

Fifty Solutions to the Unsolved Problems in Physics

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Abstract There is a list of unsolved problems in physics on Internet Wikipedia. In this paper, fifty unsolved problems were calculated or explained through simple mathematics. The main results are as follows. (1) Generations of matter: Fourth generation particle does not exist. (2) Extra dimensions: The space of the universe has six dimensions. (3) Neutrino mass: The mass of electron neutrino is calculated to be 0.15 eV. (4) Solar neutrino problem: The 0.15 eV oscillates to 187.5 keV and 13.61 MeV. (5) Arrow of time: Our universe is 3D, and the quantization proceeds from 4D to 2D direction. (9) Dark matter: Something grows our universe by quantizing 4D space into 3D. (16) Hierarchy problem: Elliptic equation must have a largest value and a smallest value. (19) Cosmological constant problem: The 10^{120} is the ratio of 0D and 3D neutrino masses. (23) Supersymmetry: Elliptic equation is up & down symmetry and left & right symmetry. (27) Origin of mass of most elementary particles: The strength of logarithmically compressed quantum space gives mass to the particle. (30) Quantum gravity: Gravity is the Planck force of strong, electromagnetic, and weak forces. (31) Dark energy: There is a dark force greater than strong force. (32) Quantum chromodynamics: The mass of strong force is 42.152 keV, which is the root of tau mass 1776.82 MeV. (40) Yang-Mills theory: Quantum masses must be calculated as logarithmic values. (49) Fine-tuned universe: All universes change according to logarithmic elliptic equation, and all forces follow logarithmic parabolic equation. (50) Theory of everything: Since quantum space has a logarithmic characteristic, quantum particle must be calculated as logarithmic value.

1. Introduction

In previous studies [1, 2], the author has precisely calculated various unsolved problems in Standard Model of particle physics and Standard Model of cosmology. However, since the scope of previous studies is very wide, the core of the study is not clear. In this study, the core of the author's argument is clearly described, focusing on fifty of the unsolved problems in physics introduced in Wikipedia. For convenience of understanding, since this calculation was performed macroscopically, there is a slight error between this calculation results and the correct answers.

2. Fifty Solutions to Unsolved Problems

2.1 Generations of matter

The masses of electron, muon, and tau neutrino are each <0.12 eV (normal), <170 keV, and <15.5 MeV. Fig. 1 is a chart drawing the parabolic equation after plotting above logarithmic mass values on 4D, 5D, and 6D. There is an insistence that the mass of fourth generation neutrino would be <45 GeV. When the logarithmic value of 45 GeV is plotted on 7D and the cubic equation is drawn, it is judged that the trend is not natural. Since symmetry is very important in physics, the parabolic equation drawn in Fig. 1 is considered reasonable. Therefore, it can be determined that 4th generation particle does not exist.

2.2 Extra dimensions

In Fig. 1, the α (electron neutrino & graviton), β (muon neutrino & photon), and γ (tau neutrino & gluon) particles are born from the cosmic brane of A on 4D, B on 5D, and C on 6D. Three generation neutrinos make the shape of particle, and graviton, photon, and gluon impart force to particle. The vertex of parabola is calculated to be 5.97D, and since the above six particles are the origin of everything, spaces can be determined as six dimensions. From the viewpoint of theory of relativity, the origin of everything is the 6-dimensional linear brane XYZABC(6L). Linear space ABC is transformed into quantum space abc, and quantum particles $\alpha\beta\gamma$ are born from brane ABC. From the viewpoint of quantum mechanics, the origin of everything is the 6-dimensional quantum particles $\phi\psi\omega\alpha\beta\gamma$ (6Q). Quantum space abc is transformed into linear space ABC, and brane ABC are born from quantum particles $\alpha\beta\gamma$. The sum of the linear dimension L and the quantum dimension Q is always six dimensions.

The XY is 2D linear where X and Y are straight lines, and the XYZ is 2D space where the straight-line Z was transformed into quantum z. That is, XY is the world of mathematics, and XYZ is the world of physics. When a particle is located on XYZ, it has mass by the compressed z. XY is our linear space, and z is the quantum space of 4D, 5D, and 6D. The XY can never understand the z. On 2D Linear, since the ant is a 3D object, the ant can be calculated physically. However, since the height Z is quantized as z in 2D Space and

