Left-handed neutrinos, charged dark matters, Higgs mechanism, universe
evolution and extended standard model

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In the present work, the charged dark matters of B1, B2 and B3 bastons are explained as the right-handed partners of the left-handed neutrinos. The new Higgs mechanism of $SU(2)_{DM} \times SU(2)_{Weak} \times SU(2)_{Strong}$ including electromagnetic and gravitational forces is applied. And the rest masses of the elementary particles depend on their charge configurations. The left-handed neutrinos have only the lepton charges (LC) and the right-handed dark matters have only the electric charges (EC). This explains the fact that the rest masses of the left-handed neutrinos are so small, and the rest masses of the right-handed dark matters are relatively very large. The proposed rest mass (26.12 eV/c^2) of the B1 dark matter is indirectly confirmed from the supernova 1987A data. The missing neutrinos are newly explained by using the dark matters and lepton charge force. The neutrino excess anomaly of the MinibooNE data is explained by the B1 dark matter scattering within the Cherenkov detectors. The quark mixing and neutrino mixing are not required in the present model. It is shown that our matter universe and its partner antimatter universe can be created from the big bang in the point of view of time -, charge -, space -, and quantum state – symmetric universe evolution.

Key words: charged dark matters, left-handed neutrinos, universe evolution, extended standard model

1. Introduction

The contents of the present paper are listed as follows.

1. Introduction
2. Charged dark matters and gravitation constant
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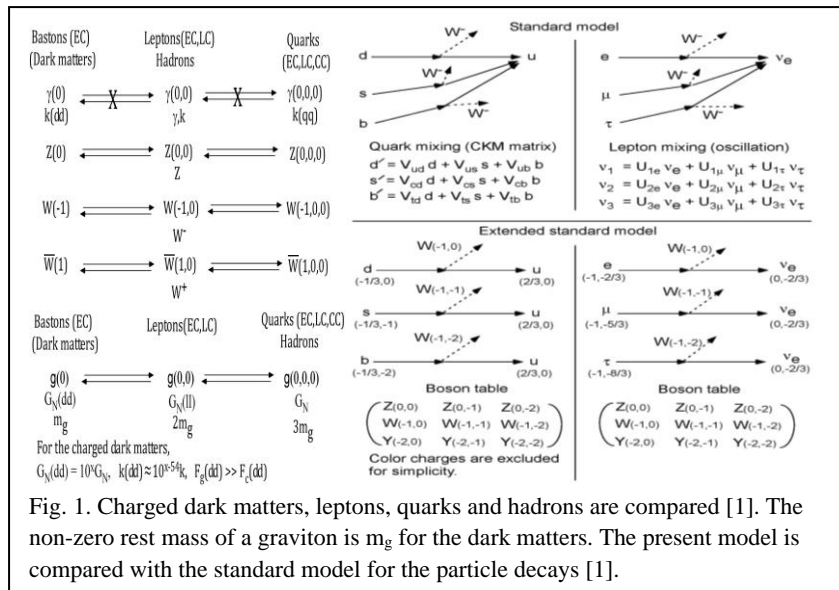
7. Summary

The standard model has been well established. However, several new discoveries like the dark matter and left-handed neutrinos need the extended standard model. The present extended standard model [1] is compared with the standard model in Fig. 1. For example, the Z, W$^-$ and W$^+$ bosons in the standard model do not have the lepton charge (flavor) dependence but the quarks and leptons have the lepton charge dependence in Fig. 1. Therefore, the quark mixing (CKM matrix) and lepton mixing (oscillation) are required in order to explain the particle decays. But, in the present extended standard model, the force carrying bosons of Z, W and Y have the lepton charge dependence in Fig. 1 like the quarks and leptons have the lepton charge dependence. In this case, the quark mixing (CKM matrix) and lepton mixing (oscillation) are not needed in order to explain the particle decays. The missing neutrinos are newly explained by using the dark matters and lepton charge force

rather than the neutrino oscillation and sterile neutrino in section 3. The neutrino anomalies of the SN1987A data and MinibooNE data are explained by the B1 dark matter scattering within the Cherenkov detectors.

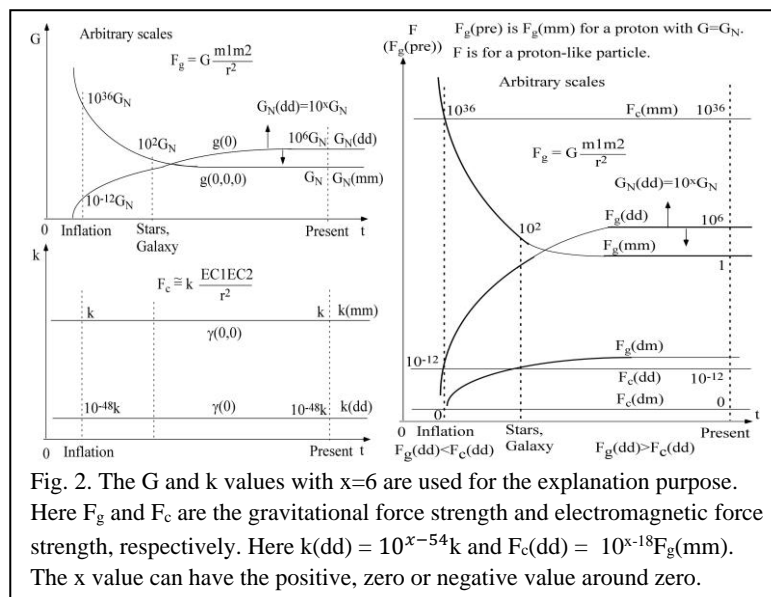
In the present work, the charged dark matters of B1, B2 and B3 bastons are explained as the right-handed partners of the left-handed neutrinos in the last section. And the rest masses of the elementary particles depend on their charge configurations. The left-handed neutrinos have only the lepton charges (LC) and the right-handed dark matters have only the electric charges (EC). This explains the fact that the rest masses of the left-handed neutrinos are so small, and the rest masses of the right-handed dark matters are relatively very large. The new Higgs mechanism of $SU(2)_{DM} \times SU(2)_{Weak} \times SU(2)_{Strong}$ including electromagnetic and gravitational forces is applied, too.

The dark matters have been known to have two properties. First the electromagnetic interactions between the dark matters (d) and normal matters (m) are zero. Secondly, the electromagnetic interactions between the dark matters are zero. Therefore, the zero Coulomb's forces of $F_c(dm) = 0$ and $F_c(dd) = 0$ have been proposed. Here, d and m represent the dark matter and normal matter, respectively. Because of the zero Coulomb's force, the electrically neutral particles have been proposed as the most

Fig. 1. Charged dark matters, leptons, quarks and hadrons are compared [1]. The non-zero rest mass of a graviton is m_g for the dark matters. The present model is compared with the standard model for the particle decays [1].

possible candidates of the dark matters. In other words, the electric charges (EC) of these dark matters are zero in $F_c(EC) = k \frac{EC1 EC2}{r^2}$. Also, the mini-charged particles (or milli-charged particles) with the near-zero EC charge [2] have been proposed as other possible candidates of the dark matters which give the very small Coulomb's forces between the dark matters and normal matters and between the dark matters. In

this case, the same Coulomb's constant of k is applied for both of dark matters and normal matters.

In the present work, the zero Coulomb's constant of k(dm) = 0 in Figs. 1 and 2 is applied between the dark matters and normal matters in order to meet the first condition. In order to meet the second condition, the very small k(dd) values for the dark matters and the k(mm) = k values for normal matters are proposed. Therefore, the relation of k(mm) = k >> k(dd) > k(dm) = 0 is shown in Figs. 1 and 2. In this case, the dark matters can have the EC charges close to the EC charge of the electron. The B1, B2 and B3 bastons with the tentative electric charges of -2/3e, -5/3e and -8/3e, respectively, were, for the first time, reported as the possible candidates of the dark matters in Ref. [1]. The B1 and B2 dark matters are expected to be relatively stable because of the lack of the decaying channels. Therefore, in the present work, the B1, B2 and B3 bastons with the condition of k(mm) = k >> k(dd) > k(dm) = 0 are explained as the good candidates of the dark matters. The relations of $G_N(ll) = G_N(qq) = G_N(mm)$ and $k(ll) = k(qq) = k(mm) = k$ are assumed for the simplicity in Figs. 1 and 2. Here, l and q represent the leptons and quarks, respectively. Then, note that k(dm) = k(lq) =0. Then the normal matters consist of leptons, quarks and hadrons, and the dark matters are the three bastons of B1 with -2e/3, B2 with -5e/3 and B3 with -8e/3 [1]. In Fig. 2, the Coulomb's constant (k) and gravitation constant (G) have been changed in terms of the conserved charges and conserved rest masses of the particles. Because the correct evolution curves of k and G are not known, these

Fig. 2. The G and k values with x=6 are used for the explanation purpose. Here F_g and F_c are the gravitational force strength and electromagnetic force strength, respectively. Here k(dd) = 10^{x-54}k and F_c(dd) = $10^{x-18}F_g$(mm). The x value can have the positive, zero or negative value around zero.

curves are tentatively drawn for the explanation in Fig. 2. And the effective charges and effective rest masses of the particles are defined in terms of the fixed Coulomb's constant (k) and fixed gravitation constant (G_N). Then, the effective charge of the B1

dark matter with EC $=-\frac{2}{3}$ e is $(EC)_{eff} = -\frac{2}{3}10^{(x-54)/2}$e depending on the x value. Here k(dd) = 10^{x-54}k. And the effective rest mass of the dark matter with the rest mass of m is $m_{eff} = 10^{x/2}$m depending on the x value. Here G_N(dd) = $10^x G_N$. Therefore, F_c(mm) > F_g(dd) (?) F_g(mm) > F_g(dm) > F_c(dd) > F_c(dm) = F_c(lq) = 0 for the proton-like particle in Fig. 2. In Fig. 2, the cases of x = 6 and F_g(dd) > F_g(mm) are shown for the explanation purpose. Note that F_g(dd) = F_g(mm) for the x=0 case and F_g(dd) < F_g(mm) for the x < 0 case in Fig. 2.

