About The Geometry Of Cosmos (2)

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Abstract

The current paper presents the theoretical formulas for the W, Z, e, μ, ν masses' values.The formulas lead to values for $Z = 91.17239(8)Gev/c^2$.$W = 80.37268(3)Gev/c^2$,$e = 0.51096(8)Mev/c^2$,$\mu = 105.65263(6)Mev/c^2$,$\tau = 1776.48(7)Mev/c^2$.Possible answers to EPR problem were given.The singularity problem in Big Bang problem is examined.This paper is the extension of the "About the Geometry of Cosmos"

1 Preliminaries

In our first paper "About The Geometry Of Cosmos" we have established a new theory, which could be a candidate for GUT or a Theory of Everything. We do not know if every aspect of this theory is in the right direction but we strongly believe that this is the path to succeed. The main idea is to give a geometrical interpretation of mass, which can lead to the unification with general relativity (GR). The steps and the results of [1]

1. Introduce a mass space.
2. Hypothesis an $8-D$ real space or 4-D complex space where the coordinates are x_1, x_2, x_3 length coordinates, m_1, m_2, m_3 mass coordinates and t, T two different dynamical coordinates or "clocks".
3. The metric in flat space is : $dk^2 = dx_1^2 + dx_2^2 + dx_3^2 + dT^2 - dm_1^2 - dm_2^2 - dm_3^2 - dt^2$.

   with all units equal to one or :

   $$dk^2 = d\overrightarrow{r}^2 + dT^2 - \frac{G^2}{c^4} d\overrightarrow{m}^2 - c^2 dt^2$$

   with units.
4. The metric in curved space is: $dk^2 = G_{ij} dk^i d\overline{k}^j$ and analyse in Dirac - Gellman basis where G_{ij} Hermitian Complex Metric
5. From Cartan's theory about triality we have as group invariance of G_{ij}

   $$G_{tr} = G \otimes S_3 = Spin8$$

   which as we have shown in [1] can be written as

   $$U(1) \times SU(2) \times SU(3) \times U(4)$$

   as a result we can prove mathematically the standard model's part

   $$U(1) \times SU(2) \times SU(3)$$

   Then $SU(4)$ describes dark matter. Furthermore from the signature $(4, 4)$ we have a Majorana-Weyl chiral and anti-chiral Fermionic $8 - d$ real representation.
6. From step 3 introduce the momentum-mass operator and dark energy operator from the tangent vector space. Solve the Klein-Gordon equation provided by step 3 and we get a mass for Higg's boson at $125, 17394(5)$ Gev/c^2. Moreover, from the part of T,t we get the De-Sitter space and a value for cosmological constant at $4.41348x10^{-5}Gev/cm^3$.

We want to remark that by this theory we succeed not only to prove mathematically but even better, describe the standard model plus the Higg's mechanism plus it gives us the potential to investigate forbidden areas of physics such as dark energy, dark matter and what are the particles' masses. We have to admit that the basic idea of this theory could be interpreted as "extremely heretical" but at the same time could be the most profound one. The only way to test an idea is through it's results and it's simplicity. So the question that arises is if the theoretical prediction of this theory agrees with the experimental ones. The first results presented in [1] were the mass of Higg's boson and the cosmological constant which agrees with the experimental ones. It seems that the there is a good fit between them which seems promising. But someone could say that is not enough. We have decided to proceed and test our theory in more experimental values, as the masses of several other particles. Furthermore we wanted to see if our theory could give possible and promising answers to other questions such as the EPR problem or even what happens with Big-Bang's singularity.

2 Mass problem

It is evident that the Higg's field is responsible for the masses of all particles through their interactions with it.Our theories till know fail to predict a single one mass value and so our models are open to many parameters.According to our theory the key to open the mass problem is the Hermitian complex metric tensor.The flat case led us to the Higg's boson mass value and so,the next step is to investigate the curved one.We will start only with $U(1) \times SU(2)$ part because of its simplicity.From [1] we have :

$a_0 = \frac{1}{4}(g_{11} + g_{22})$, $a_1 = g_{12}$, $a_2 = I_{12}$ and $a_3 = \frac{1}{2}(g_{11} - g_{22})$