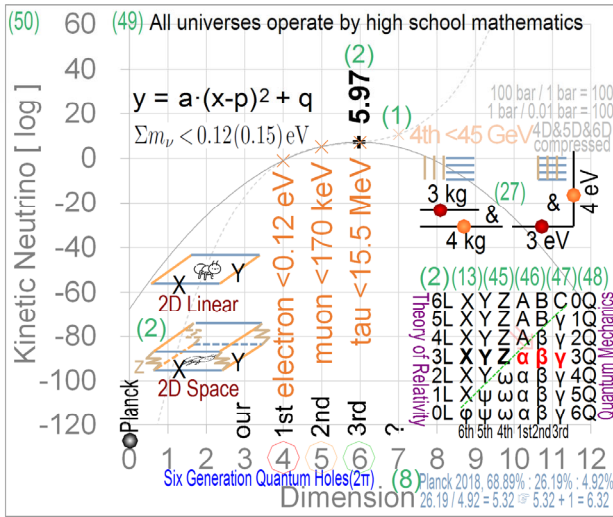


Fig. 1 Three generation neutrinos

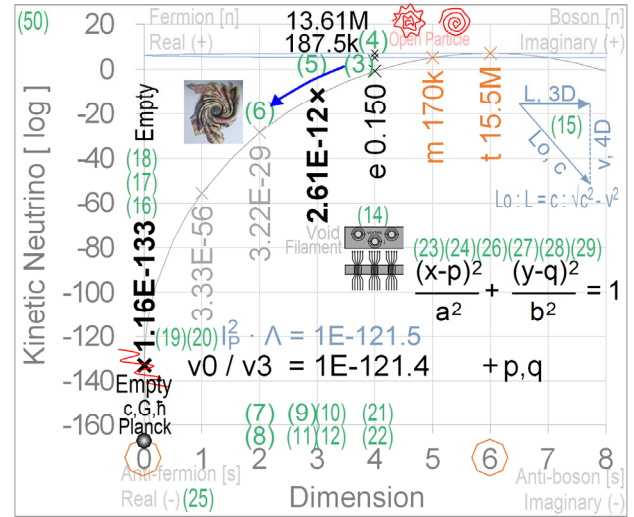


Fig. 2 Logarithmic elliptic equation

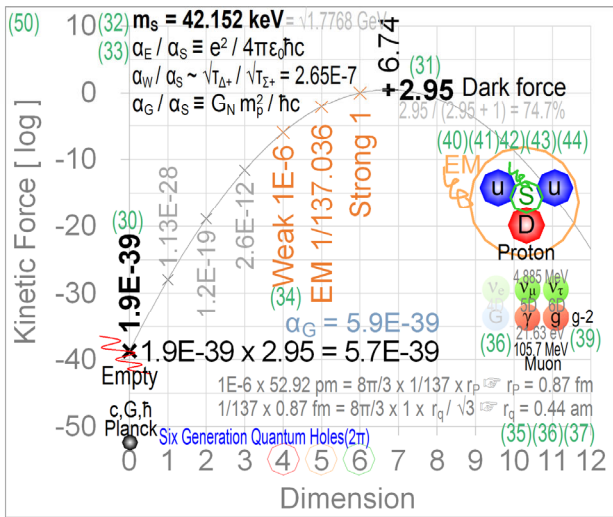


Fig. 3 Integration of four fundamental forces

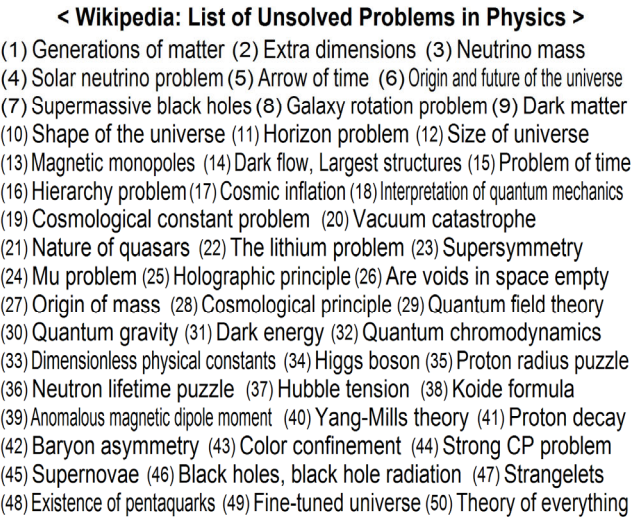


Fig. 4 Fifty unsolved problems in Physics

the ant becomes a 2D object, the ant cannot be calculated physically. Our 4D, 5D, and 6D spaces are quantized, and three generation quantum particles are located there. Since our spaces 1D, 2D, and 3D have not yet been quantized, this is 0D without a quantum space. When a quantum particle bounces into our space, it turns into a wave located at 0D, and its value is the Planck value of the minimum or maximum.

