Origin of Quantum Mass and Cause of Koide Formula

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Abstract The properties of quantum space are similar to thermodynamics. That is, the property of quantum mass m is the same as pressure P. Therefore, the combination of 1 eV and 9 eV in quantum space is not addition 1 + 9 = 10 eV or middle 10/2 eV, but multiplication 1 x 9 = 9 eV or square root √9 eV. The core of Koide formula is to figure out what the root mass means. The key points are as follows. (1) Origin particles are 3 neutrinos and 3 gravitons (graviton, photon, gluon). (2) The 6 origin particles exist all in electron, muon, and tau. (3) The compressed quantum space is reversible and optimized. As the result, the √m is established. (4) The 9 combination mass regions are composed of 3 mass regions of electron, muon, tau and 6 empty regions. (5) Electron, muon, and tau fight each other to occupy the six empty regions. The fighting process is 1/3 < Koide value K < 1. (6) The fairest and most stable result of the fighting is 2/3. From this, it can be understood that quantum space was reversible and optimized before Big Bang. The K is calculated as 0.666 661(7). The anomalous magnetic moments at the g-2 factors of electron, muon, and tau affect Koide formula very finely. Considering this, the value is calculated as 0.6666665. The K is judged to be 2/3 correct, and the mass of tau is predicted to be 1776.8885 MeV.

1. Introduction

The compressed quantum spaces of three generations give particles mass. That is, the mass of quantum particle is compressible. It is very easy to understand quantum mass as the pressure of thermodynamics. The core of Koide formula is to understand $\sqrt{m_e}$, $\sqrt{m_\mu}$, and $\sqrt{m_\tau}$. To do this, first, the origin of electron, muon, and tau must be answered.

2. Electron, Muon, Tau

2.1 Origin particles, Normal

The author suggested that the origin particles are electron neutrino (1st on 4D), muon neutrino (2nd on 5D), tau neutrino (3rd on 6D), graviton (1st on 4D), photon (2nd on 5D), and gluon (3rd on 6D) [Fig. 2 in Ref. 1], and calculated their masses [Fig. 4, 5 in Ref. 1]. The shapes and masses of the six origin particles are shown in Fig. 1(a). Here the mass of photon existing in compressed quantum space is 0.16090 eV, and the mass of light existing in our empty space is 1.919E-202 eV.

2.2 Origin particles, Oscillation

The six origin particles have the oscillating masses, and the masses calculated in previous study [Fig. 4, 5 in Ref. 1] are shown in Fig. 1(b). As an example, electron neutrino of 0.1524 eV on 4D oscillates to 186.5 keV on 5D and 13.53 MeV on 6D.

2.3 Square root mass of oscillation

In Fig. 1(b), the simple average mass of oscillating electron neutrino is 4.572 MeV, and the 3 square root is 7.272 keV. The latter is the correct answer. ① What does the square root mass mean?

