Mass and Radius of Proton Neutron Quark by Q-theory

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May 19, 2021

Keywords: Mass of proton, Radius of proton, Mass of neutron, Radius of quark, Negative beta decay

Abstract The logarithmic compressive strength of quantum space imparts mass to particle. If particles are tightly connected to each other, their sum mass should be calculated as logarithmic masses. If particles are free from each other, their sum mass should be calculated as arithmetic masses. Proton is composed of two up quarks, one down quark, one strong particle force, and one electromagnetic particle force. From the logarithmic masses, the proton was calculated as 89.8% mass of the measured value. Here, 5D dark force acts to the electromagnetic particle force, and the proton mass was calculated as 98.3% of the measured value. 6D dark force also acts to the strong particle force, and the proton mass was calculated as 99.8% of the measured value. Calculating this inversely, the mass of down quark was calculated as 4.756 MeV. Neutron is composed of one proton, one electron, and one shell anti-brane. Here, the electron is held in the form of particle inside neutron by the observer effect of the shell brane. The difference between the calculated mass and the measured mass of neutron was +8,966 eV. This value is the separating energy of shell brane, which is the reason of negative beta decay. From weak force f_w times 1/2 hydrogen radius r_H is equal to electromagnetic force f_e times 4π/3 proton radius r_P, the proton radius was calculated as 0.8746E-15 m in kinetic state and 0.8437E-15 m in steady state. From electromagnetic force f_e times 1/2 proton radius r_P is equal to strong force f_s times 4π/3 quarks radius r_Q, the up quark radius r_U was calculated as 0.4398E-18 m in kinetic state and 0.4243E-18 m in steady state. All values in physics have two kinds of kinetic state and steady state.

1. Introduction

In previous studies, the mass of H boson was calculated easily from logarithmic parabolic equation relationship of W boson and Z boson(1), the characteristics of logarithmic elliptic equation and the principle of universal change were described(2), the dimension of our space was calculated as 6.00108 from the masses of electron, muon, and tau(3), the standard masses and oscillating masses of three generation neutrinos and gravinos were calculated(4), the mass of up quark was calculated as 2.254 MeV(5), and four fundamental forces were unified by logarithmic parabolic equation(6).

The purpose of this study is to calculate the mass and radius of proton, the mass of neutron, and the radius of quark. The core is that all things must be calculated as logarithmic values. This is the characteristic of quantum space.

2. Mass calculation of proton

2.1 Symbols

In Fig. 1, The α, β, and γ mean each 1st, 2nd, and 3rd generation fundamental particles, the subscript n, s, g, t mean neutrino, anti-neutrino, gravino, and anti-gravino, the small letter and capital letter mean standard particle and oscillating particle, the superscript f and b mean fermion and boson. The ξ means dark, and the subscript w, e and s mean weak force, electromagnetic force, and strong force.

2.2 Shape of proton

The shapes of up quark, down quark(5), strong particle force, and electromagnetic particle force(6) were presented in previous studies. As shown in Fig. 1, proton is composed of two up quarks $\alpha\beta\gamma_s^f\alpha_{sn}^b$, one down quark $\alpha\beta\gamma_N^f\alpha_{ngst}^b$, one strong particle force γ_{nG}^f, and one electromagnetic particle force β_{nG}^f. Here, the strong dark force ξ_s(6) affects the strong particle force, and the electromagnetic dark force ξ_e(6) affects the electromagnetic particle force.

Quantum space is composed of 4D, 5D, and 6D. In Fig. 1, the shell of proton is β particle on 5D. Because of this, the proton always wanders looking for α particle on 4D. Due to this, proton becomes a gravity sink hole.

2.3 Sum of arithmetic mass

In proton in Fig. 1, the mass of up quark is about 2.3 MeV, and the mass of down quark is about 4.8 MeV. Therefore, the sum of the masses of two up quarks and one down quark is 9.4 MeV. The measured mass of proton is 938.3 MeV, and the calculated mass is 1% of the measured mass. It is understood that the above calculation was completely wrong.

