The gravitational constant

Based on the gap space theory

SHOGO NIIMI

shogo-ni@sk2.aitai.ne.jp

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[1] Substantiality with mass

I got electronic mass expression m_q in <The creation of the electron>.

$$m_q = \beta \sin\Delta\omega\tau \int_{j=1}^{n} A_j \, d\tau \qquad [1\text{-}1]$$

First, confirm that j has the area as ambiguous in that paper. Adapting that I got the limitation from the <Gap space theory> to j. Therefore, $\omega_1\tau$ equivalent to $j = 1$ is

$$\omega_1\tau = 0.0001312066853\,\pi/2 \qquad (2.06099\times10^{-05}) \qquad [1\text{-}2]$$

Also, $\omega_n\tau$ equivalent to $j = n$ is

$$\omega_n\tau = 0.999999999890292\,\pi/2 \quad (\quad \pi/2) \qquad [1\text{-}3]$$

Taking them, I got

$$\sin\Delta\omega\tau = \sin(\Delta w\tau \sin\Delta\theta)$$

$$= 8.1057195\times10^{-4}$$

$$\Delta w\tau = 0.025235, \qquad \Delta\theta = 0.032126471 \qquad [1\text{-}4]$$

β is expressed by fine-structure constant α, as follows.

$$\beta = \frac{1}{4\pi\varepsilon_0\alpha} \qquad [1\text{-}5]$$

ε_0 is the dielectric constant of the vacuum. The value of β that has width by j has the area from 1 to n.

$$1.3698229\times10^{-05} \leqq \beta \leqq 1.3712259\times10^{-05} \qquad [1\text{-}6]$$

A_j is the electric current, as follows.

$$\Delta q = \int_{j=1}^{n} A_j$$

$$= 8.2\times10^{-23} \qquad [1\text{-}7]$$

The value of electronic mass m_q has width by above

$$9.1047882\times10^{-31}\leqq m_q\leqq 9.1141134\times10^{-31} \qquad [1\text{-}8]$$

The measurement value of electronic mass m_e has

$$m_e = 9.1093897\times10^{-31} \qquad [V^1A^1m^{-2}s^3] \qquad [1\text{-}9]$$

It is almost average value of m_q. However, the width of m_q is caused by the curvature that it has. Actually, here is an important concept for the essence of the g-factor.

By the way, will be possible to the generalization of the mass? Here, I pay attention to the β and $\sin\Delta\omega\tau$. The average of the product of both is

$$\beta\sin\Delta\omega\tau = 1.1107753\times10^{-08} \qquad [1\text{-}10]$$

Actually, round twice of this value equivalent to Planck mass M_{PL}. However, it is difficult to give this 2 to [1-10] under the logical limitation. Also, it is difficult to give spin 2 to the expression, then I consider of the consistence with the electronic mass.

$$M_{PL} = 2A\beta\sin\Delta\omega\tau$$

$$= 2.1767\times10^{-08} \qquad A = 0.97981 \quad (\ 1) \qquad [1\text{-}11]$$

I have an idea that - Must be dwell on Planck mass? -. However, put a high valuation that electronic mass m_q and Planck mass M_{PL} are expressed by $\beta\sin\Delta\omega\tau$ for it approaches essence and substantiality with mass. Incidentally, the elementary function has a positive, negative mark from the history. The positive, negative electric charges appear by this meaning. Also, β has the positive, negative value, in the same way. In this case, the positive, negative masses exist in whole space $\mathbf{H}^9$. Will this be a negative solution? If the discussion of here is right, the mass expression of all elementary particles will be shown using $\beta\sin\Delta\omega\tau$. In any case, I need more consideration, including the approach from the manifoldness.

[2] Gravitational constant G_N

We cannot find the gravitational constant by the concept, function that is known same as the mass. Therefore, I take <Kármán Vortex Street> on the hydrodynamics as you know(★Photo collection [Flow]/The Mechanics Society of Japan/Maruzen Co. Ltd./JPN. ★Study of the Flow science by PC/Genki Yagawa/BLUE BACKS/B-1337/Kodansha/JPN.). Why <Kármán whirlpool>? Because, I think that situation of electron is born in the gap space resembles situation of Kármán whirlpool is born. In this way, electron can be supposed to Kármán whirlpool itself. I^3 shows imaginary space, G^3 shows gap space and R^3 shows real space in **[Fig-g1]**. q is Kármán whirlpool electron and resistance object G is equivalent to the isolate isle in the natural world. The vertical line in G^3 expresses the transverse wave. The arc in R^3, I^3 expresses the diffracted wave, I can suppose that they are the electromagnetic wave. **[Fig-g2]** is the figure that adapted the value that was gotten from the gap space theory to Kármán whirlpool. Here, I give the direction of x $\omega\tau$ and give the direction of y θ. Make width to the Kármán whirlpool direction of x $\Delta\omega\tau$ and make width to the direction of y $\Delta\theta$. Give isolate isle G width $\Delta w\tau$. The way of giving these values does not have logical limitation, only convenience as visual thinking.