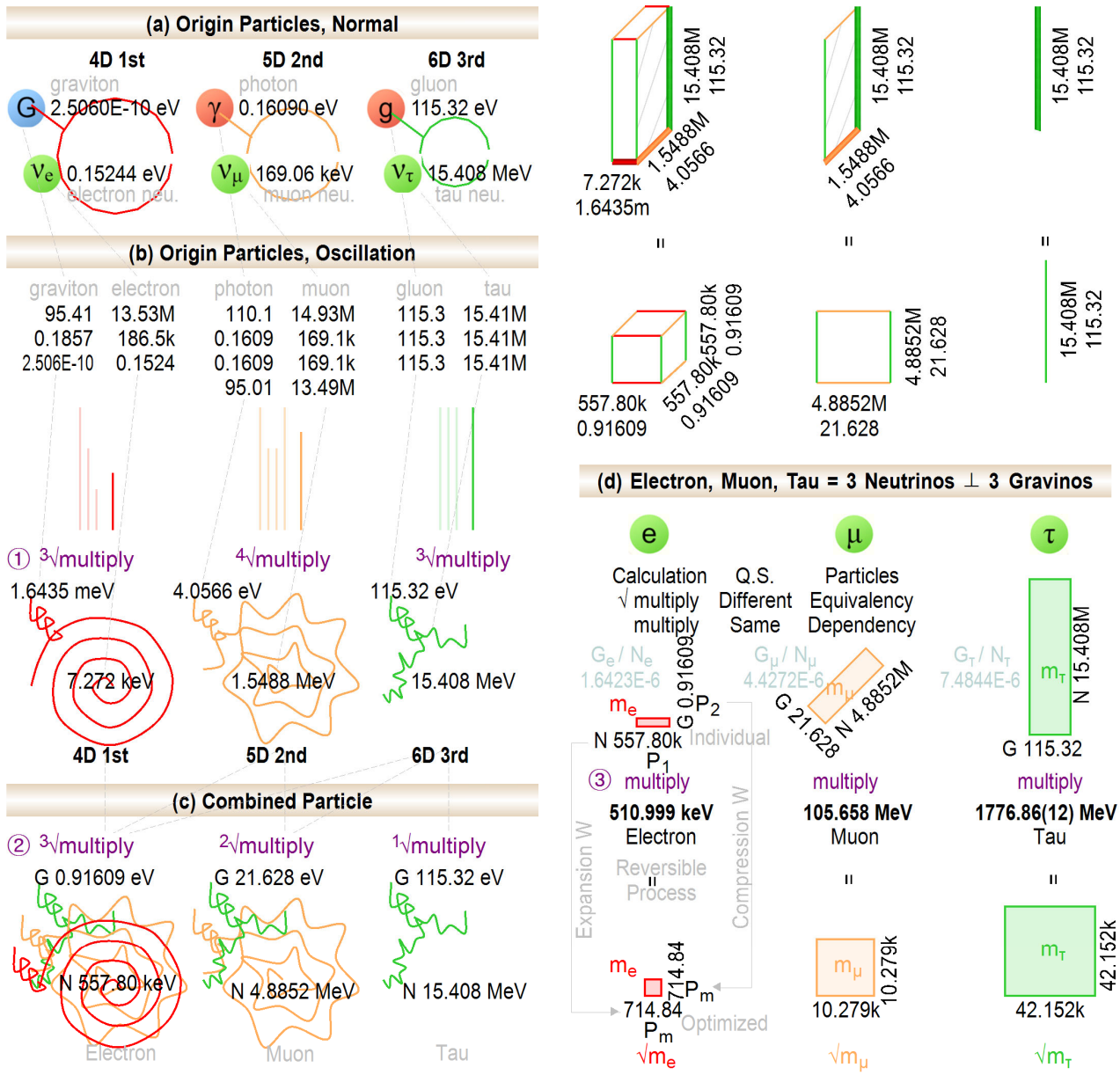
2.4 Combined particle mass

In Fig. 1(c), electron is the combination of 1st, 2nd, and 3rd particles, muon is the combination of 2nd and 3rd particles, and tau is the 3rd particle. Here, N means neutrinos and G means gravinos(graviton, photon, gluon). ② This is also square root mass. Expressing this as a line, the green line is the 3rd, the orange line is the 2nd, and the red line is the 1st. Each multiplication means line, plane, and volume, and each square root mass means the regular length of one line.

2.5 Electron, Muon, Tau

In Fig. 1(c), electron, muon, and tau are composed of N and G. They are drawn as rectangles in (d). Therefore, ③ the electron mass of m_e 510.999 keV is the product of N 557.80 keV and G 0.91609 eV, the muon mass of m_μ 105.658 MeV is the product of N 4.8852 MeV and G 21.628 eV, and the tau mass of m_τ 1776.8 MeV is the product of N 15.408 MeV and G 115.32 eV.

The $\sqrt{m_e}$, $\sqrt{m_\mu}$, and $\sqrt{m_\tau}$ is the change of shape from the rectangle mass to square mass. Why does rectangle change into square? ① in (b) and ② in (c) are also the same phenomenon.



※ Intermediate pressure P_m to minimize 2-stage reversible compression work $W_{1,rev} + W_{II,rev}$

$P_1\,T_1 \xrightarrow{W_I} P_m\,T_{m,s} \xrightarrow{Q_{out}} P_m\,T_1 \xrightarrow{W_{II}} P_2\,T_{2s}$ ☞ Thermodynamic calculations ☞ $W_I = W_{II}$, $P_m = \sqrt{P_1 \cdot P_2}$

Compressed Q.S.
1) Reversible
2) Optimized

Fig. 1 Origin of electron, muon, tau

2.6 Reversible and optimized quantum space

The compressed quantum space gives particles mass [Fig. 5 in Ref. 2]. That is, quantum space has the same characteristics as a compressor of thermodynamics. In a reversible two-stage compressor, the intermediate pressure P_m of minimum work for compressing inlet state $P_1\,T_1$ to outlet state $P_2\,T_{2s}$ is calculated as $\sqrt{P_1 \cdot P_2}$ of $W_I = W_{II}$ from the complex equations of thermodynamics. The above prerequisites are reversibility and optimization.