In Figs. 1 and 2, the new concepts of the photon confinement and graviton evaporation are introduced. The Coulomb's constant should be constant with increasing of the time because of the photon confinement. The gravitation constant has been changed since the big bang because of the graviton evaporation. It is shown that the relation of, at the present time, F_c(mm) > F_g(dd) (?) F_g(mm) > F_g(dm) > F_c(dd) > F_c(dm) = 0 for the proton-like particle could explain the universe evolution including the B1, B2 and B3 dark matters by giving the tentative values of the Coulomb's constants (k) and gravitation constants (G) for the explanation purpose in Fig. 2. It is discussed that the gravitation constant (G_N(mm)) could be decreased from the very large value like $10^{36}G_N$ down to the very small value like G_N near the inflation period in Fig. 2. Therefore, during most of the universe evolution the gravitation constant could be taken as G_N(mm) = G_N. The inflation of the x1x2x3 space is caused by the huge repulsive Coulomb force (F_c(dd)) between dark matters in the x1x2x3 space and huge graviton evaporations into the x1x2x3 space in Fig. 2. The rest mass of 1.4 TeV/c^2 is assigned to the Le particle with the EC charge of -2e from the cosmic ray observations [1]. This rest mass of Le is smaller than the tentative previous rest mass (25.3 TeV/c^2) of Le [1]. The proposed rest mass (26.12 eV/c^2) of the B1 dark matter [1] is indirectly confirmed from the supernova 1987A data. In the present work, the Q1 baryon decays are used to explain the anti-Helium cosmic ray events.

2. Charged dark matters and gravitation constant

The baston dark matters have only the electric charges (EC) [1]. Then, the bastons can be described as (EC). For example, the B1 dark matter with the electric charge of -2e/3 is defined as B1(-2/3). The dark photon of γ(0) and the dark graviton of g(0) are associated with the bastons in Figs. 1 and 2. The leptons have the electric charges (EC) and lepton charges (LC). Then, the leptons can be described as (EC,LC) [1]. For example, the electron neutrino and electron are defined as v_e(0,-2/3) and e(-1,-2/3). The normal photon of γ(0,0) and the graviton of g(0,0) are associated with the leptons in Figs. 1 and 2. The quarks have the electric charges (EC), lepton charges (LC) and color charges (CC). And the quarks can be described as (EC,LC,CC) [1]. For example, the u and d quarks are defined as u(2/3,0,CC) and d(-1/3,0,CC). The photon of γ(0,0,0) and the graviton of g(0,0,0) are associated with the quarks in Figs. 1 and 2. Also, note that three charges of EC, LC and CC are tentatively quantized based on the systematics [1]. And, the baryons can be described as (EC,LC,-5) or

(EC,LC) in Figs. 1 and 2 [1]. For example, the proton is defined as (1,0,-5) or (1,0). The fact that the baryons and mesons can be defined as (EC,LC) in the electromagnetic interactions is called as the hadronization in Figs. 1 and 2 in terms of the electromagnetic interaction. Then, the hadrons can emit and absorb both photons of $\gamma(0,0)$ and $\gamma(0,0,0)$. Therefore, the charged baryons and charged mesons are interacting with the leptons like the electrons through the normal photons of $\gamma(0,0)$ in Fig. 1.

Three things have been observed for the electromagnetic interactions. First the electromagnetic interactions between the dark matters (d) and normal matters (m) are zero. Secondly, the electromagnetic interactions between the dark matters are zero. Thirdly, the independent quarks have never been observed electromagnetically through the normal photons of $\gamma(0,0)$. The third condition indicates that the electromagnetic interactions between the leptons and quarks are zero. Therefore, k(lq) = 0. And the first condition indicates that the electromagnetic interactions between the dark matters and normal matters are zero. Therefore, k(dm) = 0. This indicates that three photons of $\gamma(0)$, $\gamma(0,0)$ and $\gamma(0,0,0)$ are not changed to each other in Figs. 1 and 2. This is called as the photon confinement in the present work. This means that the different Coulomb force should be defined to the bastons, leptons and quarks in Figs. 1 and 2. Second condition can indicate that the $F_c(dd)$ value for the charged dark matters is nearly zero. So, the very small k(dd) value like k(dd) = 10^{x-54}k for the charged B1, B2 and B3 dark matters can meet the second condition in Figs. 1 and 2.

Three things have been observed for the gravitational force at the present time. First, the gravitational force ($F_g(dm)$) between dark matters and normal matters is not zero as seen in the galaxy structures. Secondly, the gravitational force ($F_g(mm)$) between the normal matters is very weak compared with the electromagnetic force ($F_c(mm)$) between the normal matters. For example, for the proton $F_g(mm) = 0.8 \cdot 10^{-36} F_c(mm)$. Thirdly, the gravitational force is dominating over the electromagnetic force for the dark matters. Because $F_g(mm)$ is so small in the second condition, $F_g(dd)$ could be larger than $F_g(mm)$ for the proton-like particle. And the gravitational force of $F_g(dm)$ could be smaller than the gravitational forces of $F_g(mm)$ and $F_g(dd)$ because $F_c(dm)$ = 0 is smaller than the Coulomb forces of $F_c(mm)$ and $F_c(dd)$. This gives the relations of $F_g(dd) > F_g(mm) > F_g(dm) > 0$ and $G_N(dd) > G_N(mm) > G_N(dm) > 0$ because the gravitational force formula is $F_g(dd) = G_N(dd) \frac{m1m2}{r^2}$. The non-zero gravitational force of $F_g(dm)$ indicates that three gravitons of g(0), g(0,0) and g(0,0,0) are changed to each other. This is called as the graviton evaporation in the present work in Figs. 1 and 2. These relations between the gravitational forces can be compared with the relations of $F_c(mm) > F_c(dd) > F_c(dm) = F_c(lq) = 0$ and k(mm) = k >> k(dd) > k(dm) = k(lq) = 0. In order to make dark matters to be controlled by the attractive

gravitational force in the third condition, the attractive gravitational force ($F_g(dd)$) between the charged dark matters should be greater than the repulsive Coulomb force ($F_c(dd)$) between the charged dark matters. Therefore, $F_g(dd) > F_c(dd)$. Therefore, the relation of $F_c(mm) > F_g(dd) > F_g(mm) > F_g(dm) > F_c(dd) > F_c(dm) = F_c(lq) = 0$ for the proton-like particle is obtained for the x = 6 case as shown in Fig. 2.

And why the gravitation force of $F_g(mm)$ is so smaller than the electromagnetic force of $F_c(mm)$ for the proton at the present time is explained as follows. In order to explain this question, we need to consider those forces near the inflation in Fig. 2. Because three photons of $\gamma(0)$, $\gamma(0,0)$ and $\gamma(0,0,0)$ are not changed to each other, the Coulomb's constant of $k(mm)_{inf}$ near the inflation should be equal to the Coulomb's constant of $k(mm)_{pre} = k$ at the present time. This means that $F_c(mm)_{inf}$ is equal to $F_c(mm)_{pre}$ for the proton. Because three gravitons of $g(0)$, $g(0,0)$ and $g(0,0,0)$ are changed to each other, the gravitation constant of $G_N(mm)_{inf}$ near the inflation can be greater than the gravitational constant of $G_N(mm)_{pre} = G_N$ at the present time because of the graviton evaporations. Near the inflation, $F_c(mm)_{inf}$ could be equal or similar to $F_g(mm)_{inf}$ for the proton. Then the $F_c(mm)$ remains constant with increasing of the time since the inflation. However, $F_g(mm)_{inf}$ near the inflation has been decreased to the present value of $F_g(mm)_{pre} = F_g(mm)$ for the proton with increasing of the time since the inflation in Fig. 2. Therefore, $F_c(mm) \gg F_g(mm)$ at the present time in Fig. 2.

Also, in Figs. 1 and 2, the photons are confined within the corresponding space. This indicates that the Coulomb's constant (k) does not change since the inflation. Therefore, always $k(mm) \gg k(dd)$ and $k(mm) = k$. However, the gravitation constant of G_N is different because the gravitons can evaporate into other spaces in Figs. 1 and 2. This indicates that the gravitation constant of G has been changing since the inflation. In other words, near the inflation period, $F_g(mm) \gg F_g(dd)$ and $F_c(mm) \gg F_c(dd)$ with the condition of $G_N(mm) \gg G_N(dd)$ and $k(mm) \gg k(dd)$ in Figs. 1 and 2. Then, because of the graviton evaporation, $G_N(mm)$ has been decreased and $G_N(dd)$ has been increased since the inflation. At the present time, $F_g(dd) > F_g(mm)$, $F_g(dd) > F_c(dd)$ and $F_g(mm) \ll F_c(mm)$ with the condition of $G_N(mm) < G_N(dd)$ and $k(mm) \gg k(dd)$ in Figs. 1 and 2. At the present time, $F_c(mm) > F_g(dd) > F_c(dd)$ in the force strength and $F_g(dd) > F_g(mm)$. In other words, it is assumed that $G_N(dd) > G_N(mm) = G_N = G_N(qq) \approx G_N(ll)$.