The issue is that do I replace resistance object G to something of the gap space theory. I consider about this. Generally, seem to be that the mass does not born in resistance-less. The standard theory (the G-W-S theory) authorizes that the mass exists there by the Higgs mechanism(★Physics of the elementary particles/Modern Sciences/Totsuka Yoji/ Iwanami Shoten). In the same way, some mechanism will exist here. For example, it is following one. The Light velocity was decision by that the vacuum has the dielectric constant and magnetic permeability. Therefore, seem to be that the vacuum has viscosity. I think that this viscosity becomes resistance and generates mass. Therefore, I accept that this resistance was generated by whole space H^9 has the curvature. Resistance object G has this meaning in **[Fig-g1]**, **[Fig-g2]**. Also, I can explain that G relates to the gravitational constant by accept that the curvature generates gravitation. By the way, G is expressed the reverse of resistance $\Omega[V^1A^{-1}]$ on the electromagnetism. As described on the <The creation of the electron>, the unit of the resistance is

equal to unit $[m^1 s^{-1}]$ with velocity.

$$[V^1 A^{-1}] \equiv [m^1 s^{-1}] \qquad [2\text{-}1]$$

Therefore, the key point is " velocity v_j" and "the product of time $\tau \sin\theta_j$ to acceleration a_j". The relation of both is as follows.

$$w_j \tau v_j = a_j \tau \sin\theta_j \qquad [2\text{-}2]$$

In this result, the relational expressions of resistance object G are

$$G_j = \frac{1}{w_j \tau v_j} = \frac{1}{a_j \tau \sin\theta_j} \qquad [2\text{-}3]$$

I get gravitational constant G_N approximately by numerical calculation of [2-3] at two points of "j = 1" and "j = n".

$$G_1 = 6.8246 \times 10^{-11} \qquad [2\text{-}4]$$

$$G_n = 6.8211 \times 10^{-11} \qquad [2\text{-}5]$$

Do these results have reliability? By the way, the value of gravitational constant G_N is as follows(★Chronological Scientific Tables/National Astronomical Observatory/Maruzen Co. Ltd./JPN).

$$G_N = 6.67259 \times 10^{-11} \quad [V^{-1}A^{-1}m^5 s^{-5}] \qquad [2\text{-}6]$$

[2-3] has $w_j \tau$ that appears the curvature of $\mathbf{H}^9$ indirectly is an advantage. In the other hand, I cannot miss the expression that is assembled by acceleration a_j. Product $G_j \mathcal{H}_j$ has constant approximately in the given area that is more important.

$$7.19331 \times 10^{-45} \leqq G_j \mathcal{H}_j \leqq 7.19703 \times 10^{-45} \qquad [2\text{-}7]$$

It has the important meaning that is the same as ratio

$$\mathcal{H}_j / v_j = 3.51767 \times 10^{-43} \qquad [2\text{-}8]$$

that is constant. The width of [2-7] is same as the electric charge. Look at **[Sheet-g1]**. Therefore, I accept

$$G_N \quad G_j \qquad [2\text{-}9]$$

By the way, they have A' that is the difference about 2% between G_N and G_j.

$$0.97823 \leqq A' \leqq 0.97773 \qquad [2\text{-}10]$$

This is equal to A with Planck mass in the front-chapter approximately.

$$A \quad A' \qquad [2\text{-}11]$$

However, I do not accept that these differences came out from the same place.

Incidentally, theoretical gravitational constant G_j has the positive, negative solutions in here.

[3] Correction of G_N by the gravitational field

Here, I explain that the difference between G_N and G_j. Therefore, I use the general theory of relativity by Albert Einstein (1879-1955). The equation of gravitational field R_{ik} has

$$R_{ik} - \frac{1}{2} g_{ik} R = \frac{8\pi G_N}{c^4} T_{ik} \qquad [3\text{-}1]$$

R_{ik} expresses the Ricci tensor, g_{ik} expresses the metric tensor in the space-time and T_{ik} expresses the energy-momentum tensor, as you know. We get

$$R = - \frac{8\pi G_N}{c^4} T \qquad [3\text{-}2]$$

by operate the contraction about i and k.

