Quantum Space and Origin of Mass

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Abstract From the Higgs masses of Run 1 and 2016 measured at CMS, a very special value of 36.9% was found. Applying 36.9% to Run 1 and Run 2 of ATLAS, the Higgs mass is calculated to be 125.07 GeV at Run 1 and 125.06 GeV at Run 2. Also, when applying 36.9% to Run 1 and 2016 of CMS, 47 identical values are found. From 36.9%, the Hubble constant of 70.93 km/s/Mpc, the age of the universe of 13.785 BY, the dark energy ratio Ω of 68.45%, and the cosmological constant of 1.1020E-52 /m2 are simply calculated. The compressive strength of three generation quantum spaces makes the three generation particles and gives it a quantum mass. Since quantum space has a logarithmic property, the total mass of particles must be calculated as the logarithmic value. From the log-parabola equation of W Z H, the relationships of $H^2 = Z^7 / W^5$ and $\Omega = W^3 / Z^3$ were derived. Therefore, substituting Z 91.1880 GeV of PDG 2024, the masses of W and H are calculated to be 80.36 GeV (= $Z \cdot \Omega^{1/3}$) and 125.06 GeV (= $Z / \Omega^{5/6}$). From more precise calculations, when the mass of Z is 91.1880 GeV, the values of Ω, W, and H were calculated to be 68.4523%, 80.3650 GeV, and 125.059 GeV. The value of Z / H is calculated as 72.9161%. Multiplying by 68.4523%, 2.00350 is calculated, which is similar to the g-2 factor of 2.002xx.

1. Introduction

The mass of Higgs boson presented by PDG 2024 is 125.20±0.11 GeV [1]. At ATLAS, the Higgs mass of Run 1 is 125.38±0.41 GeV, that of Run 2 is 125.10±0.11 GeV, and the combined mass is 125.11±0.11 GeV [2]. At CMS, the Higgs mass of Run 1 is 125.07±0.28 GeV, that of 2016 is 125.46±0.16 GeV, and the combined mass is 125.38±0 GeV [3]. The purpose of this study is (1) to reinterpret the Higgs mass measured by ATLAS and CMS and find a special value of 36.9%, (2) to recalculate the Higgs mass from 36.9%, (3) to calculate the origin of the universe from 36.9%, (4) to find the Higgs mass and dark energy formulas from the log-parabolic equation, and (5) to suggest the quantum space and origin of mass.

2. Discovery of Dark Ratio 36.9% from CMS

2.1 ATLAS and CMS

The masses of Higgs boson measured by ATLAS and CMS are shown in Fig. 1. The 4ℓ mass of ATLAS Run 1 is 124.51±0.52 GeV, the γγ mass is 126.02±0.51, and the combined mass of above two is 125.38±0.41 GeV. The 4ℓ mass of ATLAS Run 2 is 124.99±0.19 GeV, the γγ mass is 125.17±0.14, and the combined mass of above two is 125.10±0.11 GeV. The combined mass of Run 1 and Run 2 was presented as 125.11±0.11 GeV [2]. The γγ mass of CMS Run 1 is 124.70±0.34 GeV, the 4ℓ mass is 125.59±0.46, and the combined mass of above two is 125.07±0.28 GeV. The 4ℓ mass of CMS 2016 is 125.26±0.21 GeV, the γγ mass is 125.78±0.26, and the combined mass of above two is 125.46±0.16 GeV. The combined mass of Run 1 and 2016 was presented as 125.38±0 GeV [3]. Recently, CMS measured 125.04±0.12 GeV at 4ℓ [4].

Two peculiar things are visible in Fig. 1. At ⓐ of CMS, the left side of Run 1 is γγ, but the left side of 2016 is 4ℓ. At ①, CMS presented the value of Run 1 + 2016 as 125.38 GeV, and the combined mass of ATLAS Run 1 is also 125.38 GeV.

2.2 Six numbers of 125.38 GeV

Table 1 and Fig. 2 present calculations for four cases where 125.38 GeV is calculated. In Fig. 2, γγ of Run 1 is (1) 124.70 and 4ℓ is (4) 125.59. By multiplying these values by the ratio of 36.9%, the values of SK (2) 125.03 and KS (3) 125.26 are calculated. γγ of 2016 is (5) 125.26 and 4ℓ is (8) 125.78. By multiplying these values by the ratio of 36.9%, the values of SK (6) 125.45 and KS (7) 125.59 are calculated. When the above values are recalculated at the ratio of 36.9%, as shown in Fig. 2, 125.38 GeV is calculated for all four cases with a standard deviation of 0.0001 GeV. Also, in Fig. 1, Run 1 of ATLAS was also 125.38 GeV, and Run 1 + 2016 of CMS was also 125.38 GeV. As calculated in Table 1, when 37.6% is applied, the standard deviation is calculated as 0.0037 GeV, and when 36.5% is applied, it is calculated as 0.0020 GeV. That is, when the ratio is between 37.6% and 36.5%, the four values are all calculated as 125.38 GeV.

2.3 Dark ratio: 36.9%

A very peculiar ratio of 36.9% was found from CMS Run 1 and 2016. Since its physical meaning is unknown, it can be