The tentative numerical values of k and G in Fig. 2 are added just in order to show that the graviton evaporation and photon confinement can explain the relative force strengths of the electromagnetic interactions and gravitational interactions well. For example, near the inflation $G_N(mm) \approx 10^{36}G_N$, and $G_N(dd) = 10^{-12}G_N$ in Fig. 2. At the present time, $G_N(mm) = G_N$, and $G_N(dd) \approx 10^6 G_N$ because of the graviton evaporation in Fig. 2. And, always $k(mm) = k \approx 10^{48}k(dd)$. This can be generalized

as $G_N(dd) = 10^x G_N$ and $k(mm) = k \approx 10^{x-54} k(dd)$ in Figs. 1 and 2. The x=6 case is shown in Fig. 2. Therefore, in general, $F_c(mm) > F_g(dd)$ (?) $F_g(mm) > F_g(dm) > F_c(dd) > F_c(dm) = F_c(lq) = 0$ for the proton-like particle in Fig. 2. In Fig. 2, the cases of x = 6 and $F_g(dd) > F_g(mm)$ are shown for the explanation purpose. Note that $F_g(dd) = F_g(mm)$ for the x=0 case and $F_g(dd) < F_g(mm)$ for the x < 0 case in Fig. 2. It will be interesting to look for the proper x value for the further studies.

At the present time, $F_g(mm) = 8 \ 10^{-37} F_c(mm) \approx 10^{-36} F_c(mm)$ for the proton. $F_c = F_c(EC) + F_c(LC) + F_c(CC) \approx F_c(EC) = k \frac{EC1EC2}{r^2}$ because $k(EC) > k(LC) > k(CC)$ [3,4]. The lepton charge force of $F_c(LC)$ plays an important role for the neutrinos with the zero EC charges and non-zero LC charges [3,4]. The missing neutrino fluxes can be studied again by using the lepton charge force of $F_c(LC)$ rather than the neutrino oscillation explanation as shown in section 3. Here it is assumed that the k and G values are similar for the leptons and quarks. Then $F_c(mm) \approx 10^{36} F_g(mm)$, $F_g(dd) = 10^x F_g(mm)$ and $F_c(dd) = 10^{x-18} F_g(mm)$ for a proton-like particle in Fig. 1. This assumption can explain the relation of, at the present time, $F_c(mm) > F_g(dd)$ (?) $F_g(mm) > F_g(dm) > F_c(dd) > F_c(dm) = F_c(lq) = 0$ for the proton-like particle in Fig. 2. For the B1 dark matter with the rest mass of 26.12 eV/c^2 [1], $F_g(dd) \approx 10^{x-16} F_g(mm)$ and $F_c(dd) = \frac{4}{9} 10^{x-18} F_g(mm)$ where $F_g(mm)$ is for the proton. Therefore, $F_g(dd) > F_c(dd)$ for the B1, B2 and B3 dark matters in Figs. 1 and 2. This assumption can explain the reason why the gravitational force strength ($F_g(mm)$) between the matters is so weak compared with the electromagnetic force strength ($F_c(mm)$) between the matters at the present time. Therefore, it is concluded that the Coulomb's constant is constant because of the photon confinement but the gravitation constant has been changed since the inflation because of the graviton evaporation along with the space evolution in Figs. 1 and 2. It is expected that the changing process of the gravitation constant between the matters from $G_N(mm) \approx 10^{36} G_N$ to $G_N(mm) = G_N$ happened mostly near the inflation period in Fig. 2. Therefore, during most of the universe evolution the gravitation constant could be taken as $G_N(mm) = G_N$. This explanation with the possible numerical values of k and G in Fig. 2 is only the example which needs to be further investigated in the future.

In Figs. 1 and 2, if the gravitons are confined within the corresponding space like the photons, the gravitation constant of $G_N(mm)$ could be much larger than the gravitation constant of $G_N(dd)$ like k(mm) is larger than k(dd). And the gravitation force strength ($F_g(mm)$) should be similar to the electromagnetic force strength ($F_c(mm)$). But because the gravitation force strength ($F_g(mm)$) is much weaker than the electromagnetic force strength ($F_c(mm)$), it is clear that the gravitons are not confined but evaporated to other spaces as shown in Figs. 1 and 2. In Figs. 1 and 2, it is proposed that k(dd) is much smaller than k(mm) in order to explain the charged dark matter distribution of the galaxy cluster. And if the gravitons are evaporated to other spaces, the gravitation constant of $G_N(mm)$ could be similar to the gravitation constant of $G_N(dd)$. Experimentally, $F_g(mm) = 8 \ 10^{-37} F_c(mm)$ for the proton. Therefore, the $G_N(mm)$ value is so small at the present time when compared with the

k(mm) value in terms of the force strength. This indicates that the gravitons are evaporated as shown in Fig. 2. Because of the huge number (N) of the evaporated gravitons into the x1x2x3 space, the gravitational force between the dark matters on the x1x2x3 space should be stronger than the electromagnetic force between dark matters. Because of the strong gravitational force between the dark matters, the charged dark matters of the B1, B2 and B3 bastons are distributed following the gravitational forces rather than the electromagnetic force between the dark matters. The observed dark matter distributions around the galaxies and galaxy clusters support the strong gravitational force between the dark matters. As shown in Figs. 1 and 2, for the dark matters $F_g(dd) > F_c(dd)$, for the matters $F_g(mm) << F_c(mm)$ and between the matter and dark matter $F_g(dm) > F_c(dm) = 0$. Here F_g and F_c are the gravitational force strength and electromagnetic force strength, respectively. Also, it is assumed that $G_N (dd) = 10^x G_N(mm) > G_N (dm)$ for the gravitation constant and $k(dm) = k(lq) = 0$, $k(mm) = k >> k(dd) = 10^{x-54}k$ for the Coulomb's constant in Figs. 1 and 2. Here d and m mean the dark matter and (normal) matter, respectively. Then, $F_c(dm) = 0$, $F_c(mm) >> F_c(dd)$ for the proton-like particle and $F_g(mm)$ (?) $F_g(dd) > F_g(dm)$ for the proton-like particle. Also, $F_c(mm) > F_g(dd)$ in Figs. 1 and 2.

It has been observed from the gravitational lensing measurements for the bullet cluster [5], Abell 1689 cluster [6] and Abell 520 cluster [7] that the dark matters have been easily separated from the normal matters. The weak gravitational force with the small $G_N(dm)$ value between the dark matters and normal matters can explain why the dark matters are distributed as observed in the gravitational lensing measurements [5,6,7]. In other words, these gravitational lensing measurements [5,6,7] are the direct evidence of the weak gravitational force with the small $G_N(dm)$ value between

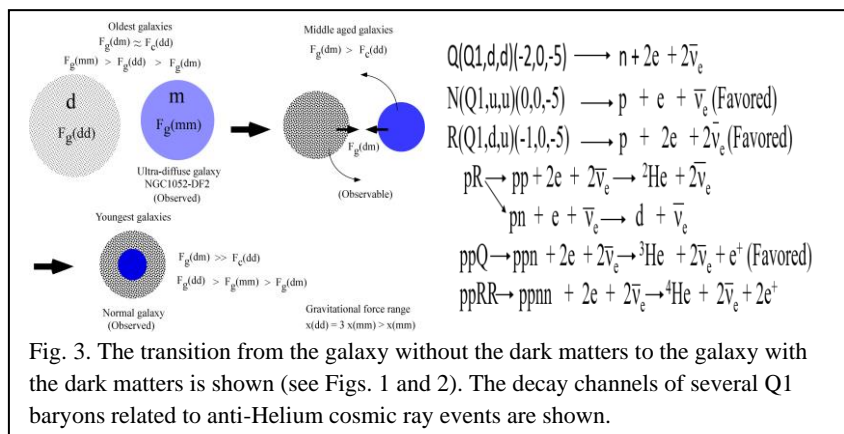



Fig. 3. The transition from the galaxy without the dark matters to the galaxy with the dark matters is shown (see Figs. 1 and 2). The decay channels of several Q1 baryons related to anti-Helium cosmic ray events are shown.

the dark matters and normal matters. Therefore, the dark matters and normal matters around the galaxies are connected by the weak gravitational force which can affect the rotational motions of the normal matters. For the bullet cluster [5], the dark matters and normal matters are taking the head and tail parts, respectively, when the corresponding galaxy cluster is moving. The non-zero rest mass of a graviton is m_g for the dark matters in Fig. 1. Then the non-zero rest mass of a graviton is $3m_g$ for

the normal matters of the hadrons in Fig. 1. The strong gravitational force with the longer force range of the g(0) graviton between the dark matters can make the location and shape of the dark matter distributions different from those of the normal matter distributions as observed in the Abell 1689 cluster [6] and Abell 520 cluster [7]. The weak gravitational force with the shorter force range of the g(0,0,0) graviton between the baryonic normal matters can make the location and the shape of the normal matter distributions as observed in the Abell 1689 cluster [6] and Abell 520 cluster [7], which have mostly the normal matters (galaxies) in the outside area and dark matters in the inside center area. Recently, the ultra-diffuse galaxy called as NGC1052-DF2 without the dark matters was found [8]. The formation of the galaxy without the dark matters could be explained with increasing of $F_g(dm)$ as a function of the time as shown in Figs. 2 and 3. The transition from the galaxy without the dark matters to the galaxy with the dark matters could be explained, too, as shown in Fig. 3. Therefore, the galaxies can be classified as the oldest galaxies, middle aged galaxies and the youngest galaxies as shown in Fig. 3. The ultra-diffuse galaxy called as NGC1052-DF2 without the dark matters was found [8] and is classified as the oldest galaxy. Then the dark matter galaxy and matter galaxy classified as the middle aged galaxies can rotate as the pair by the $F_g(dm)$ force. Therefore, looking for the rotating pair of the dark matter and matter galaxies will be interesting. See Ref. [9] for the gravitational force range for the dark matters in Fig. 3.