By the above, we get $\Delta\psi$ that the equation of the gravitational field on the un-relativity, as follows.

$$\Delta\psi = 4\pi G_N D \qquad [3\text{-}3]$$

D is the mass density of material in here. Potential ψ in the field of a particle has

$$\psi = - \frac{G_N m}{R} \qquad [3\text{-}4]$$

(★Classical field theory/Curriculum of Theoretical Physics/ L. D. Landau, E. M. Lifusit/Л. Д. Ландау и Е. М. Лифшиц /ТЕОРИЯ ПОЛЯ/Издание шестое, исправленное и дополненное, Издательство <Наука>, Москва, 1973). m is the mass of particle. ψ has unit $[m^1 s^{-1}]^2$. Therefore, I rewrite it is as follows.

$$\psi = - v_j^2 \qquad [3\text{-}5]$$

Of course, this solution is approximation. Consequently, I must be correction to it for the relativity.

First, I rewrite G_j in [2-3] use [3-5].

$$G_j = \frac{1}{w_j \tau v_j}$$
$$= \frac{v_j}{w_j \tau \psi} \qquad [3\text{-}6]$$

This expression shows us that G_j need correction for adjust to the actual space because it is the gravitational constant on the un-relativity. Incidentally, the positive negative symbol can be omitted because velocity v_j has both. So, is the gap space theory the one to get merely approximate solution? The conclusion is rashness. I should consider why the equation of gravitational field on the relativity is a nonlinear. In other words, the gap space theory shows an ideal condition in the moment that whole space $\mathbf{H}^9$ was born; on the other hand, the theory of relativity and the quantum theory express the condition that the influence of the self must be considered. Consequently, I should accept that the theory of relativity, the quantum theory and the gap space theory also the value of experiment are correct. Therefore, for example, I give potential ψ ι (iota) that is the self correction by the gravitational field, as follows.

$$\iota = \prod_{n=1}^{\infty}\left(1 - \frac{n}{(w_j \tau)^n}\right)$$
$$- \sin w_j \tau \qquad [3\text{-}7]$$

More approximation of self correction o (omicron) has

$$o = \prod_{n=1}^{\infty}\left(1 - \frac{n^2}{(w_j \tau)^n}\right) \qquad [3\text{-}8]$$

In this connection, the width of o is as follows **[Sheet-g2]**.

$$0.977822005 \leqq o \leqq 0.977834359 \qquad [3\text{-}9]$$

As the result, the expression of gravitational constant G_{Nj} after the correction has

$$G_{Nj} = \frac{v_j o}{w_j \tau \psi} \qquad \left(= \frac{o}{w_j \tau v_j} \right) \qquad [3\text{-}10]$$

$$= \frac{a_j \tau \sin\theta_j o}{(w_j \tau)^2 \psi} \qquad \left(= \frac{o}{a_j \tau \sin\theta_j} \right) \qquad [3\text{-}11]$$

Finally, theory value G_{Nj} will be convergence to experiment value G_N.

$$G_N = G_{Nj} \qquad [3\text{-}12]$$

By the way, I have ever been had doubt that light velocity c may be not maximum speed v_{max} in the whole space. v_{max} may be faster than c about 2% as the correction of gravitational constant G_j is unnecessary by the fact of the photon is dominated in the gravitation. In this case, v_{max} is the velocity that has the relation in the expending universe (C. H. Lineweaver, T. M. Davis/Misconceptions about the Big Bang/SCIENTIFIC AMERICAN/March 2005). Actually, it is possible to say that self-correction ι, o is the correction with the velocity by [3-5]. This idea is in consistency with other quantum constant even if considering that the acceleration of the expending universe. On the other hand, the cause of the doubt may be consequence in the change of gravitational constant G_{Nj} by I admit c is maximum speed in the space persistently. The gravitational constant changes by about 2% in 1.37×10^{10} years after the space was born that is the big problem.

Footnote

① We know that the gravitational lens refracts the photon. The photon curves by about 1.74-second degrees with the sun. This value is same as the theory value on the relativity. The solution of the "Newton theory" has 0.87-second degrees (★Tastuo Uctiyama/The general relativity/The physics 15/Shokabo/JPN). There are 2 times of differences in both. This 2 may be adapted to [1-11]. As for the reason, this 2 is a steady value, as the following. As for the "Newton theory", it considers only mass and gravitation, on the other hand, as for the relativity, it considers the gravitational field in addition to them (★Hermann Weyl/Space・Time・Material///Raum・Zeit・Materie/Vorlesungen ber allgemeine Relativit tstheorie)

② The acceleration of the space may have a positive symbol (★L.V.E.Koopmans, R.D.Blandford/Gravitational Lenses/Physics Today/Vol.57-No.6). This fact admits a result with

the decreasing gravitational constant that is gotten by [3-10], [3-11].

③ The Hubble constant may have 70[$Km^1s^{-1}Mps^{-1}$] by the latest observation. The age of the space is 1.37×10^{10} years old by it (★Yoshiaki Tanigucti/ Mystery of the quasar/BLUE BACKS/B-1458/Kodansha/JPN).