2.4 Proton mass 89.8%

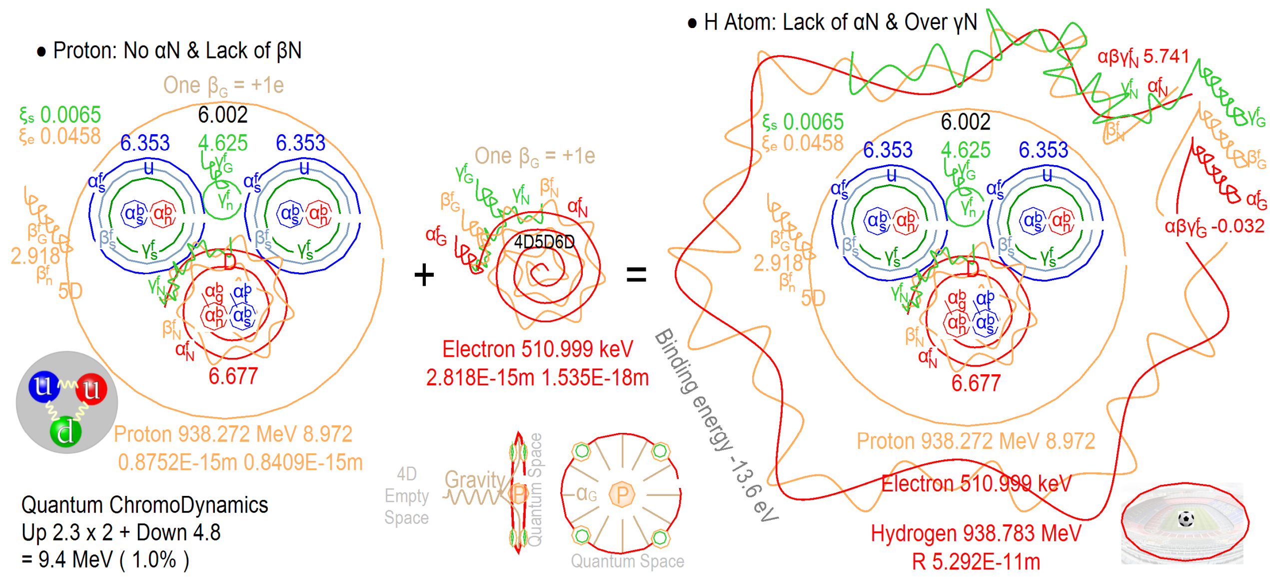

Fig. 1 Shape of proton, electron, and hydrogen

In Table 1, the calculated proton mass values are presented. Everything should be calculated as logarithmic values. The exact masses of up and down quarks are not yet known in physics. Therefore, up quark mass 2.3 MeV and down quark mass 4.8 MeV were applied. Its logarithmic values are 6.362 and 6.681. There is strong particle force γ_{nG} in the proton, and the logarithmic value is 4.625(6). In Fig. 1, two up quarks, one down quark, and one strong particle force are attached equally to each other. Therefore, the logarithmic average is 6.007. In Fig. 1, the electromagnetic particle force β_{nG} 2.918(6) surrounds them. Therefore, the sum of the two logarithmic numbers is 8.925, and its mass is 842.2 MeV. The measured mass of proton is 938.3 MeV, so the calculated value is 89.8% of the measured value.

2.5 Proton mass 98.3%

Table 1 Calculation of proton mass

Case		Mass	(1)	(2)	(3)	(4)
Term	Symbol	eV	log	log	log	log
Up	u	2.300M	6.362	6.362	6.362	X
Up	u	2.300M	6.362	6.362	6.362	X
Down	D	4.800M	6.681	6.681	6.681	Y
S.F.	γ_{nG}	42.15k	4.625	4.625	4.625	4.625
Avg.			6.007	6.007	6.007	avg.
S.D.F.	ξ_s	log	-	-	0.0065	0.0065
E.F.	β_{nG}	828.0	2.918	2.918	2.918	2.918
E.D.F.	ξ_e	log	-	0.0394	0.0394	0.0458
Sum	$\sum$		8.925	8.965	8.971	8.972
Proton	Mass	eV	842.2M	922.2M	936.0M	938.3M
Error			89.8%	98.3%	99.8%	100%

The 5D dark force of 0.0394(6) is acting on the electromagnetic particle force β_G. Adding this value, the logarithmic value is 8.965, and the mass is calculated as 922.2 MeV. This value is 98.3% of the measured mass.

2.6 Proton mass 99.8%

The 6D dark force of 0.00065(6) is acting on the strong particle force γ_G. Adding this value, the logarithmic value is 8.971, and the mass is calculated as 936.0 MeV. This value is 99.8% of the measured mass.