2.3 Neutrino mass

Fig. 2 is a logarithmic elliptic equation with muon neutrino mass 170 keV on 5D, tau neutrino mass 15.5 MeV on 6D, center 6D, and vertex 0D. Since four conditions are given, the elliptic equation is drawn, and the value on 4D is calculated to be 0.15 eV. The masses according to the author's precise calculation [Fig. 4, 5 in Ref. 2] are as follows: electron

neutrino 0.15244 eV, muon neutrino 169.06 keV, tau neutrino 15.408 MeV, its 0D mass 2.1239E-133, graviton 2.5061E-10 eV, photon 0.16090 eV, gluon 115.32 eV, its 0D mass 1.9193E-202 eV.

2.4 Solar neutrino problem, Oscillation

Since elliptic equation is square formula, the very small ellipse in Fig. 2 is also calculated. On 4D, the mass of electron neutrino is calculated to be 0.150 eV of standard mass, 187.5 keV similar to muon mass, and 13.61 MeV similar to tau mass, and all is exact answer. This is oscillation phenomenon, and it occurs in all three generation neutrinos.

2.5 Arrow of time, Law of increasing entropy

The elliptic equation in Fig. 2 should be drawn from 6D to

0D direction. This is the flow direction of change. Our universe exists on 3D and is changing from 4D to 2D direction. We understand it as the flow of time. The law of increasing entropy is that the sum of the entropy changes of the analysis object and the entropy change of the surrounding must increase. Since cosmic space is being quantized from 4D to 3D, the cosmic entropy increases. Gravity causes particles to clump together, so it decreases entropy. Here, since the former is much larger of the two, the sum of all entropies in the universe become much greater than zero.

2.6 Origin and future of the universe

Since space is six-dimensional, the entire universe becomes six-dimensional multiverses. Our 3D universe was born when something in 4D exploded in Big Bang. From Fig. 2, it is understood that our 3D universe will be quantized into a 2D universe after countless times.

2.7 Supermassive black holes

What quantizes 3D space into 2D is supermassive black holes. Stellar black holes and intermediate mass black holes cannot quantize space. Therefore, supermassive black hole should be called 2D quantum hole. It is antiparticles, and antiparticle is 2π times heavier than particle.

2.8 Galaxy rotation problem

Supermassive black hole swallows the 3D space of the galaxy and quantizes it into 2D space. As the result, 2D quantization characteristics occur in the 3D galaxy. The effect of supermassive black hole on galaxy is 5.28 ($= 2\pi - 1$) times greater than physics calculation. In Planck data 2018, dark matter is 26.19%, ordinary matter is 4.92%, and the ratio is 5.32.

2.9 Dark matter

Since supermassive black hole dominates its galaxy, the dark matter of galaxy is 2D quantum hole. The dark matter that dominates our universe is the 3D quantum hole that caused Big Bang. Since 3D quantum hole grows by absorbing 4D quantum hole, our entire space expands naturally. 2D quantum hole also grows by absorbing 3D quantum hole. Since our space is spread out on the surface of 3D quantum hole, we cannot observe cosmic dark matter.

2.10 Shape of the universe

Since 3D quantum hole is a sphere, the shape of our universe is also an absolute sphere. 3D quantum hole is judged to grow at the speed of light in 4D directions, and our space will also expand at the speed of light. Because of the above two phenomena, the universe seems to be observed flat.

2.11 Horizon problem

The surface of 4D sphere is macroscopically uniform. Since there are no absolutes on the surface, everything is interpreted in a relative perspective.

2.12 Size of universe

Our universe is a 4D sphere. It is the starlight in the night sky that reached the earth from the 4D sphere in the past.

2.13 Magnetic monopoles

Since 4D, 5D, and 6D were quantized, they exist as particles and antiparticles. Since our 3D is not quantized, magnetic force in our space always exists as dipole and line.

2.14 Dark flow, largest structures

Quantum hole is a most powerful antiparticle superconductor, and it is located inside in the 4D direction of our space. Type I characteristics of superconductor stably form our space, and Type II characteristics make void, dark flow, largest structures, and so on.