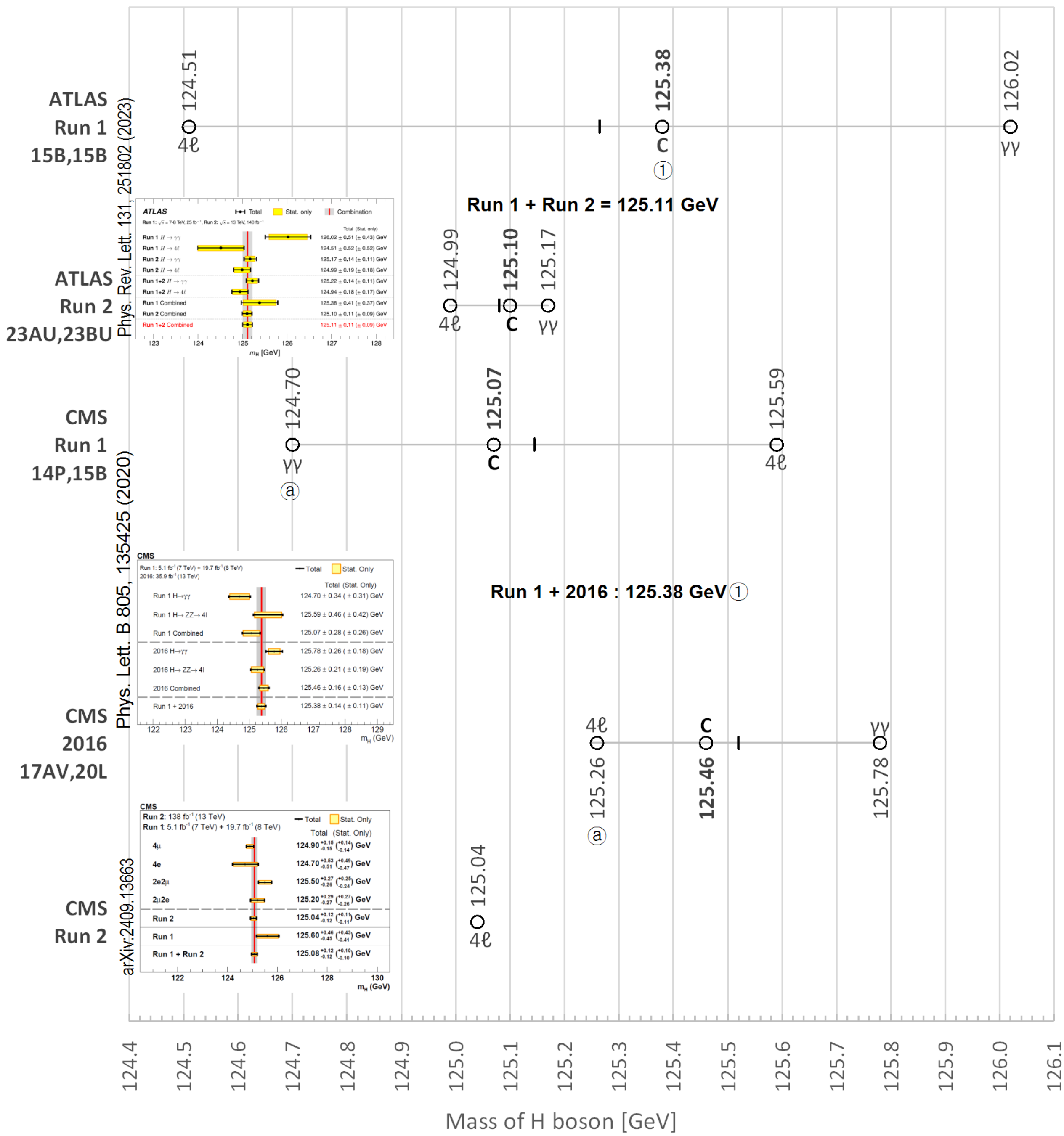


Fig. 1 The measured H boson masses [GeV]

called the dark ratio.

2.4 Mass of H boson: 125.06 GeV

In Fig. 1, the combined value of ATLAS Run 1 is 125.38 GeV, and the combined value of Run 2 is 125.10 GeV. Fig. 3 shows the recalculated results by applying 63.1% and 36.9% to all values of ATLAS and CMS.

Applying 63.1% to 4ℓ 124.51 and 36.9% to γγ 126.02 of ATLAS Run 1, 125.07 GeV is calculated. Applying 63.1% to 4ℓ 124.99 and 36.9% to γγ 125.17 of ATLAS Run 2, 125.06 GeV is calculated.

In Fig.1, the combined value of CMS Run 1 is 125.07 GeV, and that of 2016 is 125.46 GeV. Applying 63.1% to γγ 124.70 and 36.9% to 4ℓ 125.59 of CMS Run 1, 125.03 GeV is calculated. Applying 36.9% to Run 1 γγ 124.70 and 63.1% to 2016 4ℓ 125.26, 125.05 GeV is calculated.

The recalculated values are converging to 125.06 GeV. Therefore, the mass of H boson is estimated to be 125.06 GeV.

Table 1 Combination applying a dark ratio of 36.9% to Run 1 and 2016 of CMS

State	Ratio	CMS	γγ	SK	KS	4ℓ	Deviation
[E]	62.4%	Run 1	124.70	125.03	125.26	125.59	68.80%
[Q]	37.6%	2016	125.26	125.46	125.58	125.78	72.67%
			125.37	125.38	125.38	125.38	0.0037
[E]	63.1%	Run 1	(1) 124.70	(2) 125.03	(3) 125.26	(4) 125.59	1 - 63.1% / 2 Ω_X 68.45%
[Q]	36.9%	2016	(5) 125.26	(6) 125.45	(7) 125.59	(8) 125.78	1 / (1+36.9%) Ω_Q 73.05%
			(1↔8) 125.38	(2↔7) 125.38	(3↔6) 125.38	(4↔5) 125.38	σ 0.0001
[E]	63.5%	Run 1	124.70	125.02	125.27	125.59	68.25%
[Q]	36.5%	2016	125.26	125.45	125.59	125.78	73.26%
			125.39	125.38	125.38	125.38	0.0020

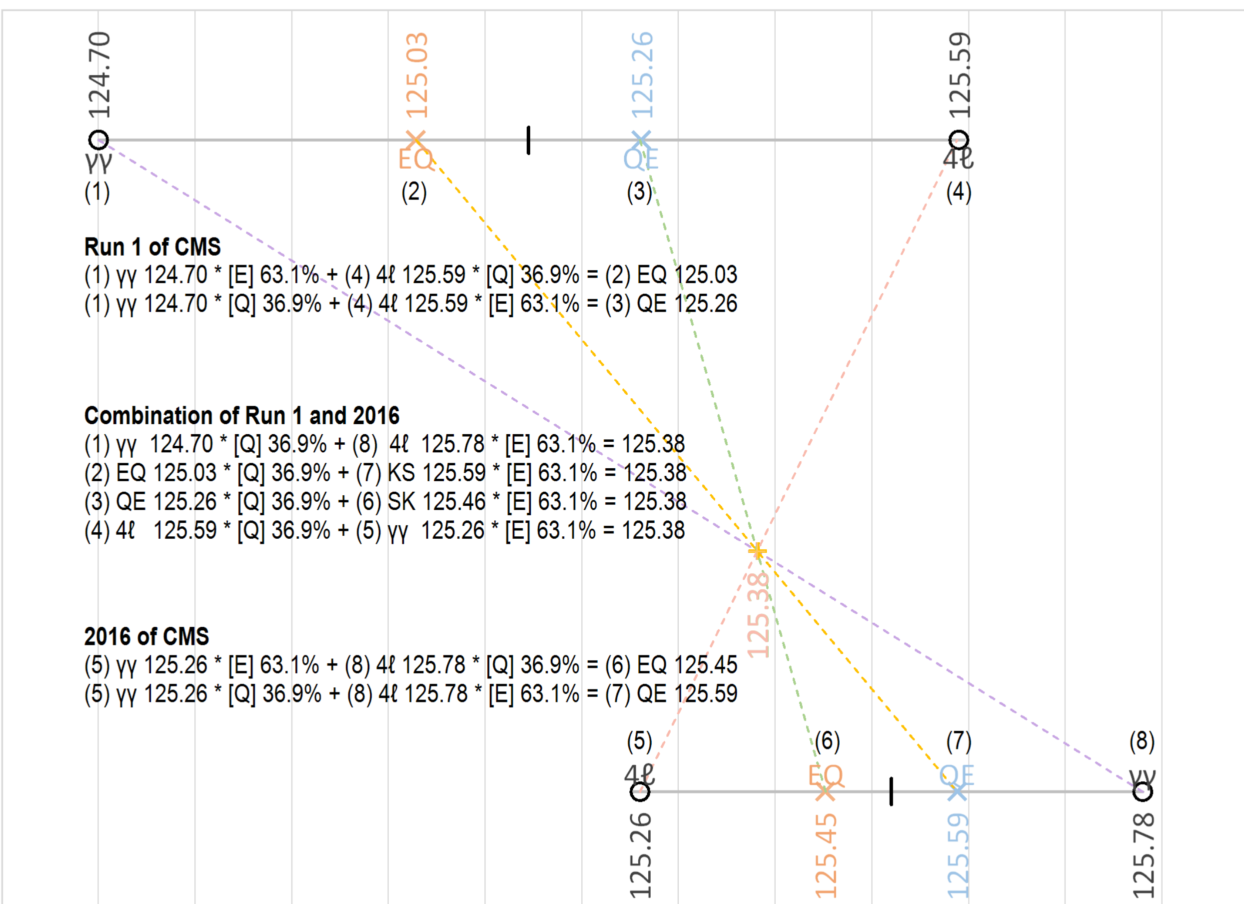
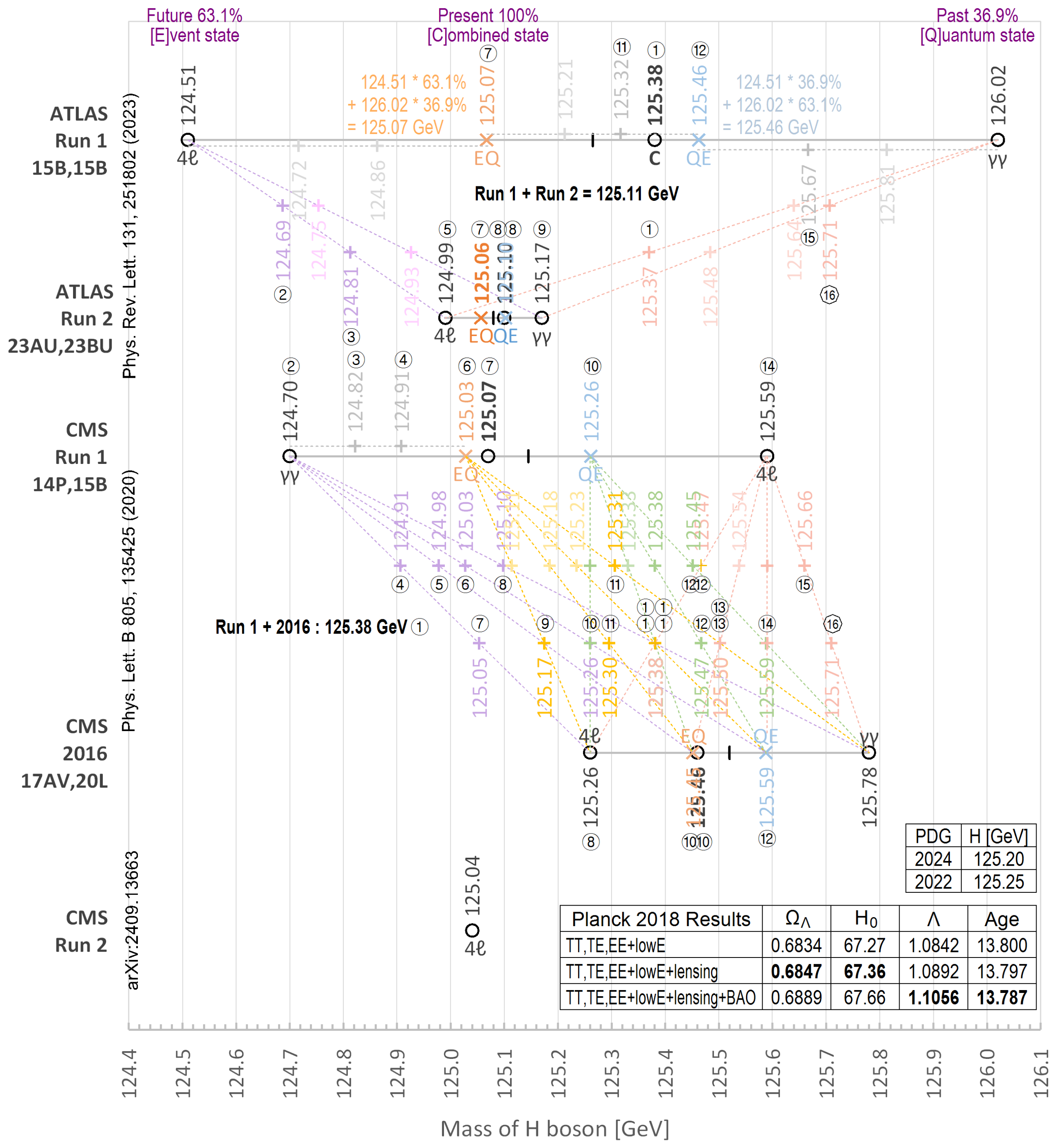