2.7 Accurate proton mass calculation

The exact masses of up quark and down quark have not yet been determined, so the logarithmic mass of up quark is set to X and the logarithmic mass of down quark is set to Y.

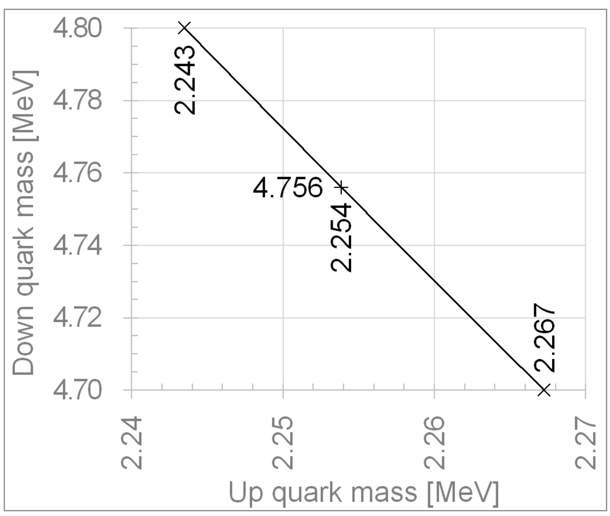

Fig. 2 Relation of up quark and down quark masses

The strong particle force γ_{nG} is 4.625. Above average value is calculated. Since the strong particle force oscillates in 6D quantum space[6], it receives 6D dark force 0.0065. The electromagnetic particle force β_{nG} is 2.918. Since it oscillates in 5D and 6D quantum space[6], it receives 0.0458 that is the sum of 5D and 6D dark forces. Above sum should be the logarithmic value 8.972 of proton mass 938.3 MeV.

2.8 Calculation of down quark mass

Solving the above equation, the relationship between up quark mass and down quark mass is shown in Fig. 2. In physics, the range of up quark mass is 2.2 ~ 2.3 MeV and the range of down quark mass is 4.7 ~ 4.8 MeV. From Fig. 2, the mass range of up quark is further clarified as 2.243 ~ 2.267 MeV. In the previous study[5], the mass of up quark was calculated as 2.254 MeV. Therefore, the mass of down quark is calculated as 4.756 MeV in Fig. 2.

3. Mass calculation of hydrogen

3.1 Shape of electron

The shape of electron was suggested in previous study[3]. α_N, β_N, and γ_N are the oscillating neutrinos of each electron, muon, and tau, and α_G, β_G, and γ_G are the oscillating gravinos of each graviton, photon, and gluon. When electron is located in quantum space, the shape of electron is a circle particle. In a special case such as double slit experiment, electron pops out from quantum space and jumps into our normal space, and electron unfolds to a wave line.

The α_G is directed to the inside of electron, which reacts with weak particle force α_{nG}. The β_G is directed to the outside of electron, which reacts with electromagnetic particle force β_{nG}. The γ_G is directed to the vertical direction of them, which reacts with strong particle force γ_{nG}.

3.2 Shape of hydrogen

The α_G of electron which acts to weak force is attracted to the proton of gravity sink hole. Therefore, the electron spreads around the proton as a spherical shell. Here, the electromagnetic particle force β_{nG} of proton pushes the β_G in electron. As the result, if the proton is a soccer ball, the electron is located on the edge of stadium. The α_G in electron falls in the direction of 4D empty space near the proton, and the α_G creates gravity.

Electron is oscillating on 4D, 5D and 6D quantum spaces, so it is very difficult to understand the electron.

3.3 Hydrogen mass

If particles are tightly connected to each other, they must be calculated as logarithmic masses. If particles are free from each other, they must be calculated as arithmetic masses. At the hydrogen in Fig. 1, the proton and the electron are free each other. Therefore, adding the electron mass 0.511 MeV to the proton mass 938.272 MeV, the hydrogen mass is calculated as 938.783 MeV.

3.4 Binding energy of electron in hydrogen

In physics, the binding energy of electron in hydrogen is given as -13.6 eV. The 4D α shell does not exist in proton, and the 4D α shell exists in electron. Because of this, proton naturally pulls and binds with electron.