3. Missing neutrinos, Le lepton, Q1 quark and B1 dark matter

In Ref. [1], three heavy leptons (Le, Lμ, Lτ) with the EC charge of -2 are proposed. The rest mass energy of the Le particle is expected between $3 \ 10^{11}$ eV and $3 \ 10^{13}$ eV because the gamma ray excess was reported from the TeV gamma ray spectrum from

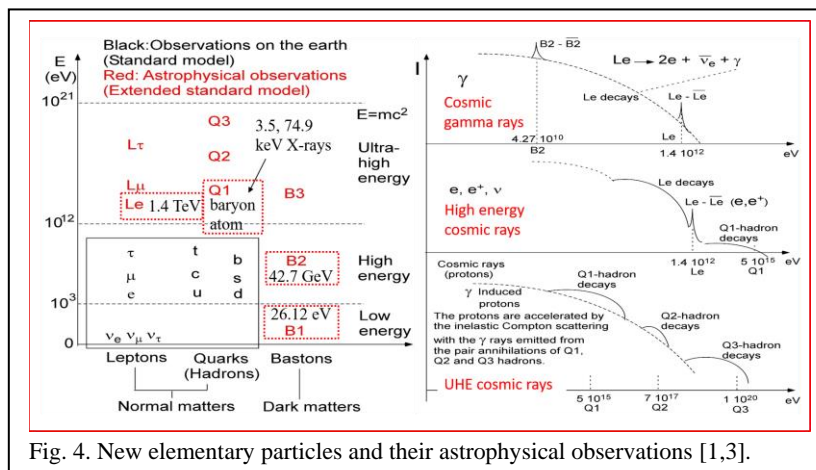
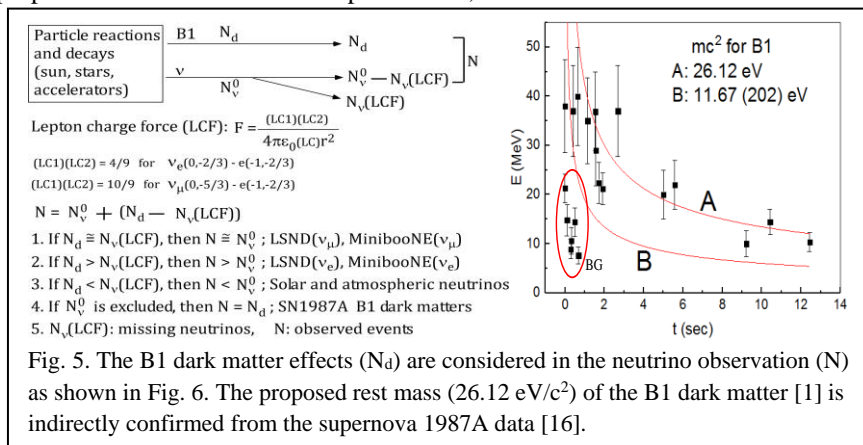



Fig. 4. New elementary particles and their astrophysical observations [1,3].

RX J1713.7-3946 with HESS and Fermi-LAT data [10,11]. In the present work, this gamma ray excess around 1.4 TeV is proposed as the gamma ray peak from the annihilation peak of Le and anti Le particles as shown in Fig. 4. And the cosmic-ray electron and positron excess at the energy range between 10^{11} eV and $2 \ 10^{12}$ eV was

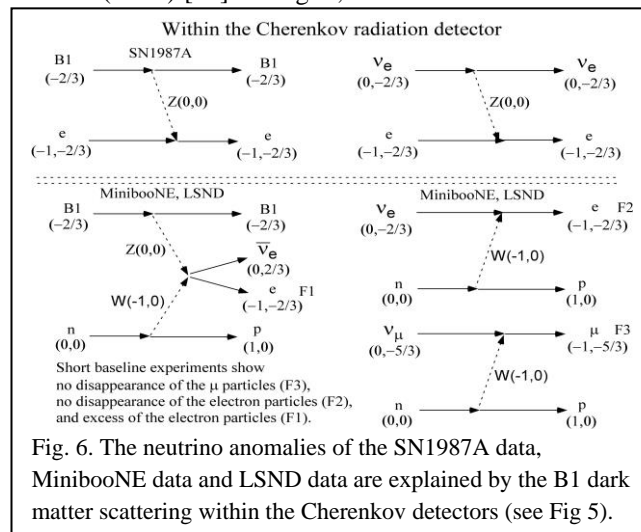
observed from the data of DAMP (Dark Matter Particle Explorer) [12]. Also, the 1.4 TeV electron and positron peak was observed from the same data. And the 1.4 TeV peak observed at the cosmic ray is explained as the annihilation peak of Le and anti Le particles as shown in Fig. 4. Then, the rest mass of 1.4 TeV/c^2 is assigned to the Le particle with the EC charge of -2e. This rest mass of Le is smaller than the tentative previous rest mass (25.3 TeV/c^2) of Le [1]. And the cosmic-ray electron and positron excess at the energy range between 10^{11} eV and 2 10^{12} eV, which was observed from the data of DAMP (Dark Matter Particle Explorer) [12], is explained to be originated from the decay of Le particle of $L_e \rightarrow 2e + \overline{v}_e$. And the cosmic gamma ray spectrum by CALET 5 year measurements [13] was observed from the Galactic center including galactic diffusing background. The 1.4 TeV gamma ray peak which was originated from annihilation peak of Le and anti Le particles was found [13]. Also, Planck collaboration [14] indicates that the electron and positron cosmic ray data observed around 1.4 TeV by the Fermi/HESS and AMS/PAMELA are excluded from the dark matter candidates by CMB. These electron and positron data can be explained by the decay and annihilation of the new Le particle. The rest masses of Le, Lμ and Lτ leptons can be tentatively calculated by E = 0.4498 10^{38+2F} and F(EC,LC) = -23.24488 + 7.26341 |EC| - 1.13858 EC^2 + 0.62683 |LC| + 0.22755 LC^2. These data support the existence of heavy leptons like Le, Lμ and Lτ.

In Ref. [1], the B1, B2 and B3 dark matters (bastons) are proposed. These B1 and B2 dark matters are very stable because of the lack of the decaying channels [1]. Their possible rest masses have been tentatively calculated in Ref. [1] under the assumption that the B2 dark matter has the 42.7 GeV/c^2 [12]. The 42.7(7) GeV peak was identified in the gamma-ray spectrum from the Fermi Large Area Telescope (LAT) in the directions of 16 massive nearby Galaxy Clusters [1,15]. The 42.7 GeV peak is proposed as the B2 annihilation peak. Then, the rest mass of the B2 dark matter is

Fig. 5. The B1 dark matter effects (N_d) are considered in the neutrino observation (N) as shown in Fig. 6. The proposed rest mass (26.12 eV/c^2) of the B1 dark matter [1] is indirectly confirmed from the supernova 1987A data [16].

42.7 GeV/c^2 [1]. Also, the proposition of the 42.7 GeV/c^2 B2 dark matter is consistent with the dark matter rest mass energy predicted by the Fermi Galactic center excess,

AMS anti-proton excess, thermal cross-section and the CMB condition [14]. Planck collaboration [14] reported recently the possible rest mass energy range of the dark matter in Fig. 46 of the paper on Planck 2018 results. VI. Cosmological parameters [14]. This rest mass energy range [14] is consistent with the present B2 dark matter rest mass energy of 42.7 GeV/c^2.

The Cherenkov radiation of the electrons produced from the elastic scattering of the anti-neutrino and electron was observed by the Kamiokande II detector, Irvine-Michigan-Brookhaven detector (IMB) and Baksan neutrino observatory detector (BNO) [16]. And the anti-neutrino data emitted from SN 1987A [16] were explained by using the annihilation of B1 and anti-B1 dark matters [1]. In the present work, the alternative explanation is tried to explain the SN 1987A data [16]. It is proposed in Fig. 6 that the Cherenkov radiation of the electrons produced from the elastic scattering of the B1 dark matter and electron was observed by the Kamiokande II detector, Irvine-Michigan-Brookhaven detector (IMB) and Baksan neutrino observatory detector (BNO) [16]. In Fig. 5, the curve A fits the observed data well

Fig. 6. The neutrino anomalies of the SN1987A data, MinibooNE data and LSND data are explained by the B1 dark matter scattering within the Cherenkov detectors (see Fig 5).

except the 6 BG data. The equation of $2E^2t = m^2c^4t_0$ is taken from the paper by Ehrlich [16]. Here, t_0 is the travel time of the light from SN 1987A to the earth. The background data are expressed as BG in Fig. 5. The 5 data detected by the BNO detector considered as the background data are not shown in Fig. 5 [16]. The curve A uses the proposed dark matter mass of B1. It is proposed that the B1 particles come from SN 1987A to the earth. The energies, E(ν) of the observed neutrinos are re-interpreted as the energies, E(B1) of the B1 dark matters. This supports indirectly

that the rest mass of the B1 dark matter is 26.12 eV/c^2. The curve B fitted with all data in Fig. 5 is shown for the comparison with the curve A.