Fig. 2 Combination applying a dark ratio of 63.1% to Run 1 and 2016 of CMS



PDG	H [GeV]
2024	125.20
2022	125.25

Planck 2018 Results	Ω_Λ	H_0	Λ	Age
TT,TE,EE+lowE	0.6834	67.27	1.0842	13.800
TT,TE,EE+lowE+lensing	**0.6847**	**67.36**	1.0892	13.797
TT,TE,EE+lowE+lensing+BAO	0.6889	67.66	**1.1056**	**13.787**

ATLAS Run 1 4ℓ 124.51 * 63.1% + Run 1 γγ 126.02 * 36.9% = 125.07 GeV ⑦

Run 2 4ℓ 124.99 * 63.1% + Run 2 γγ 125.17 * 36.9% = 125.06 GeV ⑦

CMS Run 1 γγ 124.70 * 63.1% + Run 1 4ℓ 125.59 * 36.9% = 125.03 GeV ⑥

Run 1 γγ 124.70 * 36.9% + 2016 4ℓ 125.26 * 63.1% = 125.05 GeV ⑦

CMS Run 2 4ℓ 125.04 * 63.1% + Run 2 γγ _____* 36.9% = 125.06 ☞ γγ = 125.09 GeV

Run 2 4ℓ 125.04 * 36.9% + Run 2 γγ _____* 63.1% = 125.06 ☞ γγ = 125.07 GeV

Fig. 3 Reinterpretation of the measured H boson masses [GeV]