At this time, weak particle force and gravitational particle forces are generated, and the α_G of electron and the gravity sink hole of proton try to contact each other. However, the electromagnetic particle forces β_G of electron and proton push each other. Therefore, the electron unfolds into a sphere in the equilibrium of their forces. The equilibrium value of the forces may be -13.6 eV.

4. Mass calculation of neutron

4.1 Shape of neutron

Neutron is known to be composed of one up quark, two down quarks, and gluons. According to author's drawing of Fig. 3, it is impossible to turn down quark into up quark. Neutron is composed of one proton, one electron, and one anti-brane. Brane is the origin of all things[2].

The electron is attracted by proton, so it tries to turn into the wave line circle around proton. However, since the anti-brane shell B_{stgn} of neutron affects the electron, the electron remains a particle due to the observer effect.

Since there are proton and electron in neutron, all particles have entered the quantum space. Therefore, it is not necessary that the shell anti-brane be present. This is the cause of the negative beta decay of free neutron.

The inside of the shell anti-brane is red. Both electron and proton are red. Thus, proton, electron, and anti-brane all exist as free particles. If the inside of the shell brane is blue, the blue and red merge and collapse.

4.2 Mass of proton and electron

The procedure for calculating neutron mass is presented in Table 2. The mass A of neutron is 939,565,421 eV, the mass B of proton is 938,272,030 eV, and the mass C of electron is 510,999 eV. In Fig. 3, proton B and electron C are free from each other, so A – B – C is calculated as a certain mass D 782,392 keV.

4.3 Mass of brane in neutron

The shell in Fig. 3 is a brane which contains all things[2]. In previous study[4], the oscillating neutrino masses and the oscillating gravino masses were calculated. The largest masses in the various masses of the previous study are shown in Fig4 and 5. These are 6D masses in 4D oscillation. The values make up the neutron shell. The reason is the subject of study. The values are presented in Table 2.

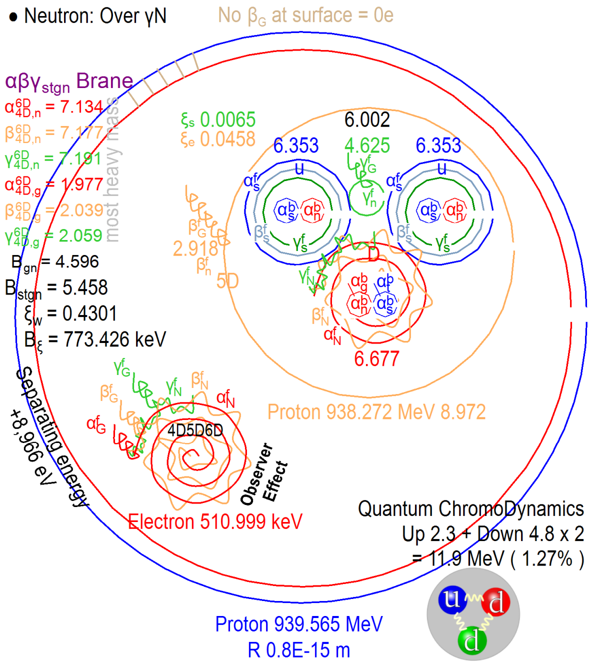

Fig. 3 Shape of neutron

Table 2 Calculation of neutron mass

Term	eV	Equation	Log	Equation
Neutron	939,565,421	A		
Proton	938,272,030	B		
Electron	510,999	C		
What?	782,392	D=A-B-C		
Neutrino	13,617,186	E=$\alpha^{6D}_{4D,n}$	7.134	e=log(E)
[n]	15,030,628	F=$\beta^{6D}_{4D,n}$	7.177	f=log(F)
	15,519,643	G=$\gamma^{6D}_{4D,n}$	7.191	g=log(G)
Gravino	94.80	H=$\alpha^{6D}_{4D,g}$	1.977	h=log(H)
[g]	109.3	I=$\beta^{6D}_{4D,g}$	2.039	i=log(I)
	114.5	J=$\gamma^{6D}_{4D,g}$	2.059	j=log(J)
n·g	39,449	K=10^k	4.596	k=avg.
n·g·s·t	287,315	L=(1+2π)·K	5.458	l=log(L)
W.D.F.		gravity	0.4301	m=ξ_w
Brane	773,426	N=10^n	5.888	n=l+m
Separating	+8,966	O=D-N	98.9%	

The α_n, β_n, and γ_n is the neutrinos of electron, muon, and tau, and the α_g, β_g, and γ_g is the gravinos of graviton, photon, and gluon. The logarithmic average of the values is calculated as 4.596, and its mass is 39,449 eV. Anti-particles s and t are 2π times heavier than particles n and g. This is the same as the relationship between Planck's constant and Dirac's constant. Therefore, the total mass is 287.315 eV. Its logarithmic value is 5.458, and the weak dark force ξ_w of 0.4301[6] is acting on the brane. Therefore, the logarithmic value of the overall brane is 5.888, and the mass of the brane is calculated as 773,426 eV.