2.7 Meaning of square root

To explain Fig. 1(d) thermodynamically, P_1 557.80 keV produces the expansion work of W and changes to P_m 714.84 eV, and P_2 0.91609 eV receives the compression work of W and changes to P_m 714.84 eV. Therefore, the above rectangle is the product mass of individual neutrinos and individual gravinos, and the below square is the optimized combined mass of neutrinos and gravinos. The optimized combined each mass of neutrinos and gravinos is

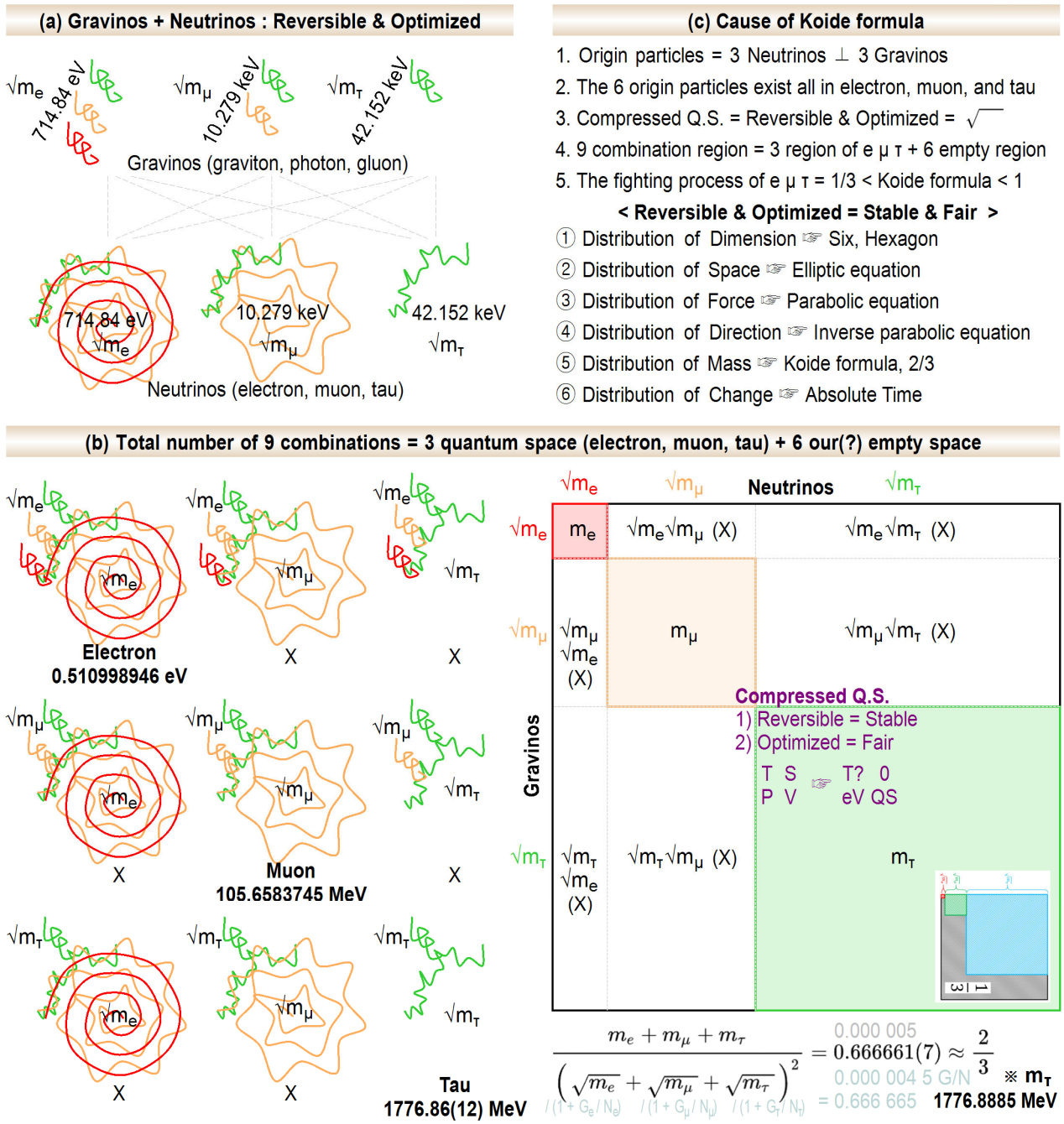


Fig. 2 Cause of Koide formula

$\sqrt{m_e}$, $\sqrt{m_\mu}$, and $\sqrt{m_\tau}$. That is, the shape of the rectangle can be variously changed by reversibility, but the optimization is the square. Therefore, the masses of ① and ② are also calculated as the reversible and optimized square root.