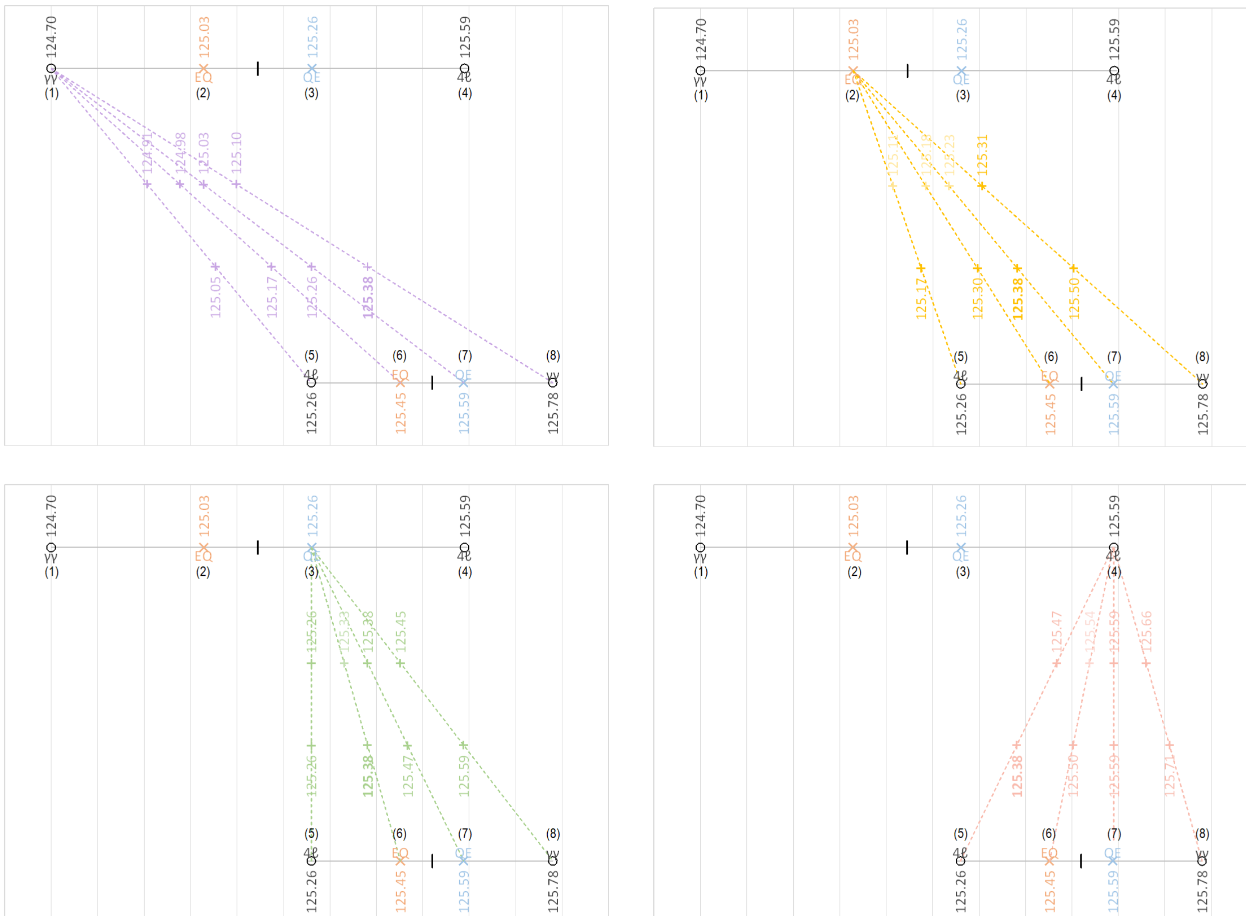


Fig. 4 Consistency between Run 1 (above) and 2016 (below)

2.5 State of 4ℓ, γγ, and H boson

Applying 36.9%, the mass of the H boson is calculated to be 125.06 GeV. This result is unlikely to be a coincidence. This means that 4ℓ, γγ, and H are all real answers, and 4ℓ exists in a certain [Q] state, γγ exists in a certain [E] state, and H exists in our [C] state.

2.6 Consistency of 47 values

All the values calculated in Fig. 3 are simply recalculated by applying the dark ratio of 36.9% to Fig. 1. In Fig. 3, 47 values from ① to ⑯ match within ±0.01 GeV.

Fig. 4 shows the detailed relationship between Run 1 and 2016 in the CMS of Fig. 3. The bold color numbers indicate consistency, while the light color numbers indicate inconsistency. It can be seen that the relationship between Run 1 and 2016 is almost perfectly established.

2.7 CMS Run 2 γγ: 125.07, 125.09 GeV

In Fig. 2, the 4ℓ of CMS Run 2 was measured at 125.04 GeV. The mass of H boson is estimated to be 125.06 GeV. Therefore, the γγ of CMS Run 2 is predicted to be measured as 125.07 or 125.09 GeV.

3. Physical Meaning of Dark ratio 36.9%

3.1 Hubble tension: 70.93 km/s/Mpc

In Planck 2018 results, Hubble constant from CMB is given as about 67.4 km/s/Mpc, and the global average value measured from redshift is given as about 73.0 km/s/Mpc. From the same calculation, the value of CMB 67.4 * [Q] 36.9% + Redshift 73.0 * [E] 63.1% is calculated to be [C] 70.93 km/s/Mpc. From this, it can be determined that CMB is [Q] state, Redshift is [E] state, and the mixture of the above two is the [C] state.

3.2 Age of universe: 13.785 BY

If the universe is expanding at a constant velocity, the Hubble constant of 70.93 km/s/Mpc is calculated to be 13.785 BY from 3.08568E19 / 70.93 / 60 / 60 / 24 / 365.24 / 1E8. In Planck 2018 results, the age of the universe is presented as 13.800 BY, 13.797 BY, or 13.787 BY.

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                100%                      ω_Q 36.9%            ω_E 63.1%
|---------------------------------------|------------X-------------------------|
0                                      0.5       Ω_X 0.6845                    1

                100%                      ω_Q 36.9%            ω_E 63.1%
|--------------------------------------Q-------------X-------------------------E
0                                  Ω_Q 0.7305        1                 Ω_E 1.4609

                100%                      ω_Q 36.9%            ω_E 63.1%
|--------------------------------------Q-----------⇛X⇚------------------------E
0                                      0.5        Ω_X 0.6845                   1
0BY          Dark Time              10.069BY       13.785BY             20.139BY
0E25m        Dark Length            9.526E25m      13.041E25m           19.052E25m
1/0 m2       Cosmological Constant  1.1020E-52/m2  CMB→|→Redshift       Hyper Black Hole
Big Bang     Dark Matter            3D Planck star 3D Universe          4D Event Horizon

              ξ_456 2.710                    1                  1.710
|--------------------------------------Q-----------⇛X⇚------------------------E
0                                  Ω_Q 0.7305        1                 Ω_E 1.4609
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Fig. 5 Dark energy ratio and Cosmological constant in Steady State

3.3 Dark energy ratio: 68.45%

At first line in Fig. 5, the 0.5 is plotted on the coordinate axes of 0 and 1. Let the interval between 0 and 0.5 be 100%, the interval between 0.5 and the unknown X be ω_Q 36.9%, and the interval between the unknown X and 1 be ω_E 63.1%. From this, the value of Ω_X where the unknown X is located is calculated to be 0.6845 (= 136.9% / 2). In the Planck 2018 results, the dark energy ratio by TT,TE,EE+lowE+lensing is presented as 0.6847.

3.4 Dark energy ratio: 73.05%

In Fig. 5, let the unknown X be 1. Then, Ω_Q is calculated as 0.7305 (= 1 / 136.9%). Until Planck 2012, the dark energy ratio was suggested as about 73%. Therefore, it can be understood that 68.45% and 73.05% are simply the differences in the reference positions, and the product of the two is exactly 1/2 (0.5 : 0.6845 = 0.7305 : 1).

3.5 Dark matter: Q

The unknown X would be our universe, and 0 to 0.5 would be dark matter Q.

3.6 Dark time: 10.069 BY

In Fig. 5, the 0 is Big Bang. Since the time from 0 to X is 13.785 BY, the time from 0 to Q is calculated from the proportional equation to be 10.069 BY, and since it is an unknown value, it becomes dark time.

3.7 Dark length: 9.525E25m

The dark time multiplied by the speed of light is the dark length, which is calculated to be 9.526E25m (= 10.069 BY * 1E8 * 2.99792E8 * 60 * 60 * 24 * 365.2422)

3.8 Cosmological constant: 1.1020E-52 /m2

1/m2 of the dark length is calculated as 1.1020E-52 /m2. In Planck 2018 results, the cosmological constant Λ was given as 1.1056E-52 /m2 (TT,TE,EE+lowE+lensing+BAO).

3.9 3D Planck star & Hyper black hole

Our universe X is located in the void between 0.5 and 1. In order for that X to remain stable, a certain extreme force must push from the left of X, and a certain extreme force must pull from the right of X. The Q of size 0 to 0.5 could generate the extreme forces. The Q is a 3D Planck star, and the E is the 4D event horizon of Hyper black hole. We inside of X can never observe Q and E.

3.10 Cosmological constant problem

The length of 3D Planck star l_{P3} is 9.525E25 m, and the cosmological constant Λ_3 is 1.1020E-52, so the cosmological constant problem $l_{P3}^2 \cdot \Lambda_3$ becomes 1/1, not 1/10^120.

3.11 Expansion of the universe

In Fig. 5, our universe is located at X, and as our universe expands, X moves to the right. Here, it is not reasonable to assume that only X moves to the right and the rest are fixed. It would be reasonable to assume that, like a 4D rubber band, 0 is fixed and 1 expands to the right. Therefore, 100%, ω_Q 36.9%, and ω_E 63.1% are absolute constants, and the rest are time-dependent parameters. That is, dark energy ratio is the absolute constant, and cosmological constant is the cosmological parameter.