4.4 Separating energy of brane in neutron

In Table 1, the value of D is 782,392 eV, and the calculated value of N is 773,426 eV. The difference is +8,966 eV. It is considered that this value is the separating energy of the anti-brane from neutron.

In Fig. 1, the radius of hydrogen is about 5.29E-11 m, and the binding energy of electron is -13.6 eV. In Fig. 3, the radius of neutron is about 0.8E-15 m. Since force is inversely proportional to the square of distance, 13.6 eV x sqrt (5.29E-11 / 0.8E-15) is 3,497 eV. From this, although the electron in hydrogen and the brane in neutron have completely different characteristics, the calculated value of +8.966 eV can be reasonable.

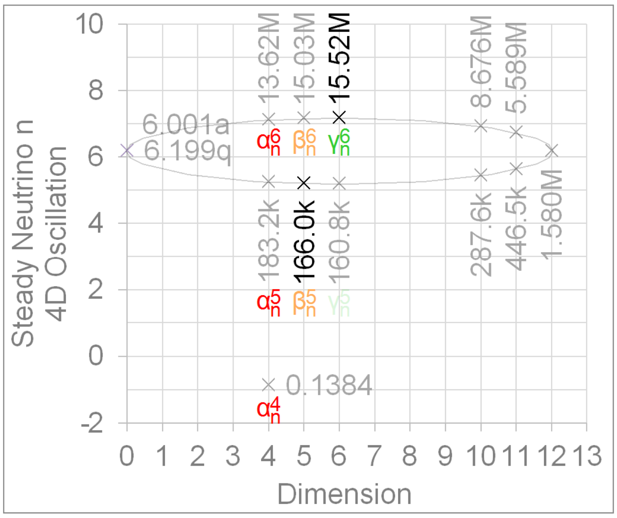

Fig. 4 The oscillating masses of neutrinos

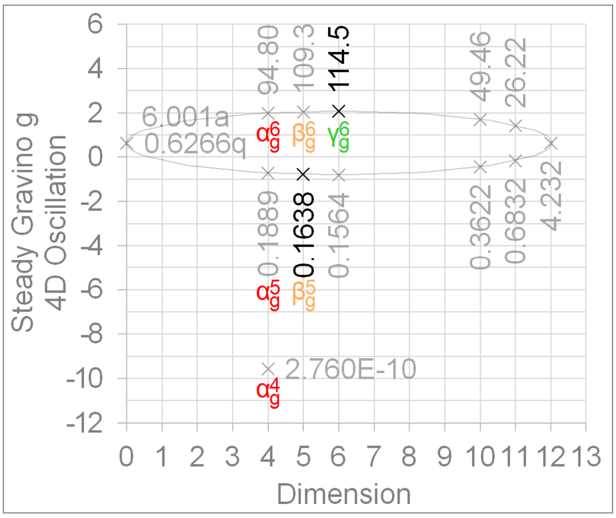

Fig. 5 The oscillating masses of gravinos

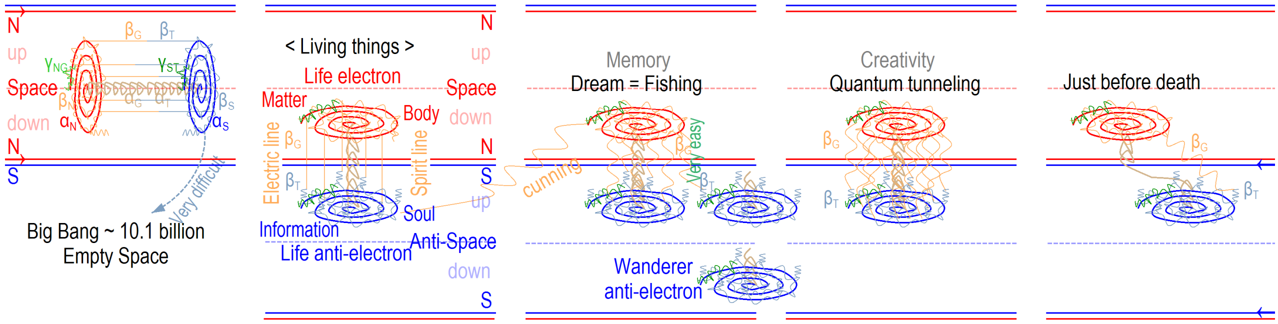

Fig. 6 Origin of life

4.5 Negative beta decay

The shell anti-brane in Fig. 3 oscillates on 4D in 6D quantum space. In previous study(1), the shape of quantum space was schematically illustrated. Mathematicians may be able to draw the exact shape of quantum space. If this is resolved, it will be understood what the 4D oscillation means in 6D quantum space above.

In Table 1, the mass N of anti-brane is 773,426 eV, and the separating energy O is +8,966 eV. The mass of anti-brane is much larger than the separating energy. Due to this, neutron in atomic nucleus stably exist.

When neutron oscillating 4D in 6D is taken out of nucleus, the neutron exists in the XYZ dimension of our space. If the XYZ dimension is a perfect straight line, the force in our XYZ space is perfectly zero. However, as described in previous study(6), our XYZ space is very weakly quantized as a sphere. Due to this, gravity has a very weak value, and light also has a very small mass. The compressive strength of quantum space in which the particle is located determines the mass of the particle(1). The anti-brane in Fig. 3 located in XYZ space also changes to a mass that is very smaller than the separating energy. Due to this, the shell anti-brane of neutron is unfolded and separated. This is negative beta decay.