In Figs. 5 and 6, the missing neutrinos are newly explained by using the B1 dark matters and lepton charge force. $F_c = F_c(EC) + F_c(LC) + F_c(CC) \approx F_c(EC) = k \frac{EC1 EC2}{r^2}$ because k(EC) > k(LC) > k(CC) [3,4]. The lepton charge force of $F_c(LC) = k(LC) \frac{LC1 LC2}{r^2}$ plays an important role for the neutrinos with the zero EC charges and non-zero LC charges in Fig. 5 [3,4]. The missing neutrino fluxes can be studied again by using the lepton charge force of $F_c(LC)$ rather than the neutrino oscillation explanation as shown in section 3.The neutrino anomalies of the SN1987A data, MinibooNE data [17,18] and LSND data [19] are explained by the B1 dark matter scattering within the Cherenkov detectors in Figs. 5 and 6. Also, the reactor missing antineutrino anomaly can be explained by the condition of $N_d < N_v(LCF)$ in Fig. 5.

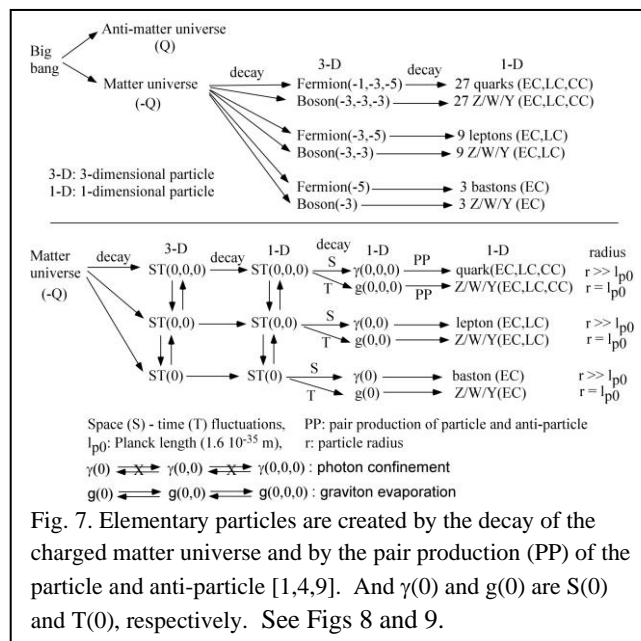



Fig. 7. Elementary particles are created by the decay of the charged matter universe and by the pair production (PP) of the particle and anti-particle [1,4,9]. And γ(0) and g(0) are S(0) and T(0), respectively. See Figs 8 and 9.

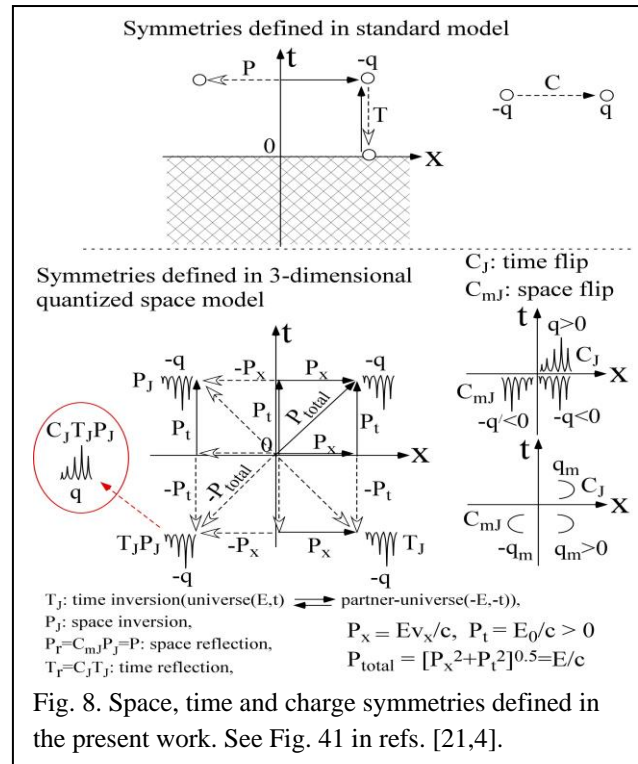
In the present extended standard model, the force carrying bosons of Z, W and Y have the lepton charge dependence in Fig. 1 like the quarks and leptons have the lepton charge dependence. In this case, the quark mixing (CKM matrix) and lepton mixing (oscillation) are not needed in order to explain the particle decays. Then, it is concluded that the B1 dark matters were already observed in the SN1987A data [16] and MinibooNE data [17,18].

Six anti-^{3}He cosmic ray events and two anti-^{4}He cosmic ray events were observed by AMS-02 measurements [20]. Anti-matter clouds and anti-matter stars are proposed by Poulin et al. as their origins [20]. However, in the present work the Q1 baryon decays are used to explain the anti-Helium cosmic ray events. It indicates that the enhanced anti- ^{3}He events are originated from the anti- (ppQ) decay in Fig. 3. And the anti- ^{4}He events are originated from the anti- (ppRR) decay in Fig. 3. Also, the ultra high energy cosmic rays can be explained by the decaying channels of the Q1, Q2 and Q3 baryons [1] as shown in Fig. 3. This supports the existence of the new heavy Q1, Q2 and Q3 quarks with the charge of EC = -4e/3 [1].

4. Elementary particles and the extended standard model

The relations of $G_N(ll) = G_N(qq) = G_N(mm)$ and $k(ll) = k(qq) = k(mm) = k$ are assumed in Fig. 2. Here, l and q represent the leptons and quarks. Then, note that $k(dm) = k(lq) = 0$. And the normal matters consist of leptons, quarks and hadrons, and the dark matters are the B1, B2 and B3 bastons [1]. Then the B1, B2 and B3 dark matter particles exist since the big bang along with the photons and gravitons [9]. Therefore, all elementary particles including the B1, B2, B3 dark matters are created near the inflation. The particles with the rest mass (m) of $m > E_p/c^2$ and the radius (r) of $r < R$ become the virtual black hole particles from the condition of the Schwarzschild radius of $R = 2Gm/c^2$. $E_p/c^2 = m_p$ is the Planck mass which is the black hole. The real particles are defined as the particles with the radius (r) of $r > R$. Therefore, the B1, B2 and B3 dark matters are the real particles. And it is proposed that the force carrying bosons of gravitons and Z/W/Y bosons with the non-zero rest masses have the radii equal to the Planck length (l_{p0}) in Fig. 7 [9,1,4]. Therefore, the force carrying Z/W/Y bosons and gravitons are always the real particles because the radii of the force carrying bosons and gravitons are $l_{p0} = 1.6 \ 10^{-35}$ m larger than their Schwarzschild radii given by $R = 2Gm/c^2$. The size of the photon with the zero rest mass cannot be defined. These Z/W/Y bosons exist only during the very short time allowed by the uncertainty principle. These Z/W/Y bosons are created from the decay of the vacuum energy in Fig. 7. Therefore, the first Z(0,0) and W(-1,0) particles with the rest mass energies of 91 GeV/c^2 and 80 GeV/c^2, respectively, were the real particles that were created from the decay of the vacuum energy. The pair of the matter universe with the charge configuration of -Q and anti-matter universe with the charge configuration of Q could be created from the big bang because our universe is full of the matters in Fig. 7 [9]. In this case, if the matter universe is defined to be negatively charged for the EC, LC and CC charges, the anti-matter universe should be defined to be positively charged for the EC, LC and CC charges. Then, the matters can be created from the decay of the matter universe with decreasing of the gravitation constant (G(mm)) in Fig. 2. Also, the pair of the matter and anti-matter

can be created from the vacuum energy fluctuation with decreasing of the gravitation constant (G(mm)) in Fig. 2. The anti-particles created by the pair production of the particle and anti-particle are later changed to the photons by the pair annihilation of the particle and anti-particle. And the particles created by the decay of the matter universe survive to form the galaxies and stars. This is the reason why our matter

Fig. 8. Space, time and charge symmetries defined in the present work. See Fig. 41 in refs. [21,4].

universe is full of the particles. The decay of the matter universe to create the new particles takes place mostly near the inflation period through the formation of the universe particle and galaxy particles [9,4]. But the pair production of the particle and anti-particle to be created from the vacuum energy fluctuation takes place always from the big bang time up to the present time. Also, the pair production of the matter universe and anti-matter universe can explain the CP symmetry problem of why the matters are dominating over the anti-matters on the present universe.