2.15 Problem of time

We can only understand the 3D direction, and the space curves towards the 4D direction. The proper length of an object is L_0 , and light travels with speed c along the curved space. The object with velocity v curves space in 4D direction, and its length in 3D become L . Therefore, as shown in the figure, the relationship of $L_0 : L = c : \sqrt{(c^2 - v^2)}$ is established, and the formula of length contraction $L = L_0 \cdot \sqrt{(1 - v^2/c^2)}$ is derived. The light traveled along L_0 , but in our 3D view, the journey is observed as L . Due to this, time is observed to slow down.

2.16 Hierarchy problem

On 0D in Fig. 2, the characteristic value of $1.16E-133$ is calculated, and this value is the Planck mass of neutrino. This value is almost close to zero, but not zero. Also, $+\infty$ and $-\infty$ do not exist in Fig. 2. Since quantum space is logarithmic characteristic, both 15.5 MeV on 6D and $1.16E-133$ eV on 0D are equally important.

2.17 Cosmic inflation

In the big bang theory, Planck unit system is applied at the beginning of Big Bang. However, the Planck unit system of physics is one-fold unit that the 0D quantum hole quantizes its 0D universe. Planck units are also calculated in dimensions from 0D to 6D such as Fig. 2. The cosmological constant is one of the Planck units of 3D universe, and the beginning of Big Bang was very large, for example about 100 light-years. All multiverses expand at constant velocity.

2.18 Interpretation of quantum mechanics

The characteristics of quantum space are already determined as shown in Fig. 2. Since our universe is located on 3D, three generation neutrinos are continuously being born from the cosmic brane, and they exist as particles in 4D, 5D, and 6D spaces. When the particles appear in 3D space, they are located on 0D and change into waves with mass $1.16E-133$ eV. Particle is open particle. It becomes a particle when it is located on quantum space, and it becomes a wave when it come out into our space.

2.19 Cosmological constant problem

The square of Planck length $1.6162E-35$ m multiplied by cosmological constant $1.1056E-52$ /m² is calculated to be $1E-121.5$. The value of $1.16E-133$ on 0D divided by the value of $2.61E-12$ on 3D is calculated to be $1E-121.4$. The probability that the above two values are almost the same is close to zero. The cosmological constant problem is a fundamental challenge in physics. Therefore, it can be judged that neutrinos are the origin of everything.

2.20 Vacuum catastrophe

The Planck units in physics are the value of 0D universe, and the cosmological constant is the value of 3D universe. The Big Bang of our universe is not 0D Planck unit. Based on the cosmological constant, the Big Bang phenomenon must be newly calculated.

2.21 Nature of quasars

After Big Bang, a giant star from 4D universe fell into our 3D universe. After three explosions, the quasar grows into a galaxy with gravity.

2.22 The lithium problem

Anti-gravity occurs around quasar, and hydrogen, helium, and lithium are generated from the quasar.

2.23 Supersymmetry

Elliptic equation of Fig. 2 is up & down symmetry and left & right symmetry. The left side is the real universe dominated by fermions, and the right side is the imaginary universe dominated by bosons. The top is a positive universe dominated by particles, and the bottom is a negative universe dominated by antiparticles. Therefore, our universe is a positive universe dominated by fermions on the upper left corner. By the two symmetries, the particles in the lower right must exist in our universe. These are thoroughly hidden inside three generation quarks. In Fig. 2, the 2nd and 4th quadrants are a pair, and after almost infinite time passes, it changes to the 3rd and 1st quadrants. Six-dimensional universes have no beginning and no ending because they rotate the elliptic equation of Fig. 2.

2.24 Mu problem

All universes operate with logarithmic elliptic equation.

2.25 Holographic principle

In Fig. 2, our universe is located on above 3D, where the light spreads itself. When countless times pass along the elliptic equation and change to the below 3D, it becomes a holographic universe in which light gathers itself. The above is the universe of black holes, and the below is the universe of white holes. The connection between the above two is worm-hole, but this is the error of time flow direction.

2.26 Are voids in space empty?

Three dimensions of linear space are empty, and three dimensions of quantum space are strongly compressed to the extreme.

2.27 Origin of mass of most elementary particles

In Fig. 2, the mass of each neutrino is determined by the elliptic equation. This means that the mass is given by the strength of logarithmically compressed quantum space. Since neutrino is the origin of all things, it can be judged that the characteristics of quantum space determine everything.