3.12 Size of Big Bang

The movement of Q X E in Fig. 5 to the left is going back to Big Bang. The radius of Q at the time of Big Bang is estimated to be 31 light-years.

3.13 Theory of absoluteness

The entirety of Fig. 5 is the absolute theory of 4D space and 1T time, and our universe X is the relativity theory of 3d space and 1t time. When infinitely small dark particles exist infinitely in an infinitely large space, it would be difficult for them to cause beautiful changes. A single infinitely large dark particle could absolutely bring about beautiful changes. The one infinitely large dark particle could cause the absolute beautiful changes.

3.14 Absolute gravity

In Fig. 5, the space between Q and X is a four-dimensional void, and dark matter Q of ξ_{456} 2.710 causes absolute gravity in universe X of 1.

3.15 Quantum, Event, and Combined state

The left side of X is the past space that expanded at the speed of light, and is in [Q]uantum state dominated by the pushing force. The right side of X is the future space that is stationary, and is in [E]vent state dominated by the pulling force. X itself is present space where the past and future coexist, and is in [C]ombined state.

3.16 [Q] 36.9% + [E] 63.1% = [C] 100%

Hubble constant from CMB is about 67.4 km/s/Mpc, and that from redshift is about 73.0 km/s/Mpc. This problem is called "Hubble Tension". The radius of proton in ordinary hydrogen is 0.8751fm, and that in muonic hydrogen is 0.8409fm. This problem is called "Proton Radius Puzzle". The lifetime of neutron in beam is 887.7s, and that in bottle is 877.75s. This problem is called "Neutron Lifetime Puzzle". The above reason is the difference between kinetic measurement method and steady measurement method. That is, [Q], [E], and [C] are all correct answers.

3.17 [Q] CMB vs. [E] Redshift

As shown in Fig. 5, [Q] CMB is the kinetic light that is moving due to the push of Q, and [E] redshift is the steady light that is approaching due to the expansion of E. The core of the above explanation is that the characteristics of CMB and Redshift are different from each other.

3.18 Quantum mechanics

In Fig. 5, The X is our 3D universe. On the left, ⭆ is pushing with extreme force, and on the right, ⭅ is pushing with extreme force. This gives birth to quantum mechanics in which [Q], [E], and [C] coexist in the extremely small 4D thickness of our 3D universe.

Table 2 W, Z, and H masses [GeV] presented by PDG

Year	W	Z	H
2024	80.3692	91.1880	125.20
2022	80.377	91.1876	125.25
2020	80.379	91.1876	125.10
2018	80.379	91.1876	125.18
2016	80.385	91.1876	125.09
2014	80.385	91.1876	

4. Equation Relating W, Z, and H

4.1 Masses of W, Z, H

In Table 2, the masses of W, Z, and H presented by Particle Data Group are shown.

4.2 Log-parabola equation

In the chart of Fig. 6(a), the horizontal axis is the dimension of space, and the vertical axis is the logarithm of particle mass. The core of this interpretation is that quantum mass should be calculated as logarithmic values. The values of W and Z masses are PDG 2024 data of Table 2. In (a), drawing the log-parabola with (4D, W80.3692 GeV), (5D, Z91.1880 GeV) and the vertex 4D, the value of Hu 133.15 GeV is calculated at 6D.

In Fig.6(a), capital letters W Z H represent GeV, and small letters w z h represent their logarithmic values. Solving this as $y = a\cdot(x - p)^2 + q$, the hu at 6D is calculated as 4z - 3w.

4.3 Log-inverse parabola equation

In Fig. 6(b), when the log inverse parabola is plotted for the three points (W80.377, 4D), (Z91.1876, 5D), and (Hu133.15, 6D), 125.043 GeV is calculated at its vertex, which is almost the same as the mass 125 GeV of H boson.

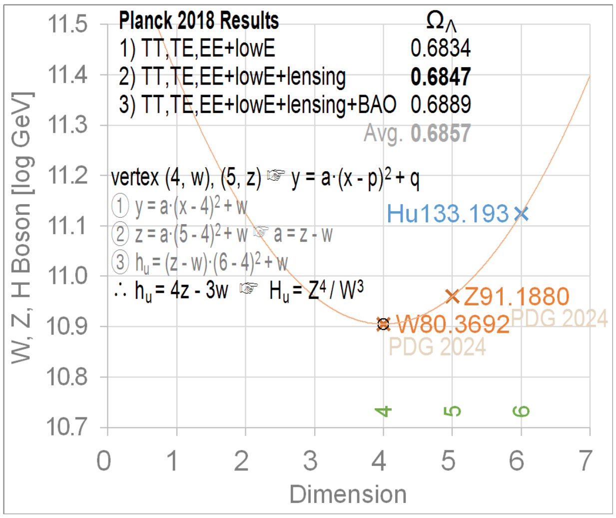
Solving this as $y = b\cdot(x - h)^2 + k$, the values of h, b, and k are calculated as $7z/2 - 5w/2$, $-1/6(z-w)^2$, and $6 + 1/24$. What is peculiar here is that 1/24 is derived.

4.4 $H^2 = Z^7 / W^5$

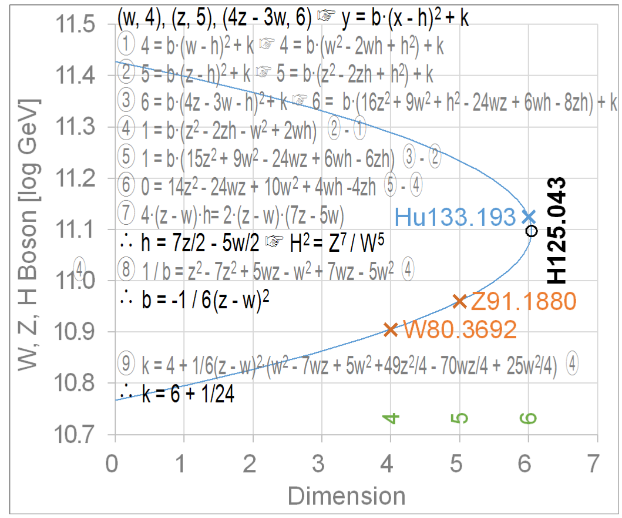
Fig. 6(c) shows (a) and (b) as one chart, and $H^2 = Z^7 / W^5$ is derived. Therefore, from the W and Z values of PDG 2024, H is calculated to be 125.043 GeV.

4.5 $\Omega_X = W^3 / Z^3$, $\Omega_Q = Z / H$

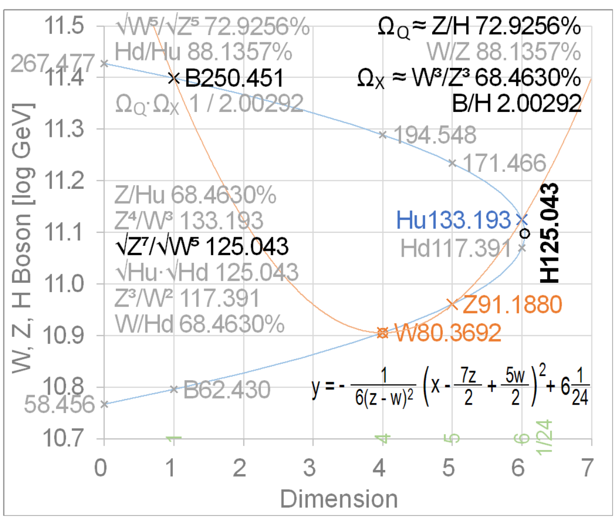
W^3 / Z^3 is calculated as 68.4630%, and Z / H is calculated as 72.9256%. These values are similar to Ω_X of 0.6845 and Ω_Q of 0.7305 in Fig. 5.