Root multiplication is applied when quantum spaces are different or when particles are equivalency ① ②. Multiplication is applied when quantum spaces are same or when particles are dependency ③.

3. Koide Formula

3.1 Combination of gravinos + neutrinos

In Fig. 2(a), the gravinos causing the force of particle and the neutrinos forming the shape of particle are individually shown. The number of cases where these are combined is nine, and they are shown in (b). Since they are combinations, their masses are reversible and optimized $\sqrt{m_e}$, $\sqrt{m_\mu}$, and $\sqrt{m_\tau}$. Here, it can be understood that X in (b) cannot be established pictorially. Therefore, the six particles do not exist.

3.2 Empty quantum space

In Fig. 2(d), the right figure is the same as the left figure. As understood from Fig. 1(d), the optimization should be square. Therefore, the rectangles are not optimized, so particle cannot be located. These are empty quantum space.

3.3 1/3 < K < 1

Therefore, Koide formula is derived. Even if the dotted line in (d) is moved arbitrarily, the K is greater than 1/3 and less than 1.

3.4 Reversible & Optimized = Stable & Fair = 2/3

In (d), the movement of the dotted lines is a reversible process without loss. If $\sqrt{m_e}$, $\sqrt{m_\mu}$, and $\sqrt{m_\tau}$ are the same, the Koide area becomes 1/3, and the empty area becomes 2/3. This is a non-optimized mass distribution. If one is very large and two are very small, the K is 1. This is unfair mass distribution. The reversible, optimized, stable, and fair mass distribution is 1/3.

3.5 K 0.666 661 ☞ g-2 factor 0.666 665

The K is calculated as 0.666 661. The difference between 2/3 and this value is 0.000 005. In muon g-2 experiment, the value of anomalous magnetic moment is 0.000 004 3 [Table 1 in Ref 3]. This value is the mass ratio of muon's gravino G to neutrino N. In Fig. 1(d), the values of G / N are calculated as 1.6423E-6, 4.4272E-6, and 7.4844E-6, and the simple average of above is 0.000 004 5. This value is very similar to 0.000 005. Applying these to the Koide formula in Fig. 2(b), The value is calculated as 0.666 665. It is understood that g-2 factor affects Koide formula.

3.6 Tau mass 1776.8885 MeV

If this is correct, when tau mass is 1776.8885 MeV, the K is calculated as 0.666 666 66.

3.7 Other particles

As shown in Fig. 1, electron, muon, and tau contain all six origin particles as fit the dimension of quantum space. Therefore, Koide formula is established only for electron, muon, and tau. That is, the other particles cannot be established.

3.8 Stable and fair distribution

In Fig. 2(c), the reversible, optimized, stable, and fair distribution of dimensions are six. Those of spaces are elliptic equation. Those of forces are parabolic equation. Those of direction is inverse parabolic equation. Those of Masses are K = 2/3. Those of Changes are absolute time.

Weak force particle is the combination of normal electron neutrino and oscillating graviton, electromagnetic force particle is the combination of normal muon neutrino and oscillating photon, and strong force particle is the combination of normal tau neutrino and oscillating gluon. Here, since the elliptic equation is established at normal particles, not oscillating particles, the forces are formed by parabolic equation which is the upper part of elliptic equation. Since it is reversible, the inverse parabolic equation is also established. Since absolute time is the same for everything, it cannot be physically discovered.

3.9 Before Big Bang vs. After Big Bang

If the reversibility, optimization, stability, and fairness were completed after Big Bang, the probability of our universe being born is 1 / 10^120. If they were completed before Big Bang, the probability of our universe being born is 1 / 1. The 4D, 5D, and 6D quantum space cannot be born inside of our 3D space Big Bang. Our universe is a singularity in 4D universe.

3.10 Thermodynamic relation

The key factors in thermodynamics are T, S, P, and V. As such, the key factors of quantum mechanics would be T?, 0, eV, and QS. Here, since quantum space is reversible, ΣS becomes 0. If this is correct, new quantum space equations similar to that of thermodynamics will be discovered.

3.11 Final question

Particles are located in 4D 5D 6D quantum space. The final question is how the actual shape of quantum spaces is drawn, and what is the relationship between the shape of Fig. 2 (b) and the shape of quantum space.

4. Conclusions

The compressed quantum space of three generations gives particles mass, and the property similar to the pressure of thermodynamics. The 1/3 of Koide formula is judged to be true. This means that quantum space is reversible (= stable) and optimized (= fair). The g-2 factors of electron, muon, and tau affect Koide formula very finely. Based on this, the mass of tau would be 1776.8885 MeV.

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