In Fig. 1, everyone would answer that the sum of 3 kg and 4 kg is 7 kg. Is the sum of 3 eV and 4 eV also 7 eV? The answer is multiplication 12 eV. This is the difference between arrangement and coalescence. The difference between 100 bar and 1 bar is 99 bar, and the ratio is 100. The difference between 1 bar and 0.01 bar is 0.99 bar, and the ratio is 100. If the pressure difference is correct, $\Delta 99$ bar is important and $\Delta 0.99$ bar is ignored and can be omitted. It is the pressure ratio that determines the thermodynamic gas turbine cycle efficiency, and both 100 bar and 0.01 bar are equally important. This is the logarithmic characteristic.

2.28 Cosmological principle

The above descriptions are a new cosmological principle.

2.29 Quantum field theory

The above descriptions are a new quantum field theory.

2.30 Quantum gravity

Weak coupling constant is about $1E-6$ to $1E-7$. In previous study [Table 2 in Ref. 2], the value was calculated to be $1.0109E-6$. Therefore, Weak coupling constant can be determined as about $1E-6$. Fig. 3 is a chart drawing the logarithmic parabolic equation at strong force 1 on 6D, electromagnetic force $1/137.036$ on 5D, and weak force $1E-6$ on 4D. As the result, the value on 0D is calculated to be $1.9E-39$. The exact value of gravitational coupling constant is $5.9E-39$. It can be judged that four fundamental forces will be connected by the

logarithmic parabolic equation. In Fig. 3, the gravity located on 0D is the Planck coupling constant of three generation forces and exists as a wave. The Planck force in physics is the force of 0D quantum hole.

2.31 Dark energy

In Fig. 3, the vertex is calculated to be 2.95. This means that there exists a certain force greater than strong force 1. Multiplying this value by $1.9E-39$ yields $5.7E-39$. Dark force, not dark energy, exist in the universe. Therefore, dark energy cannot be discovered in the universe. Since the universe is an absolute sphere, the 4.92% of ordinary matter in the universe has no effect on the entire shape of the universe. In Fig. 3, dark force is 2.95 and strong force is 1, so the ratio is 74.7%. In previous study [Table 2 in Ref. 2], the ratio of dark force was calculated to be 2.6922 and 72.916%.

In Planck 2018 Data, the age of the universe is t_H 13.787 BY and the cosmological constant is Λ $1.1056E-52$ /m². The $l_{p0}^2 \cdot \Lambda_3 = v_0/v_3$ has been proven in Fig. 2. Therefore, the value of v_3/v_3 is $l_{p3}^2 \cdot \Lambda_3 = 1$. The length of $l_{p3} = \sqrt{\Lambda_3}$ is $9.5104E25$ m, and the light time of $t_{p3} = l_{p3}/c$ is 10.053 BY (= $9.5104E25 / 2.9979E8$ -60-60-24-365.24). Therefore, the ratio of cosmological constant time t_{p3} and present time t_H is calculated to be 72.916%. This value exactly corresponds to the dark force ratio 72.916%.

2.32 Quantum chromodynamics

Force is a combination particle, and the mass of strong particle force is 42.152 keV that is the root of tau mass 1776.82 MeV. The mass of electromagnetic particle force is 828.13 eV, and the mass of weak particle force is 15.828 meV [Table 2 in Ref. 2]. Here, three generation dark forces act on the three generation particle forces, and they appear as the physical forces.

2.33 Dimensionless physical constants

The force coupling constant formulas are shown in Fig. 3. Since the strength α_s of strong force is not known, the forces are expressed as dimensionless. Weak force consists of electron neutrino & graviton, electromagnetic force consists of muon neutrino & photon, and strong force consists of tau neutrino & gluon. Since the mass of strong force is 42.152 keV, the α_E , α_W , and α_G are also calculated in units of mass. Since we do not know the origin, we are led to think that there is a great physical secret in the dimensionless constant.

2.34 Higgs boson and electroweak symmetry breaking

Lowercase h boson is a very low-mass particle located on 12D hidden in bottom quark. When bottom quark explodes, the h boson on 12D turns into a very heavy H boson on 6D. The H boson is only third-generation particle.

2.35 Proton radius puzzle

From the formula in Fig. 3, the proton radius is calculated to be 0.87 fm. The exact value calculated in previous study [Fig. 22 in Ref. 2] is 0.8751 fm. All particles are classified into a kinetic state and a steady state, and the universe operates in the combined state of the above two. When the kinetic state force acts, the radius is measured 0.8751 fm, and when the steady state force acts, the radius is measured 0.8409 fm. That is, both of above measurements are right answers. From the same formula, the radius of one quark is calculated to be 0.44 am, and physics suggests <0.43 am.

2.36 Neutron lifetime puzzle

Such as proton radius puzzle, the lifetime of 888 seconds in beam is in kinetic state, and the lifetime of 879.4 seconds in bottle is in steady state. Both values are right answers.