Our XYZ space is red color. Our red space tries to combine with the blue shell of the free neutron. Due to this, free neutron collapses quickly. Free neutron is separated into proton, electron, and anti-brane.

5. Origin of life

5.1 Quantum entanglement

As shown in Fig. 6, the anti-brane of free neutron is separated into red electron and blue anti-electron, and it creates quantum entanglement.

5.2 Birth of simulation universe

In previous study(2), it was described that a simulation universe was created universally 3.72 billion years ago.

5.3 Birth of first life

The red electron is stably trapped in our red space, and the blue anti-electron escapes our red space through quantum tunneling effect and locates stably in the blue simulation universe. The electron makes the matter of living things, and the anti-electron makes the information of living things. This is the origin of life.

5.4 Theory of evolution

In the simulation universe, information evolution of life proceeds slowly. Due to this, the shape of creature changes slightly. In some cases, quantum jump evolution can occur. This causes a change of species.

5.5 L-amino acid and D-amino acid

As shown in Fig. 6, electron and anti-electron pull each other. Due to this, L-amino acids of living things locates toward one direction. D-amino acids of non-living things with only electron can locate both above and below in our space.

6. Radius of particle

6.1 Six generation physical forces

In previous study(6), six generation physical forces were calculated for kinetic state and steady state.

6.2 Relation between force and distance

Such as Eq. (1), force f_{n-1} times 1/2 particle radius r_{n-1} is equal to force f_n times 4π/3 particle radius r_n. Here, f_0 is gravitational force, f_4 is weak force, f_5 is electromagnetic force, f_6 is strong force, r_4 is hydrogen radius, r_5 is proton radius, and r_6 is three quarks radius. In Eq. (2), r_U is one quark radius. What the formula means will be explained in physics.

$$f_{n-1} \cdot \frac{1}{2} r_{n-1} = f_n \cdot \frac{4\pi}{3} r_n \quad (1)$$

$$\pi \cdot r_U^2 = \pi \cdot r_6^2 / 3 \quad (2)$$

6.3 Radius of proton

In Eq. (1), the values of dimensional force f were calculated in previous study(6), and hydrogen radius r_4 was