These a_i will form as we saw in [1] the fields Z_μ , W_μ^- ,W_μ^+ , A_μ through the Christoffel symbols of the mass space.Specifically, the Christoffel symbols formulated by $g_{11}+g_{22}$ becomes B_μ , g_{12} and I_{12} the W_1 and W_2 and from $g_{11} - g_{22}$ the W_3.From equation $G = a_n \lambda^n = a^n \lambda_n$ we get:

$$G = \frac{1}{4} \begin{pmatrix} 3g_{11} - g_{22} & 4(g_{12} - iI_{12}) \\ 4(g_{21} + iI_{21}) & -1g_{11} + 3g_{22} \end{pmatrix}$$

It is easy to see that $g_{11} + g_{22}$ which corresponds to B_μ has disappeared and as a result the mass of photon as will appear in the Lagrangian is equal to zero.This result came extremely naturally and easy without hypothesize ad-hoc assumptions.From the above ,finally, the masses for W ,Z are:

$$Z = \frac{1}{\sqrt{\pi}} \sqrt{\frac{5}{3}} m_H = 91.17239(8) Gev/c^2$$

$$W = \frac{25}{8} \sqrt{\frac{1}{4\pi}} Z = 80.37268(3)) Gev/c^2$$

The experimental values are $W = 80.385 \pm 0,0015 Gev/c^2$ and $Z = 91.1876 \pm 0,021 Gev/c^2$.In this spirit the masses for the fermions will be of the form:

$$m_i = A_i\left(\frac{1}{8\pi}\right)^{B_i}\left(\frac{25}{8\pi}\right)^{C_i} m_H$$

where A_i are Clebsch-Gordan coefficients, B_i ,C_i are calculated from the b_i of the renormalization group equations and they have a sequence form and m_H is the Higg's boson mass value.
Particularly the masses of e, μ, τ are :

$$m_e = \frac{4}{\sqrt{6}}\left(\frac{1}{8\pi}\right)^4\left(\frac{25}{8\pi}\right)^{\frac{1}{2}} m_H = 0.51096(8)Mev/c^2$$

$$m_\mu = \frac{3\sqrt{2}}{8}\left(\frac{1}{8\pi}\right)^2\left(\frac{25}{8\pi}\right)^{-1} m_H = 105.65263(6)Mev/c^2$$

$$m_\tau = \frac{2\sqrt{2}}{8}\left(\frac{1}{8\pi}\right)^1\left(\frac{25}{8\pi}\right)^{-\frac{5}{3}} m_H = 1776.48(7)Mev/c^2$$

while the experimental values are $0.510998910(13)Mev/c^2$,$105.6583668(38)Mev/c^2$,$1776.84Mev/c^2$ respectively.We can easy see that the leading part of the formulas are the $\left(\frac{1}{8\pi}\right)^{B_i}$ which give us the scale and explains the big masses' jumps while the $\left(\frac{25}{8\pi}\right)^{C_i}$ part plays the role of correction.We have not concluded the exact formulas for the other fermions but we have managed to calculate the scale part.

For the neutrinos the scale part $\left(\frac{1}{8\pi}\right)^{B_i}$ is:

$$(\nu_\tau, \nu_\mu, \nu_e) \longrightarrow \left(\left(\frac{1}{8\pi}\right)^6, \left(\frac{1}{8\pi}\right)^7, \left(\frac{1}{8\pi}\right)^9\right)$$

For the quarks the scale part $\left(\frac{1}{8\pi}\right)^{B_i}$ is:

$$(t, c, u)) \longrightarrow \left(\left(\frac{1}{8\pi}\right)^0, \left(\frac{1}{8\pi}\right)^1, \left(\frac{1}{8\pi}\right)^3\right)$$

$$(b, s, d)) \longrightarrow \left(\left(\frac{1}{8\pi}\right)^1, \left(\frac{1}{8\pi}\right)^{\frac{3}{2}}, \left(\frac{1}{8\pi}\right)^3\right)$$

The theoretical values predicted for e, μ, τ are extremely fitted.The only problem that appears in order to check more decimental digits is the Fermi's constant which is known with only five decimental while the sixth one appears with uncertainty.All the above masses' values are depended by Higg's boson mass value as we presented in [1].At this part we would like not to present the exact calculations for the presented formulas for two reasons.The first reason is only personal without further explanation while the second one,is due to our wish to conclude and present all the existing particles' mass values in nature ,especially for the fourth fermionic generation and the dark matter ones.Moreover we want to fully present the mechanism behind the hadrons and messons.The only we can say is that the calculation of W's mass revealed us the most suprising element which is fully connected to neutrinos.