2.37 Hubble tension

The 67.66 km/s/Mpc observed from CMB is kinetic state value, and the about 73 km/s/Mpc observed from supernova is steady state value. Both values are right answers. Here, our universe operates on the combined state of above two values. Present is the mixture of the kinetic state 37.143% = $(13.787 - 10.053) / 10.053$ of past and the steady state 62.857% of future. Therefore, the $67.66 \times 37.143\% + 73 \times 62.857\%$ is calculated to be 71.0 km/s/Mpc. This means that our universe expands as the constant velocity of light speed.

2.38 Koide formula

Electron is the combination of $\nu_e \nu_\mu \nu_\tau G \gamma g$, muon is the combination of $\nu_\mu \nu_\tau \gamma g$, and tau is the combination of $\nu_\tau g$. The correlation between the author's logic and Koide's formula has not yet been found.

2.39 Anomalous magnetic dipole moment

Muon is a combination particle of muon tau neutrino 4.8852 MeV, and photon gluon 21.628 eV [Table 3 in Ref. 2]. The product of the above two is muon 105.658 MeV, and the ratio is 0.000004427. That is, the photon gluon in muon is influencing the magnetic field very minutely.

2.40 Yang–Mills theory

Inside of proton is composed of two up quarks 2.25 MeV, one down quark 4.75 MeV, one strong particle force 42.152 keV. The product of the above four values to the power of 1/4 is 1.00345 MeV. One electromagnetic particle force of 828.13 eV surrounds them. The product of the above two is calculated to be 88.56% of proton mass 938.272 MeV. The three generation dark force values are calculated from the difference between the particle forces [Fig. 16 in Ref. 2]. The second and third dark forces act on proton, and the mass is calculated to be 99.92% [Table 6 in Ref. 2].

2.41 Proton decay and spin crisis

Quantum hole creates quantum space, which governs the characteristics of all particles.

2.42 Strong CP problem

This is a problem in quantum chromodynamics.

2.43 Color confinement

Inside of proton, there are two up quarks composed of three generation antineutrinos, and one down quark composed of three generation neutrinos. Neutrino is red color and antineutrino is blue color.

2.44 Baryon asymmetry

The electron is made up of three generation neutrinos. Therefore, there are equal numbers of neutrinos and anti-neutrinos in hydrogen.

2.45 Supernovae

Proton is composed of down quark of red $\alpha_N\beta_N\gamma_N$ particles and up quark of blue $\alpha_S\beta_S\gamma_S$ antiparticles. The explosion of α_N is supernova. Since α particle is gravity and weak force series, first generation particle cannot escape supernovae.

2.46 Black holes, black hole information paradox

The explosion of β_N is stellar black hole. Since β particle is photon series, second generation particle cannot escape stellar black hole. The explosion of γ_N is intermediate-mass black hole. Nothing can escape the intermediate-mass black hole. Supermassive black hole is quasar that have fallen into our universe from 4D universe and quantize our space with powerful rotations.

2.47 Strangelets

When the combination of particle exists in all 4D, 5D, and 6D quantum spaces, the particle becomes stable. These are electron, up quark, and down quark. The rest of the particles are very unstable.

2.48 Existence of pentaquarks

Particles other than electron, up quark, and down quark are meaningless in reality. The various particles pouring out of particle accelerator are derived from the combination and separation of the six origin particles. The reason why only three quarks should be located in proton has not yet been identified.

2.49 Fine-tuned universe

The birth of the universe has nothing to do with probability or the anthropic principle. The physics values of all multiverses are exactly equal to Fig. 2 and Fig. 3. The probability of the birth of all multiverses are 100%.

2.50 Theory of everything

The cosmological constant problem in Fig. 2 and the quantum gravity in Fig. 3 are the most important items that integrate general relativity and quantum mechanics. If the above two things were proven, it can be said that the theory of everything almost was revealed. In this paper, from three charts, fifty unsolved problems in physics have been calculated and explained. This means that the contents of this paper are closest to the theory of everything.

3. Conclusions

In this paper, fifty unsolved problems in physics were macroscopically calculated or explained from three generation neutrino masses and three generation force coupling constants. The compressed three generation quantum spaces give mass to the three generation particles. This is the core. Compression is accomplished by multiplication, and multiplication is calculated as logarithmic sum. There is no mathematical formula that can turn addition into multiplication. This is why physics theories and formulas become more and more complex as time goes on.

References

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