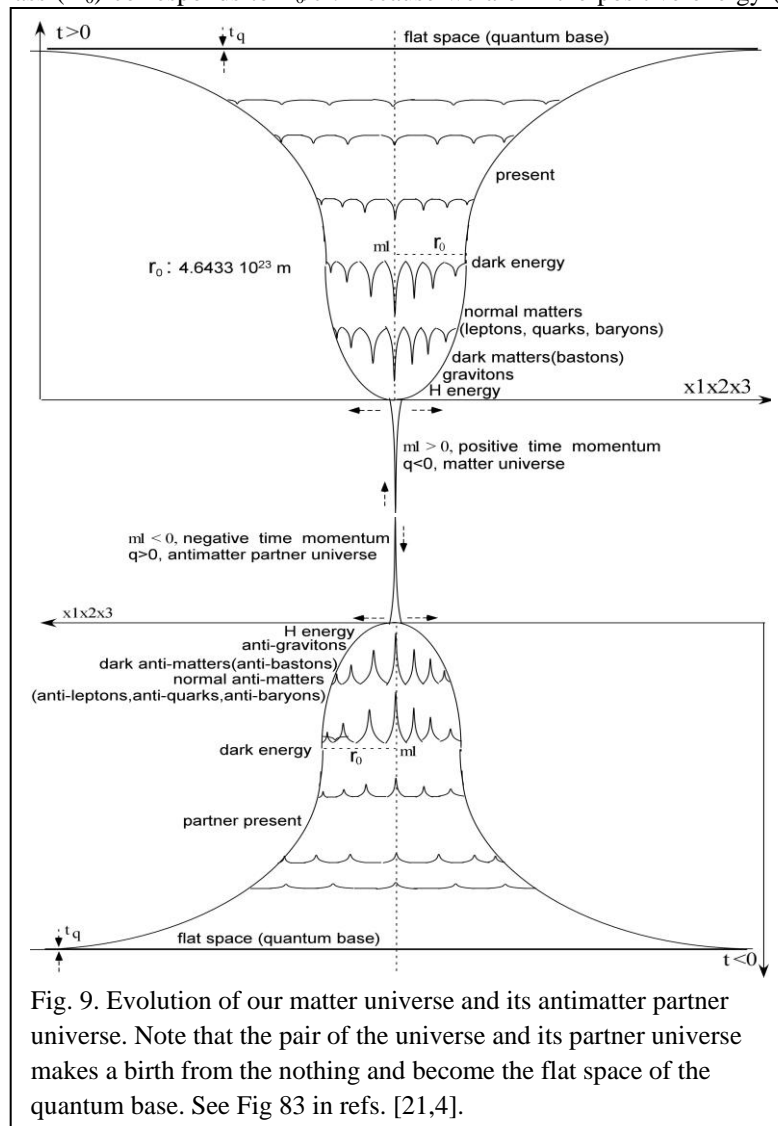
Elementary particles are created by the decay of the charged matter universe and by the pair production (PP) of the particle and anti-particle in Fig. 7 [1,4,9]. And g(0) and g(0) are S(0) and T(0), respectively in Fig. 7. Also, note that the elementary fermions are created by the particle-antiparticle pair production from the photon and the elementary Z/W/Y bosons are created by the particle-antiparticle pair production

from the high energy graviton. The high energy graviton is made by the constructive interference of the many low energy gravitons. The connection of the elementary bosons with the gravitons are for the first time proposed in the present work in Fig. 7. In other words, the gravitons and the Z/W/Y bosons are created by the fluctuations (T fluctuation) along the time axis of the space and time and the photons and the elementary fermions are created by the fluctuations (S fluctuation) along the space axis of the space and time in Fig. 7 [9,4]. The vacuum energy can be described as the 3-dimensional and 1-dimensional space and time fluctuations of ST(0), ST(0,0) and ST(0,0,0) in Fig. 7. These ST(0), ST(0,0) and ST(0,0,0) fluctuations can be exchanged to each other. Therefore, these vacuum energies are not confined within the corresponding space but evaporated to other space like the gravitons do. And the gravitons (T fluctuation) and photons (S fluctuation) can be combined to form the vacuum energy (ST fluctuation). Also, the vacuum energy (ST fluctuation) can decay to the gravitons (T fluctuation) and photons (S fluctuation). Therefore, the gravitons and photons are originated from the same space-time (ST) fluctuations [4,9]. The vacuum energy density including the photons and gravitons is defined as the ST(0), S(0) and T(0) vacuum energy density of the x1x2x3 space. If the ST(0) vacuum energy is larger than the rest mass energy of two electron neutrinos, the ST(0) energy will be changed to the ST(0,0) energy which makes the pair production of the electron neutrino and anti-electron neutrino. And the increasing of the new g(0) gravitons (T(0) fluctuation) can increase the ST(0) vacuum energy by combining with the γ(0) photons (S(0) fluctuation). The increasing of this ST(0) vacuum energy can cause the accelerated expansion of the x1x2x3 space and the inflation of the x1x2x3 space since the big bang as explained in Ref. [9]. This should be further studied in terms of the 3-dimensional quantized space model.

   5.   Space-, time- and charge- symmetric universe evolution

There is mathematically the infinite number of n-dimensional quantized spaces because the number (n) of dimensions has the infinite range. Because we live in the 3-dimensional quantized spaces composed of the x0y0z0, x1x2x3, x4x5x6 and x7x8x9 spaces, I am talking about the 3-dimensional spaces in the present work. The same explanation can be applied to all other n-dimensional cases. The uncertainty principles are $\Delta t \Delta E_0 \geq \frac{\hbar}{2}$ and $\Delta x \Delta p_x \geq \frac{\hbar}{2}$. Then, a space momentum is p_x and the corresponding time momentum is E_0. The p_x value is positive along the +x axis and negative along the –x axis. The E_0 value is positive along the +t axis and negative along the –t axis. The time momentum has the zero space change and non-zero time change ($\Delta x = 0$ and $\Delta t \neq 0$) and the space momentum has the non-zero space and non-zero time change ($\Delta x \neq 0$ and $\Delta t \neq 0$). Therefore, the velocity can be defined only for the space momentum but not for the time momentum. To match the units of the space and time momenta, we need the scale factor of the constant light velocity (c). So the uncertainty principle of $\Delta t \Delta E_0 \geq \frac{\hbar}{2}$ and $\Delta x \Delta p_x \geq \frac{\hbar}{2}$ can be changed into $\Delta ct \Delta \frac{E_0}{c} \geq \frac{\hbar}{2}$ and $\Delta x \Delta p_x \geq \frac{\hbar}{2}$ by adding the scale factor of c (light velocity) to match the units of the time (t) and space (x) terms. Then, the corrected time momentum is

$P_t=E_0/c$. And the space momentum associated with the velocity of v_x can be defined as $P_x = Ev_x/c^2$. The space momentum (P_x) of the matter is defined as the mv_x and the rest mass (m_0) corresponds to E_0/c^2. Because we are in the positive energy ($E_0>0$)

Fig. 9. Evolution of our matter universe and its antimatter partner universe. Note that the pair of the universe and its partner universe makes a birth from the nothing and become the flat space of the quantum base. See Fig 83 in refs. [21,4].

spaces flowing along the +t axis, the rest mass (m_0) is always positive. The zero time momentum corresponds to the zero energy. The zero space momentum corresponds to the zero velocity ($v_x=0$) or zero energy (or zero rest mass). The 3-dimensional quantized spaces have the minimum space quantum with t_q and x_q and the minimum background space fluctuation with t_p and x_p in Fig. 3. The light velocity (c) has been

defined as c = x_q/t_q = x_p/t_p in the present work. The photons are originated from the background space fluctuation with the light velocity (c).

The x0y0z0 mother space with the infinite energy is the infinite 3-dmensional quantized space with the minimum space quantum of $t_q = \infty \ and \ x_q = \infty$. There are many finite 3-dimensional quantized spaces with the minimum space quantum of $t_q \neq \infty \ and \ x_q \neq \infty$. These finite spaces are within the x0y0z0 mother space and are called as the daughter spaces. The daughter spaces which have the minimum space quantum with the same quantum sizes of $t_q \neq \infty \ and \ x_q \neq \infty$ can be intertwined by the space interactions. These intertwined daughter spaces are called as the x1x2x3, x4x5x6 and x7x8x9 spaces in the present work in order to describe our universes [1-6].

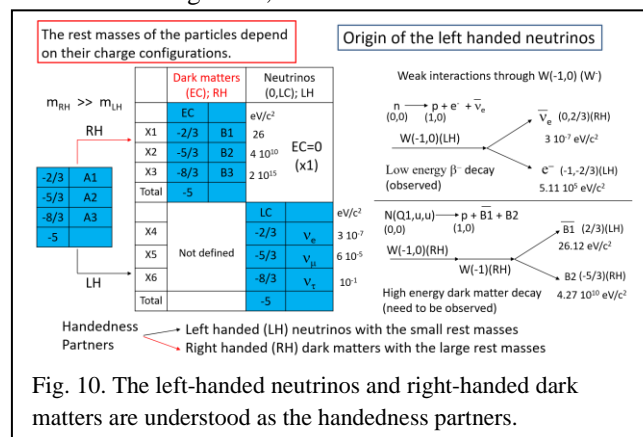
Three symmetries of P, C and T in the physics have been defined in the standard model. In the standard model, the negative time and its associated negative energy are not defined. So only the positive time direction is applied. Then the antiparticle and particle are separated by the C (charge conjugate) operator in the standard model in Fig. 8. And the TPC symmetry is conserved in the standard model. Now I am introducing the space and time symmetries newly defined in the present 3-dimensional quantized space model. Then, the space axis of x stands for three-dimensional x0y0z0 space and the particle (or matter) stands for any one of the x1x2x3, x1x2x3-x4x5x6 and x1x2x3-x4x5x6-x7x8x9 particles (or matters). Four symmetries of P_J, C_J, Cm_J and T_J are introduced and newly defined as shown in Fig. 8. P_J and T_J represent the space and time inversion symmetries, respectively. C_J and Cm_J stand for the time and space flips, respectively, as shown in Fig. 8. C_J corresponds to the charge conjugate symmetry (C) even though the definition of the charge is different between present model and standard model. The C_J and Cm_J symmetry operators change the signs of the charges and magnetic charges, respectively, as shown in Fig. 8. The particle and antiparticle are connected by the charge symmetry operator or the time flip symmetry operator of C_J. The space reflection symmetry (P_r = $P_J Cm_J$) defined in the present model is the same as the space reflection symmetry (P) defined in the standard model. In the present work, the new time inversion symmetry operator (T_J) changes the particle configuration from (E_0/c, t, P_x, -q) in the universe to (-E_0/c, -t, P_x, -q) in the partner universe in Fig. 8. The P_J symmetry operator changes x to –x. The P_J symmetry operator connects two particles with the configurations of (E_0/c, t, P_x, -q) and (E_0/c, t, -P_x, -q). Therefore, the $T_J P_J$ symmetry operator changes the configuration of the particle from (E_0/c, t, P_x, -q) to (-E_0/c, -t, -P_x, -q). Then, the $C_J T_J P_J$ symmetry operator changes the configuration of the particle from (E_0/c, t, P_x, -q) to (-E_0/c, -t, -P_x, q) as shown in Fig. 8. A particle with a configuration of (E_0/c, t, P_x, -q) and its antiparticle with a configuration of (-E_0/c, -t, -P_x, q) can be annihilated to nothing of Δt=0 and Δx=0 which means zero energy, zero space momenta and zero charges. Those two particles are defined as partners which can be created from nothing or annihilated to nothing. For example, a particle (or matter) with (E_0/c>0, t, P_x, -q) can be totally annihilated with a partner antiparticle or (or partner antimatter) with (-E_0/c<0, -t, -P_x, q) to make nothing of Δt=0 and Δx=0