3 EPR problem

In our analysis in [1] we presented two different mechanisms appeared in our Cosmos.The first one was the quantization of mass in M space which explains how "mass" is produced or how the basic "internal" characteristics of mass ,such as the mass value or spin or isospin or charge are obtained.Especially we saw how the corresponding fields will appear in our usual spacetime R^4.In R^4 with a Minkowski metric $ds^2 = dr^2 - c^2 dt^2$ we get an upper limit of speed which is of course the speed of light c and moreover nor any information can propagate faster than c.But all of these happens in R^4.On the contrary in Cosmology we can see that the expansion of our Cosmos is not bounded by c.The question that arises is if we can get a much bigger speed of information propagation but not as concerned the move in R^4 or interaction ,but as concerned the main characteristics of mass space products.From [1] we have the metric:

$$ds^2 = d\overrightarrow{r}^2 + dT^2 - \frac{G^2}{c^4} d\overrightarrow{m}^2 - c^2 dt^2$$

or

$$ds^2 = d\overrightarrow{r}^2 + dT^2 - c^2 \Big(\frac{G^2}{c^6} d\overrightarrow{m}^2 - dt^2 \Big)$$

The appearance of the factor $\frac{G^2}{c^6}$ is very strange because it can give us a sort of mass speed.Particularly $\frac{c^3}{G} = 4.03709x10^{35} kgr/sec$ which is a huge number compared to mass space.Someone could say that the propagation velocity in M space is $\frac{c^3}{g}$ an "internal" communication velocity between the particles as are produced-generated from M space.As a result their main characteristics communicate with $\frac{c^3}{g}$ while the field interactions or movement in R^4 is with c.This assumption is logical if we could remember that in [1] we presented two types of special relativities.A most general special relativity in R^8 or C^4 and our usual special relativity in R^4.We have to distinguish what we want to observe,the movement or the production-generation.It is natural for an observer of R^4 ,to be unable to see inside M space giving him a picture of hidden varieties ,which is the EPR problem.On the contrary for an observer of R^8 or C^4 there is no such a problem because he 'observes" the full laws of Physics

4 Cosmology

In this section all constants are set equal to one. In order to pass from the geometry of R^8 or C^4 to the geometry of R^4 we need a general transformation which will transform the Hermitian metric tensor G_{ij} to our usual symmetric metric tensor g_{ij}.Although we have not yet reached this transformation we can still investigate the flat case.As presented in [1] we concluded about the relation between the two dynamical parameters or "times" t,T where the transformation lead us to the De-Sitter space.The transformation is:

$$< T >_t = e^t$$

If we try some analogous and almost familiar transformation between lenght and mass we could have:

$$< m >_r = e^{-r}$$

By substituted these two relations in the flat metric of R^8 and by taking spherical coordinates for the length part we have:

$$ds^2 = (1 - e^{-2r})dr^2 + (e^{2t} - 1)dt^2 + r^2(d\theta^2 + sin^2\theta d\varphi^2)$$

We can investigate the follow cases:

1. $r = 0$
$$ds^2 = (e^{2t} - 1)dt^2$$
we have no singularity problem because t or T exists
2. $t = 0$
$$ds^2 = (1 - e^{-2r}dr^2) + r^2(d\theta^2 + sin^2\theta d\varphi^2)$$
we have no singularity problem because r exists
3. $r \to \infty$
$$ds^2 = dr^2 - dt^2$$
asymptotically Minkowski metric
4. $r = t = 0$

   in this case the length space collapses leaving only the geometry of mass space.The singularity existing in our usual models is nothing else than the entrance in mass space where as we have seen the Higg's field can not be vanished because its ground state is not zero.In this case ,it seems like a white hole is created which will eventually born the length space.Moreover ,black-white holes become some sort of destruction-generation mechanisms

5 Conclusion

The main quantities of our Cosmos are length,time and mass.A.Einstein managed to unify geometrically length with time, where the scalar quantity t(I.Newton's clock) became a coordinate.The most natural and logical step is to unify geometrically all the quantities by substituting the scalar quantity of mass with coordinates and only then,the mysteries of our Cosmos will be releaved to us ,the observers of R^4.The heart of existence, the main character is mass.Our Cosmos is just a problem of initial conditions

6 References

References

[1] D.Mastoridis,K.Kalogirou http://vixra.org/abs/1509.0215