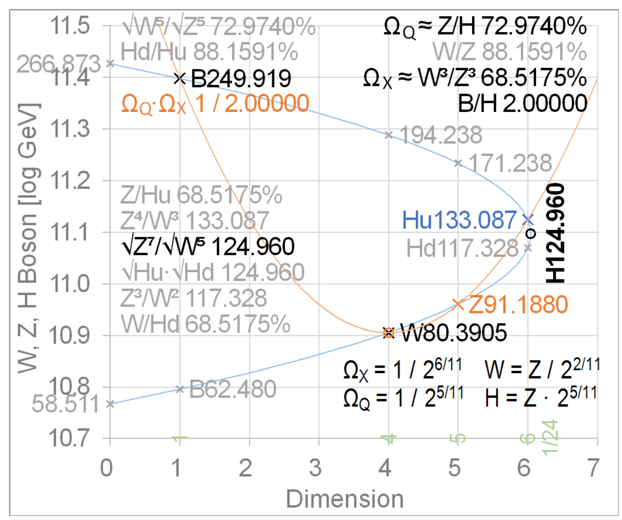
(a) Log-parabola equation



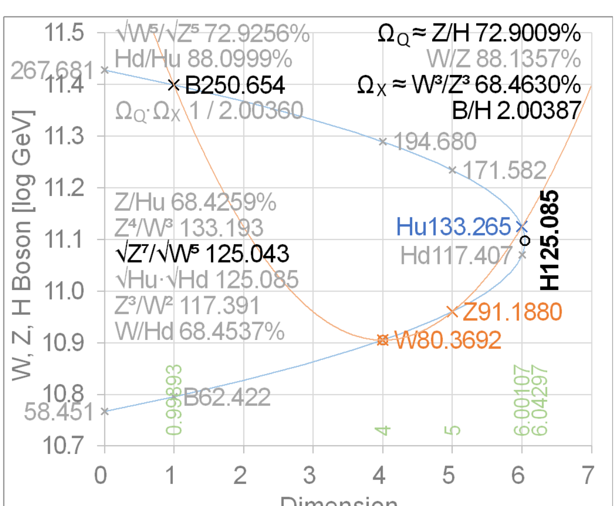
(b) Log-inverse parabola equation



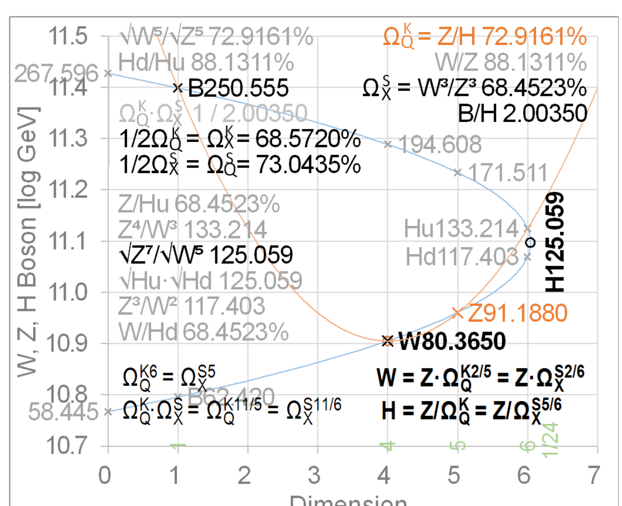
(c) Relationship of W, Z, H



(d) When $\Omega_Q \cdot \Omega_X$ is 1 / 2

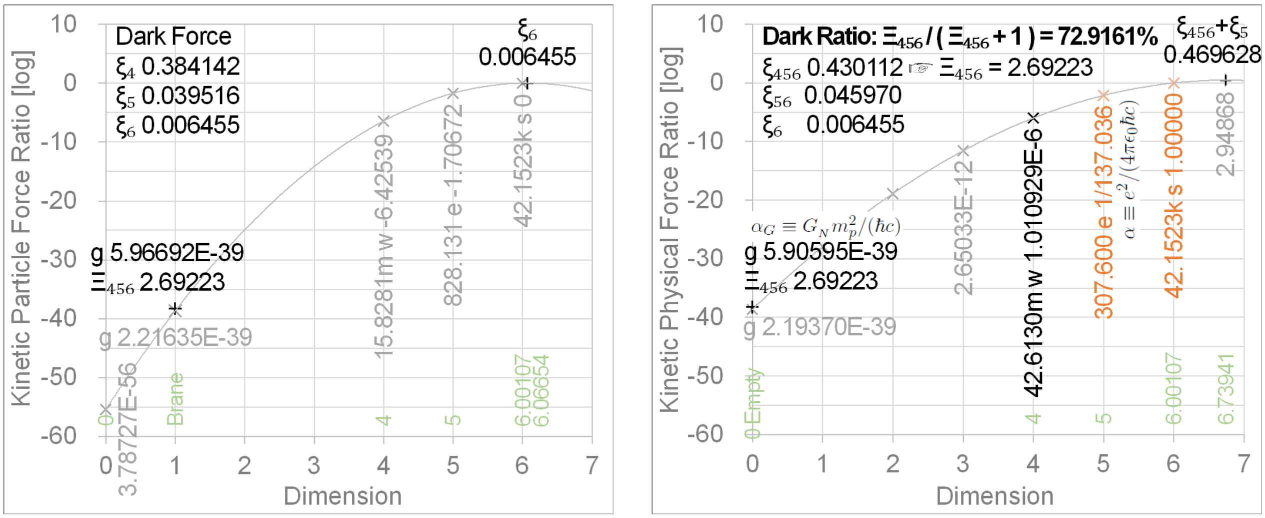


(e) When dimension is 6.00107



(f) When Z / H is 72.9161%

Fig. 6 Equation relating W, Z, and H



(a) Masses of four forces

(b) Coupling constants of four forces

Fig. 7 Dark energy ratio of 72.9161% found from the integration of four fundamental forces [5]

4.6 B / H = $\Omega_Q \cdot \Omega_X$ = 1 / 2.003xx

In Fig. 5, the product of Ω_Q and Ω_X is 1/2. However, in (c), $\Omega_Q \cdot \Omega_X$ is 2.00292, which is equal to B of 1D divided by H of vertex. This value is also very similar to the g-2 factor of 2.002xx. In (d), the value when this value is exactly 1/2 is calculated. All values seem to be slightly off the correct answer. That is, 2.003xx is judged to be correct.