which has zero energy, zero space momenta and zero charges. In other words, this is called as the partner relation by the symmetry operator of $C_J T_J P_J$. Our matter universe and its partner antimatter universe can be created from the big bang of the matter and its partner antimatter as shown in Fig. 9. Therefore, the antimatters missing within our x1x2x3 universe full of the matters exist as the partner antimatters within the partner x1x2x3 universe. This partner x1x2x3 universe with the negative energy is full of the partner antimatters. These partner antimatters within the partner x1x2x3 space are the partner antimatters in the viewpoint of the matters within our x1x2x3 space. Note that the time inversion symmetry operator of T_J cannot be applied within the x1x2x3 or x4x5x6 matter universe which has been always fixed to the positive energy and positive time momentum. The time inversion symmetry operator of T_J can be applied to all matters and particles in the viewpoint of the x0y0z0 space which can have both of positive and negative time momenta. But the P_J, C_J and C_{mJ} symmetry operators can be applied locally within the x1x2x3 and x4x5x6 spaces without changing the sign of the energy.

More details on the present new three-dimensional quantized space model are explained in the articles on the three-dimensional quantized spaces, elementary particles and quantum mechanics [4,9,21]. Also, the paper titled as the CTP-symmetric universe was published recently by L. Boyle et al. [22] in 2018. The CTP symmetric universe shown in Fig. 9 was taken from the working papers [21,4] written by myself (Jae-Kwang Hwang) in 2016. The comparison between two papers will be interesting for the further study.

6.   Right-handed dark matters, left-handed neutrinos and Higgs mechanism

Only the left-handed neutrinos have been observed [23]. In this case, the right-handed neutrinos are missing. Also, whether the neutrinos are the Dirac particles or

Fig. 10. The left-handed neutrinos and right-handed dark matters are understood as the handedness partners.

the Majorana particles have been one of the unsolved problems in terms of the standard model. Small rest masses of the neutrinos confirmed by the neutrino experiments need to be explained in terms of the standard model.

In the present work, the neutrinos are proposed as the Dirac particles without the neutrino mixing because they have the non-zero lepton charges [1]. The neutrinos

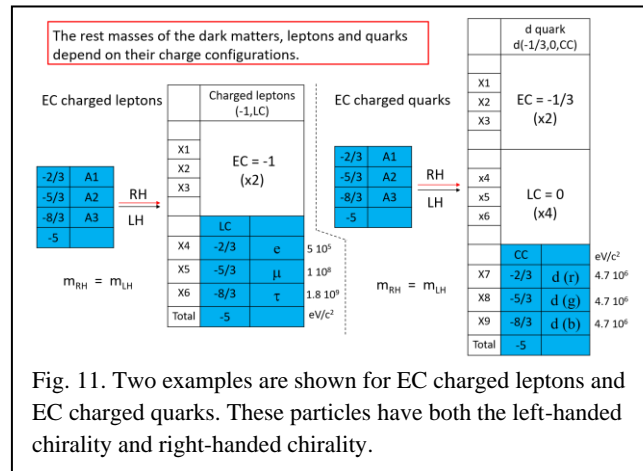
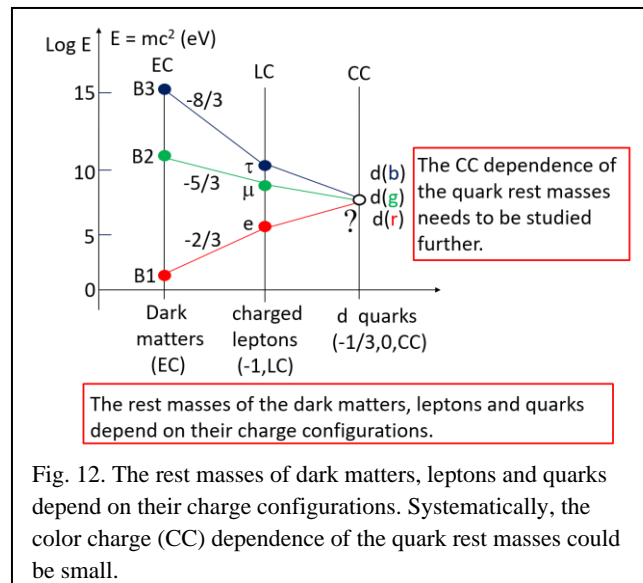



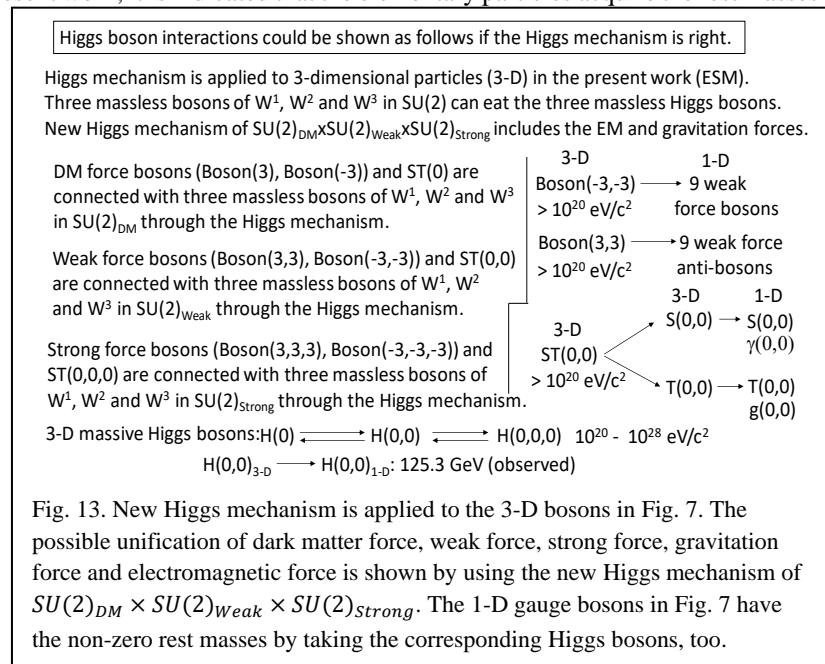
Fig. 11. Two examples are shown for EC charged leptons and EC charged quarks. These particles have both the left-handed chirality and right-handed chirality.

have the zero electric charges (EC = 0) as shown in Fig. 10. Then the lepton charges of ν_e, ν_μ and ν_τ are -2/3, -5/3 and -8/3, respectively in Fig. 10 [1]. And the B1, B2 and B3 dark matters have the electric charges (EC) of -2/3, -5/3 and -8/3, respectively

Fig. 12. The rest masses of dark matters, leptons and quarks depend on their charge configurations. Systematically, the color charge (CC) dependence of the quark rest masses could be small.

in Fig. 10 [1]. Then the neutrinos and dark matters are understood as the LC charge version and EC charge version, respectively, of the original A1, A2 and A3 particles, in Fig. 10. Because the neutrinos have only the left-handed chirality, the dark matters are proposed to have only the right-handed chirality. This concept can solve the

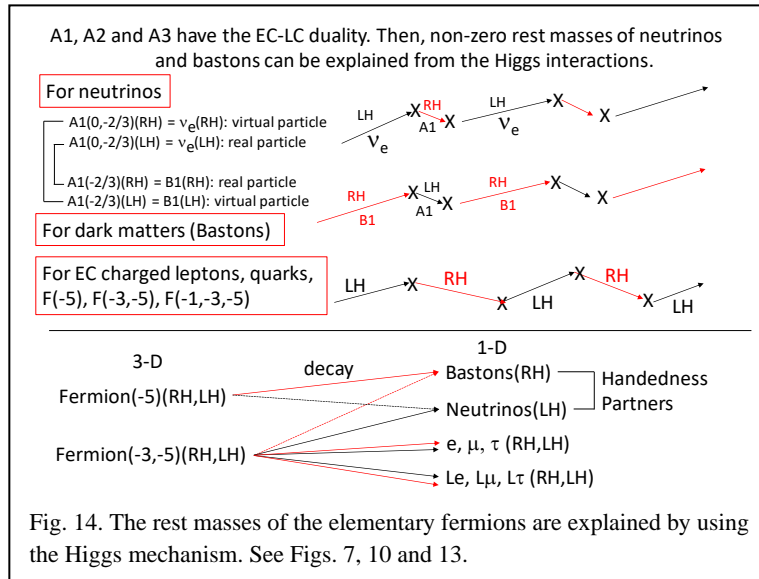
missing right-handed neutrino puzzle. And the right-handed dark matters have the relatively large rest masses [1] which can be comparable to other EC charged particles of leptons and quarks. This indicates that the rest masses of the dark matters, leptons and quarks depend on their charge configurations because the left-handed neutrinos have the relatively very small rest masses. Therefore, the neutrinos and dark matters are the handedness partners in Fig. 10. And in Fig. 11, two examples are shown for the EC charged leptons and EC charged quarks. The charged leptons of e, μ and τ with EC = -1 have the lepton charges (LC) of -2/3, -5/3 and -8/3, respectively in Fig. 11 [1]. The d quarks with EC = -1/3 and LC = 0 have the color charges (CC) of -2/3(r), -5/3(g) and -8/3(b), respectively in Fig. 11 [1]. As shown in these examples, the EC charged leptons and EC charged quarks do not have the handedness partners. However, the handedness partners of neutrinos are dark matters. Therefore, the EC charged leptons and EC charged quarks have both the left-handed chirality and right-handed chirality.

