exist in the elements in the space. On the contrary, matter can take various forms under the space conditions. This is due to the characteristics of the conditions. Unlike the common belief that the structure of the matter is similar to the ones on Earth, they might exist in various forms, names of which we cannot know yet. It is also possible under the conditions of space that new particles will create new particle blocks, thereby leading to the existence of new structures whose characteristics we cannot know. The requirement for this formation depends on speed, heat, pressure, force and energy that are visible or not visible.

4. CONCLUSION

In this study, a mathematical model has been developed related to the "fundamental particle" that composes the structure of the matter. The particles and sub-atomic particles forming the matter are formed through the binding of this fundamental particle in various structures, numbers, and forms. There is not any standard structure in the structure of the elements in the space. Depending on the conditions, new particles, new blocks, and new structures may also exist. The requirement for this is speed, heat, pressure, visible and invisible force and energy.

All types of energy force are a special case of a group of particles, or a particle that exists and in this case are the visible, invisible, measurable or unmeasurable energy, or the effect of force and power.

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