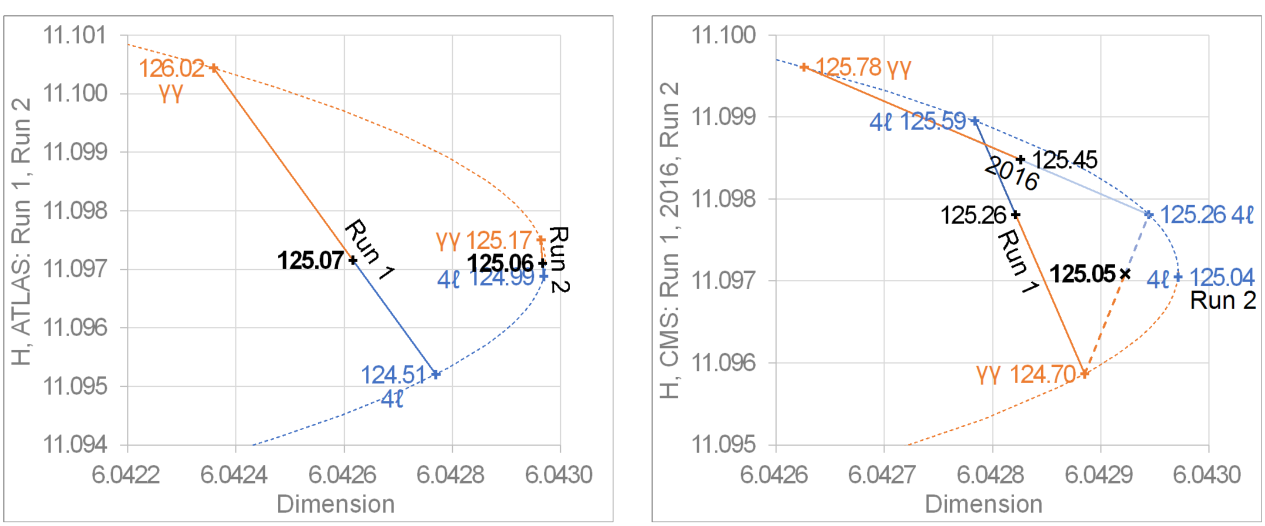
Fig. 6(e) shows the values calculated when the dimension is 6.00107D, and the values on the left and right are slightly misaligned. That is, it can be seen that this calculation formula is valid only for 4D, 5D, and 6D.

4.7 Dark energy ratio 72.9161%

Fig. 7 was published in the previous study [5]. (a) is the masses of four forces, and the masses of strong particle, electromagnetic particle, and weak particle are calculated to be 42.1523 keV, 828.131 eV, and 15.8281 meV, respectively, and gravity is not a particle. In (b), the dark energy ratio of 72.9161% was calculated from the integration of four forces.

4.8 W 80.3650 GeV, H 125.059 GeV

The value of 72.9161% is very similar to Z/H 72.9256% in Fig. 6(c). By applying this value to Z/H, the calculated result is shown in Fig. 6(f). From this, the masses of W and H are calculated to be 80.3650 GeV and 125.059 GeV. There are down and up at the vertex of the inverse parabola. The down is the region of 4ℓ, and the above is the region of γγ. W boson



(a) ATLAS: Run 1, Run 2

(b) CMS: Run 1, 2016, Run 2

Fig. 8 Plot of the log-inverse parabola for the H masses of ATLAS and CMS is located at the vertex of 4D. Therefore, left W- and right W+ exist based on the vertex.

4.9 Kinetic state & Steady state

Previous studies have continuously emphasized the [K]inetic state at the speed of light and [S]teady state at rest. Fig. 7 shows the values of the kinetic state. Therefore, Ω_Q^K is 72.9161%, Ω_X^K is 68.5720%, Ω_Q^S is 73.0435%, and Ω_X^S is 68.4523%. Since our entire universe is in kinetic state, it would be correct to calculate it as either Ω_Q^K or Ω_X^K under normal circumstances. However, in special cases, such as collisions in a particle accelerator, either Ω_Q^S or Ω_X^S may be correct.

4.10 Various equations

As shown in Fig. 6(f), various equations are found. Representatively, W is $Z \cdot \Omega_Q^{K2/5}$ or $Z \cdot \Omega_X^{S2/6}$, and H is Z/Ω_Q^K or $Z/\Omega_X^{S5/6}$. All equations probably have a physical meaning that we have not yet discovered.

4.11 Log-inverse parabola of ATLAS and CMS

Fig. 8 is a chart showing the values of ATLAS (a) and CMS (b) of Fig. 1 to log-inverse parabola. As explained in Fig. 6, when it is less than 125.06 GeV, w, z particle-antiparticle pairs (blue line) are generated, and when it is greater than 125.06 GeV, photon-antiphoton (orange line) pairs are generated. ATLAS Run 1 and Run 2 of Fig. 8(a) is consistent with the above explanation. However, CMS Run 1 in Fig. 8(b) is the opposite and Run 2 exceeded 125.06 GeV. If the measurement characteristics of ATLAS and CMS are assumed to be completely opposite, Fig. 8(b) may be correct. In this case, the combined value of 4ℓ 125.26 of 2016 and γγ 124.70 of Run 1 is calculated to be 125.05 GeV. 4ℓ of CMS Run 2 was measured at 125.04 GeV. It is necessary to confirm what the γγ value is measured to be.

5. Composition of Quarks

5.1 Shape of quarks

The shapes of up, charm, top, down, strange, and bottom quarks are shown in Fig. 9. Where, α is electron neutrino, β is muon neutrino, γ is tau neutrino, f is fermion in 4D 5D 6D, b is boson in 10D 11D 12D, n is neutrino, s is anti-neutrino, g is gravino, t is anti-gravino, and N is the oscillating particle.

5.2 Particle and anti-particle

As can be seen in Fig. 9, down, strange, bottom are particles, and up, charm, top are anti-particles. The difference is standard and oscillation.

5.3 w z h bosons inside of down, strange, bottom

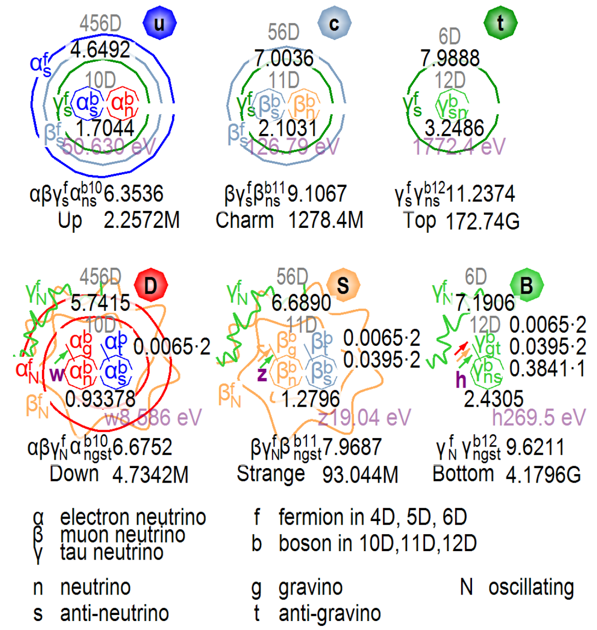


Fig. 9 Shape of quarks

Quark is a combined particle which is composed of shell fermion and inside boson in Fig. 9. There is a w boson of 10D in down quark. When down quark is collided, αN shell is peeled off and it turns into strange quark. At that time, the w boson in it changes to z boson of 11D. When the strange quark is collided, βN is peeled off and it turned into bottom quark. At that time, the z boson in it changes to h boson of 12D.

5.4 Oscillation of H Z W bosons

When the bottom quark is broken by very large energy, it is divided into 6D tau neutrino γN and 12D boson h. The boson h immediately moves into the quantum space of 6D, and its mass changes to H boson. The mass change also follows the logarithmic parabolic equation. The H boson located on 6D space of Fig. 6 moves into 5D space due to the oscillation phenomenon. This is Z boson. It also moves into 4D space. This is W boson. That is, W Z H are all the same particles. The mass of three generation boson is determined by the quantum space where the particle is located. This phenomenon is the below area of the vertex on the inverse parabola of Fig. 6, and it is the 4ℓ.