In Fig. 12, it is shown that the rest masses of dark matters, leptons and quarks depend on their charge configurations. The systematics indicates that the color charge (CC) dependence of the quark rest masses could be small. Therefore, the CC dependence of the quark rest masses needs to be further studied. This means that the particle rest masses could be expressed as the function of the EC, LC and CC charges [1]. In the present work, it is indicated that the elementary particles acquire the rest masses from

Fig. 13. New Higgs mechanism is applied to the 3-D bosons in Fig. 7. The possible unification of dark matter force, weak force, strong force, gravitation force and electromagnetic force is shown by using the new Higgs mechanism of $SU(2)_{DM} \times SU(2)_{Weak} \times SU(2)_{Strong}$. The 1-D gauge bosons in Fig. 7 have the non-zero rest masses by taking the corresponding Higgs bosons, too.

the charge configurations as shown in Figs. 10-12. Therefore, in the present work, the Higgs mechanism is not required to explain the rest masses of the elementary

particles. But the new Higgs mechanism of $SU(2)_{DM} \times SU(2)_{Weak} \times SU(2)_{Strong}$ is applied to the present extended standard model as the possible explanation of why the particles have the non-zero rest masses as shown in the following paragraph.

The Higgs mechanism [24,25] has been developed to explain the non-zero rest

Fig. 14. The rest masses of the elementary fermions are explained by using the Higgs mechanism. See Figs. 7, 10 and 13.

masses of the particles. If Higgs mechanism is right, the Higgs mechanism explanation could be applied to the 3-D (3-dimensional) particles in Figs. 7 and 13. For example, the Boson(3), Boson(-3) and ST(0) particles for the dark matters in Fig. 7 can be explained to have the non-zero rest masses because the four massless bosons of W^1, W^2 and W^3 in SU(2)$_{DM}$ are mixed by taking the Higgs bosons as shown in Fig. 13. Then ST(0) could be decayed to the photon and graviton. And the Boson(3) and Boson(-3) are decayed to 1-D dark matter force bosons in Figs. 7 and 13. Therefore, 1-D gauge bosons in Fig. 7 have the non-zero rest masses by taking the corresponding Higgs bosons, too. The same arguments can be applied to the weak and strong force bosons in Fig. 13. Therefore, this new Higgs mechanism of $SU(2)_{DM} \times SU(2)_{Weak} \times SU(2)_{Strong}$ unifies the dark matter force, weak force, strong force, electromagnetic force and gravitational force generally for the dark matters, leptons and quarks.

The elementary fermions can have the non-zero rest masses through the interactions with the Higgs bosons in Fig. 14. When the elementary fermions interact with the Higgs bosons, they change chirality. Then the neutrinos have only the left-handed chirality. This is explained in Fig. 10. Left-handed neutrinos can change to the virtual A1, A2 and A3 particles with the right-handed chirality in Fig. 14 when it interacts with the Higgs boson. Here, the A1, A2 and A3 particles have the EC-LC duality in order to explain the non-zero rest masses of the neutrinos and bastons (dark matters)

in Fig. 14. It is because that the right-handed neutrinos exist only as the virtual right-handed A1, A2 and A3 particles in Fig. 14. Therefore, the independent real left-handed neutrinos are changed to the virtual right-handed neutrinos of A1, A2 and A3 which are changed back to the independent real left-handed neutrinos from the interactions with the Higgs bosons. This new Higgs mechanism gives the non-zero rest masses to the left-handed neutrinos. Also, right-handed dark matters can change to the virtual A1, A2 and A3 particles with the left-handed chirality in Fig. 14 when it interacts with the Higgs boson. It is because that the left-handed dark matters exist only as the virtual left-handed A1, A2 and A3 particles in Fig. 14. Therefore, the independent real right-handed dark matters are changed to the virtual left-handed dark matter of A1, A2 and A3 which are changed back to the independent right-handed dark matters from the interactions with the Higgs bosons. This new Higgs mechanism gives the non-zero rest masses to the right-handed dark matters. Also, the left-handed Fermion(-5) decay to three left-handed neutrinos and the right-handed Fermion(-5) decay to three right-handed dark matters (bastons) in Fig. 14. And the left-handed Fermion(-3,-5) decay to nine left-handed leptons and the right-handed Fermion(-3,-5) decay to six right-handed charged leptons and three right-handed dark matters (bastons) in Fig. 14.

The 3-D real dark matter of Fermion(-5) have the left-handed chirality and right-handed chirality. Then the Fermion(-5) particle can change the chirality when interacting with the Higgs bosons. This massive Fermion(-5) particle can be decayed to right-handed dark matters and left-handed neutrinos as shown in Figs. 10 and 14. Also, the massive Fermion(-3,-5) particle can be decayed to right-handed dark matters and left-handed neutrinos as shown in Figs. 10 and 14. Therefore, the dark matters and neutrinos are the same particles with the different charge locations which make the different rest masses in Fig. 10. Other elementary particles with the left-handed chirality and right-handed chirality can interact with the Higgs bosons by changing the chirality, too.

7. Summary

In the present work, the neutrinos are proposed as the Dirac particles without the neutrino mixing because they have the non-zero lepton charges. The neutrinos have the zero electric charges (EC = 0) as shown in Fig. 10. Then the lepton charges of ν_e, ν_μ and ν_τ are -2/3, -5/3 and -8/3, respectively in Fig. 10 [1]. And the B1, B2 and B3 dark matters have the electric charges (EC) of -2/3, -5/3 and -8/3, respectively in Fig. 10 [1]. Then the neutrinos and dark matters are understood as the LC charge version and EC charge version, respectively, of the original A1, A2 and A3 particles, in Fig. 10. Because the neutrinos have only the left-handed chirality, the dark matters are proposed to have only the right-handed chirality. This concept can solve the missing right-handed neutrino puzzle. Therefore, the neutrinos and dark matters are the handedness partners in Fig. 10. The dark matters and neutrinos are the same particles

with the different charge locations which make the different rest masses. Here, the A1, A2 and A3 particles have the EC-LC duality in order to explain the non-zero rest masses of the neutrinos and bastons (dark matters) in Fig. 14. The new Higgs mechanism of $SU(2)_{DM} \times SU(2)_{Weak} \times SU(2)_{Strong}$ including electromagnetic and gravitational forces is applied to the present extended standard model as the possible explanation of why the particles have the non-zero rest masses as shown in Figs. 13 and 14. The possible unification of dark matter force, weak force, strong force, gravitation force and electromagnetic force is shown by using the new Higgs mechanism of $SU(2)_{DM} \times SU(2)_{Weak} \times SU(2)_{Strong}$.

In the present work, the charged B1, B2 and B3 dark matters are expected to be relatively stable because of the lack of the decaying channels. When the proper values of the gravitation constants and Coulomb's constants are given for the normal matter and dark matters, the charged dark matters like the B1, B2 and B3 dark matters can be the good candidates of the dark matters. Here it is assumed that the k and G values are similar for the leptons and quarks. Then $F_c(mm) \approx 10^{36}F_g(mm)$, $F_g(dd) = 10^x F_g(mm)$ and $F_c(dd) = 10^{x-18}F_g(mm)$ for a proton-like particle in Fig. 2. This assumption can explain the relation of, at present time, $F_c(mm) > F_g(dd)$ (?) $F_g(mm) > F_g(dm) > F_c(dd) > F_c(dm) = F_c(lq) = 0$ for the proton-like particle in Fig. 2. For the B1 dark matter with the rest mass of 26.12 eV/c^2 [1], $F_g(dd) \approx 10^{x-16}F_g(mm)$ and $F_c(dd) = \frac{4}{9} 10^{x-18}F_g(mm)$ where $F_g(mm)$ is for the proton. Therefore, $F_g(dd) > F_c(dd)$ for the B1, B2 and B3 dark matters as shown in Fig. 2. In order to make dark matters to be controlled by the attractive gravitational force, the attractive gravitational force ($F_g(dd)$) between the dark matters should be greater than the repulsive Coulomb's force ($F_c(dd)$) between the dark matters. Therefore, $F_g(dd) > F_c(dd)$. Therefore, it is concluded that the Coulomb's constant is constant because of the photon confinement but the gravitation constant has been changing since the inflation because of the graviton evaporation along with the space evolution in Fig. 2. This assumption can explain the reason why the gravitational force strength ($F_g(mm)$) between the matters is so weak compared with the electromagnetic force strength ($F_c(mm)$) between the matters.

The rest mass of 1.4 TeV/c^2 is assigned to the Le particle with the EC charge of -2e [2,24,25]. This rest mass of Le is smaller than the tentative previous rest mass (25.3 TeV/c^2) of Le [1]. The proposed rest mass (26.12 eV/c^2) of the B1 dark matter [1] is indirectly confirmed from the supernova 1987A data [16]. The neutrino anomalies of the SN1987A data and MinibooNE data are explained by the B1 dark matter scattering within the Cherenkov detectors. The missing neutrinos are newly explained by using the dark matters and lepton charge force in section 3. Then, it is

concluded that the B1 dark matters were already observed in the SN1987A data and MinibooNE data. In the present work the Q1 baryon decays are used to explain the anti-Helium cosmic ray events and ultra high energy cosmic rays.

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