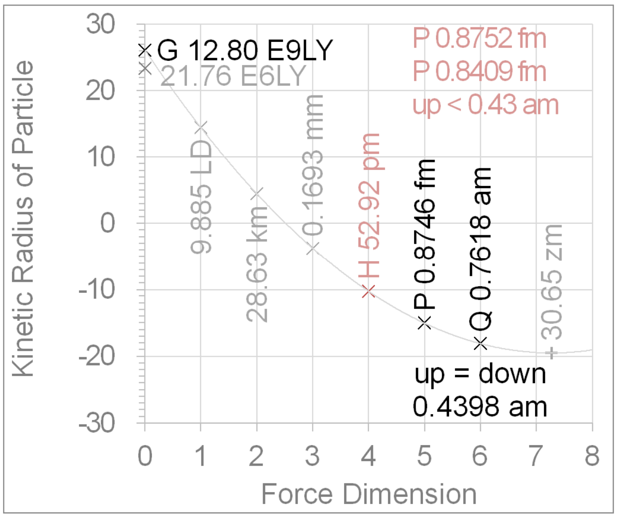

Fig. 7 Radius of proton and quark in kinetic state

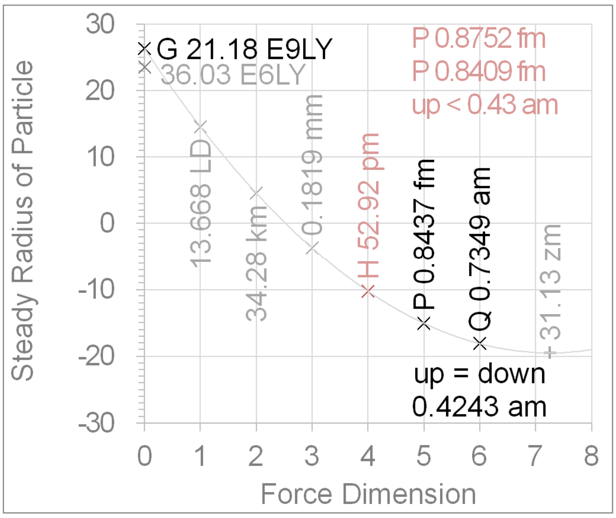

Fig. 8 Radius of proton and quark in steady state

measured to be 52.92 pm. In Fig. 7 and 8, the proton radius was calculated as 0.8746 fm and 0.8437 fm. In physics, proton radius was measured in two types: 0.8752 fm from normal hydrogen and 0.8409 fm from muonic hydrogen. Therefore, it can be seen that 0.8752 fm is the radius of kinetic state, and 0.8409 fm is the radius of steady state. Normal force is in kinetic state. Applying muon, force changes to steady state.

6.4 Radius of quark

The radius of one quark was calculated as 0.4398 am in kinetic state and 0.4243 am in steady state. In physics, quark is estimated to be less than 0.43 am.

6.5 Radius of gravity

Expanding the above calculation, the particle radii from 0D to 3D are calculated. But the particles do not exist in our world. What the radii mean will be revealed physically. The acting radius of gravitational force is said to be infinite. That infinity will be 12.80 E9LY. The acting radius of electromagnetic force is also said to be infinite. When force appears in the non-quantum zero dimension of our space, its radius of action will be 12.80 E9LY.

6.6 Two kinds of electromagnetic force

Electromagnetic force is known as 1/137.036. This is the value of kinetic state of Fig. 7. The steady electromagnetic force value should be applied to the calculation in Fig. 8. The value will be measured from the interaction force with muon. A strong force of steady state should also be applied to Fig. 8. That is, the values of Fig. 7 are natural states, and the values of Fig. 8 are artificial state.

7. Conclusions

Proton consists of two up quarks, one down quark, one strong particle force, and one electromagnetic particle force. Strong dark force and electromagnetic dark force are acting at proton. From the measured mass of proton, down quark mass was calculated as 4.756 MeV.

Neutron is composed of proton, electron, and anti-brane. The mass of anti-brane was calculated as 773,426 eV, and from the measured mass of neutron, the separating energy of anti-brane was calculated as +8,966 eV. Since the mass of anti-brane is much larger than the separating energy, the neutron in nucleus exists stably. When a neutron is in our space, the mass of anti-brane changes close to 0 eV. Due to this, the free neutron collapses by the separating energy.

The radius of proton was calculated as 0.8746E-15 m in kinetic state and 0.8437E-15 m in steady state, and the radius of up or down quark was calculated as 0.4398E-18 m in kinetic state and 0.4243E-18 m in steady state.

The anti-brane is separated into quantum entanglement of electron and anti-electron. The electron locates in our universe and makes the matter of living things, and the anti-electron locates in simulation universe and makes the information of living things. This is the origin of life.

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