5.5 Collapse of H boson

If the collision energy is stronger, the h boson inside of bottom quark of Fig. 9 is broken. This phenomenon is the above area of the vertex on the inverse parabola of Fig. 6, and it is the γγ. The h Boson is composed of tau neutrino γn, gluon γg, tau anti-neutrino γs, and anti-gluon γt. The boson gluon and boson anti-gluon on 6D space move into 5D space. It is boson photon and boson anti-photon. They move into 4D space. It is boson graviton and boson anti-graviton. Here, the measurement of photon is easy, and the others are difficult to measure.

5.6 Dark energy

From the outside of our universe, three generation dark forces of Fig. 7 are affecting our universe. Dark energy is judged to be the sum of three generation dark forces. They affect graviton, photon, and gluon. Therefore, it is assumed that W, Z, and H bosons are affected by the dark forces. Also, gravity force, weak force, electromagnetic force, and strong force are all affected by the three generation dark forces.

5.7 Neutrino inside of up, charm, top

There are boson neutrino pairs in up, charm, and top quarks. These do not respond to force, so they would be difficult to observe.

6. Quantum Space and Origin of Mass

6.1 Space = Empty + Brane + Gap

Space is called 'Gong-Gan' in Korean. Gong means empty, and Gan means gap. The author judges that our space consists of 'Heo-Gong' and 'Mak-Gan' in Korean. Heo means empty, Gong means empty also, Mak means that there are branes that we cannot understand, and Gan means that there are gaps between them. As shown in Fig. 10, based on the XYZ linear space, the quantum space is composed of Gan(gap) closed by two Mak(brane), Heo is left space(up, -) and Gong is right space(down, +).

6.2 Shape of quantum space

In Fig. 10, (a) There was 4-dimensional space of straight lines. (b) Unknown something quantized the 4D with extreme force in Big Bang. (c) This created quantum spaces to the left L and right R of the straight XYZ space. (d) Various quantum phenomena occur in the quantum space. In (e), the XYZ extends in a straight line, and the red spring abc space of vertical dimension is less than atomic thickness. Therefore, the mass of quantum particles must be calculated as logarithmic value.

6.3 Open particle = Particle & Wave

Particles collide outside the brane. Because of this, a line falls off from the brane. When the line curls inside of the red spring of (e), it turns into an open particle. When the particle pops out of the red spring (e), it turns into a wave.

6.4 Strict integer multiples

In Fig. 10, a means 4D, b means 5D, c means 6D quantum

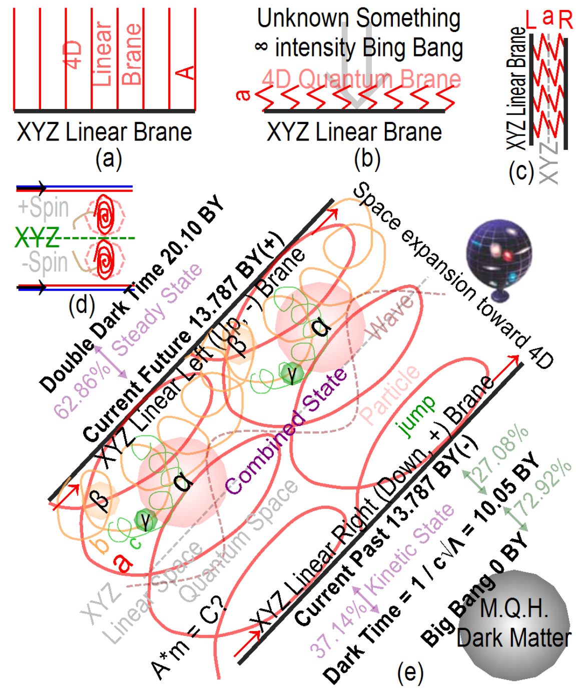


Fig. 10 Shape of quantum space

space, and α means 4D, β means 5D, γ means 6D particle. Space a has weak intensity, space b has medium intensity, and space c has strong intensity. Because of this, α has weak mass, β has medium mass, and γ has strong mass. As can be seen from the figure, the quantum space abc has the characteristic of strict integer multiple. This causes that particle moves as jump.

6.5 Observer effect

When a line is located inside of abc quantum space, it turns into an open particle, and when the open particle is located on XYZ space, it turns into a wave line. When an external influence exerts on the wave line, it hides into quantum space and turns into a particle.

6.6 Oscillation

When α particle is located on space a, it has weak standard mass, when it is located on space b, it has intermediate oscillation mass similar to β particle, and when it is located on space c, it has strong oscillation mass similar to γ particle. β particle and γ particle are also the same situation. This is the cause of neutrino oscillation phenomenon. All particles are divided into normal particle and oscillating particle.

6.7 Spin

XYZ space in Fig. 10 is divided into XYZup and XYZdown. A universal magnetic force flows from left to right along the surface of branes. As the result, the particle located on XYZup has a clockwise spin, and the particle located on

XYZdown has a counterclockwise spin.

6.8 Superposition

In the same XYZ space, only two α particles can be located on space a, many β particles can be located on space b, and innumerable γ particles can be located on space c.

6.9 Origin of mass

Particles do not have proper mass. The intensity of quantum space gives mass to particles.

6.10 Three generations of standard model

The three generation quantum spaces give properties to particles. Therefore, particles have three generations, and the fourth generation does not exist in our universe.

6.11 Elementary particle and Mixed particle

Three generations of neutrinos (electron, muon, tau) that make the shape of particle and three generation of gravinos (graviton, photon, gluon) that occur the force of particle are the elementary particles of all things. All other particles are mixed particles composed of above six particles. Here, gravino is the word suggested by the author.

6.12 Gravity

Weak, electromagnetic, and strong force act at the inside of quantum space. Gravity is the force that acts toward 4D empty space which is outside of quantum space.

6.13 Absolute Something

The final question is what made our universe so perfectly beautiful. Absolute something created our strict universal space as shown in Fig. 10. The author calls it Mommy Quantum Hole (MQH). All multi-universes are very beautiful such as our universe.

7. Conclusions

A very special ratio of 36.9% was calculated from the Run 1 and 2016 of CMS. Applying 36.9% to Run 1 and Run 2 of ATLAS, the Higgs mass is calculated to be 125.07 GeV and 125.06 GeV. Also, applying 36.9% to Run 1 and 2016 of CMS, 47 identity values are found.

From 36.9%, the Hubble constant of 70.93 km/s/Mpc, the universe age of 13.785 BY, the dark energy ratio Ω_Λ of 68.45%, and the cosmological constant of 1.1020E-52 /m2 are calculated, which are almost identical to the values in physics.

From the log-parabola and log-inverse parabola for W, Z, and H, the relationships for $H^2 = Z^7 / W^5$, $W = Z \cdot \Omega_\Lambda^{2/6}$, and $H = Z/\Omega_\Lambda^{5/6}$ are derived. From these equations, when the mass of Z is 91.1880 GeV, the masses of W and H are calculated to be 80.3650 GeV and 125.059 GeV.

Proton is simply composed of two up quarks and one down quark. When the outer shell of down quark is stripped, it becomes a strange quark. When the outer shell of the strange quark is stripped, it becomes a bottom quark. When the outer shell of the bottom quark is stripped, H boson pops out.

The intensity of the compressed quantum space gives the particle mass. In reverse, when a particle receives or loses quantum energy, the particle is moved to one of the three generations of quantum space that matches the energy. The core is that their relationship is established by log mass.

In our 3D universe, there exists an extremely small 4D thickness where [Q], [E], and [C] states coexist. We cannot easily understand this, and this is quantum mechanics.

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