SCALING PROPERTIES OF DIRAC MATRICES, THE GRAVIATIONAL FIELD, AND CONSISTENTLY LIFE LIKE TRANSFORMATION LAW BEHAVIOR ASPECT OF THESE MATRICES. DIRAC MATRICES AND DARK MATTER

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Dirac matrices reveal the certain scaling property in all three known representations. One can associate this scaling property with the basic ingredients of life as a result of its thorough analysis. Different aspects of the Dirac equation and Dirac matrices on the Lorentz transformations are analyzed to get a clearer picture on this circumstance. Signs of the dark matter and Dirac matrices relations are also discussed.

The original goal of this work was an attempt to connect the basic ingredients of quantum field theory to the domain of Riemannian Geometry and and get clearer interpretation of the formula

$$M_W /M_B = g/gN \tag{1}$$

extensively discussed in the previous works ([4] and [6]). This way one could also get a strong bridge between quantum field theory and A. Einstein's theory of gravity. One might tend to think that with some minor adjustment of the Riemannian Geometry on quantum fluctuations it would encompass all the possible theories of physics. This partial derivatives based theory describes all the possible patterns in space - time. However, as discussed further in this work, Dirac equation has a wider scope in several aspects than Lorentz invariance friendly only Riemannian Geometry. Dirac equation can be regarded as a complex relation between the partial derivatives of the wave function and mass after the shift in the symmetry occurs and mass of fermions appears. Local gauge transformations, that is presence of space - time, necessitate the replacement of Lie derivatives by the covariant derivatives:

$$M: -> M: + i(gN/2) B: \tag{2}$$

for the $B:$ field for example. Eq.(1) is consistent with this view of appearance of space - time, the appearance of space - time, that is generation of masses of particles is indispensably connected with the presence of the coupling constants and vice versa. This view of formation of space - time is certainly incompatible with the possibility of existence of the scalar fields. In the case of complex scalar fields the charge, the conserved quantity exists even for the global gauge transformations which do not require the presence of space - time. Dirac equation must have a broader scope than equations of the gravitational field, its Lorentz invariance ingredient can be regarded as a consequence of the dotted quantities' independence of the space - times formation and expansion of the universe. Derivative free charge density for the wave

function of Dirac equation $/\Theta(:\Theta$ also tells us about this nature of this equation. It is unlikely that one can get a Lorentz covariant form of Dirac equation (that is how A. Einstein wanted to see the fundamental equations of physics) in the form

$$iM:\Theta (x) - m(N:\Theta (x) = 0 \tag{3}$$

which would make the statement above weaker. Here ($N:$ is some modified form of the $(:$ matrix. That way Dirac equation would be covariant similar to the A. Einstein's gravitational field equation:

$$R:< - (1/2)g:<R = -kT:< \tag{4}$$

From the other side it is not a single - particle nature for the massive fermions, the necessity of the existence of the electron - positron pair as its full set of solutions, particles and the distance between them, means the existence of space - time. Lorentz transformation of the Dirac equation dwindles down to changing the 'orientation' of the Dirac spinor only (see the importance of the angular momentum in this context in the further discussions):

$$(i/M - m)\Theta(x)= 0 \ 6 \ 7_{1/2}[i/M- m]\Theta(7^{-1}x) = 0 \tag{5}$$

Here 7 and $7_{1/2}$ are four -dimensional and Dirac spinors representations of the Lorentz transformations, respectively.

Could the Lorentz transformation property of the Dirac matrices be the first clue how quantum fields are connected to the life activity of the living creatures? There are a number of features of these matrices consistent with this guess. Lorentz transformations of the spinor indices of Dirac matrices is equal to their vector indices'
Lorentz transformations:

$$7_{1/2}(:7_{1/2} = 7^<:(< \tag{6}$$

The spinor indices, the elements of the Dirac matrices relate to their inner part, meanwhile vector transformations regard every Dirac matrix as whole,

indivisible unit. One can say that Eq.(6) describes the inner activity of the living creature and its movement in the space at the most basic level. One can formulate this thought in the following, slightly different form too. Lorentz transformations on the inner part of Dirac matrices, live matter generator is equal to their Lorentz transformation as a vector: Dirac equation is a bridge between the live matter generating structure (with Heisenberg's uncertainty principle) and Lorentz invariant world (space - time). Dirac equation based probability density's space - time independence is also consistent with this conclusion, Dirac equation and life activity have a larger scope than just this particular universe.

It should be obvious that life is not some peculiar small fluctuation in the galactic processes. The shift in the symmetry process's eventual destination must be the formation of life the way we know it. The certain interesting features of the nuclear binding energies and their relation to the human life activity discussed in [4] could be specific for our universe. In other words, the life must have a broader range of representations, not just the one manifesting itself in our universe: better understanding the connection between the basic elements of life and quantum field theory could help in building the so called 'theory of everything' for our universe. So S. Weinberg's dream to see the consciousness process in the equations of quantum field theory is unachievable in the current state of the theory. In other words, in order to bring physics to the level encompassing human psychology we have to have the theory of the universes. Possibly paraphrased words of S. Weinberg: through the final theory to see why the world is this way but not another way.

Eq.(6) already tells us that the well - known elements of the Dirac matrices are not simply numbers or coefficients, they are elements of the certain tensor similar to the Ricci tensor R_{ik} or the metric tensor g_{ik} in th local coordinate system of the electron - positron system (see [8]). Shifting the quantum field theory calculations from the local coordinate system of particles, from the Dirac matrices coordinate system to the certain general coordinate system might noticeably simplify these calculations. This general coordinate system could also mean the usage of the Heisenberg's uncertainty principle to the greater extent. It is interesting that twelve out of sixteen elements of each of these matrices are zeros, 3/4 of them, this is approximately how much the current science ascribes to the dark matter in the galactic processes (by taking into account that the values of these matrix elements should not be necessarily distributed uniformly). Dark matter in the galaxies also reveal their own scaling property [9]. Mayorana equation can also be considered just a Dirac equation with non unit mass matrix M in this context:

$$i\,/M\Theta(x) - m\Theta_C(x) = 0 \quad 6 \quad i\,/M\Theta(x) - M\Theta_C(x) = 0 \quad (7)$$

There is another aspect of the Dirac matrices which also supports the idea that they describe the building block of life generation. Angular momentum has a Heisenberg's uncertainty principle in a self - contained form, meanwhile Dirac equation produces the correct value for the electron's magnetic moment which is indispensably connected to its angular momentum. The core of the live matter or the living creature is inseparable into parts system and it is essentially self - contained system, the ($_3$ matrix corresponding to the direction of the certain value of the angular momentum (and spin for that matter) does not scale down into smaller similar units in all three representations of Dirac matrices. Shift in symmetry process utilizing Eq. (1) also occurs in a self - consistent way, without referring to another extra field [4]. Here it is also worth mentioning that angular momentum commutation relations are also in a self - contained form with no 'break - down' and incorporates all three components of angular momentum:

$$[L_x, L_y] = i\Sigma L_z \text{ etc.,}$$

The commutator of the one - dimensional position and momentum operators does not include these quantities:

$$[x, p_x] = i\Sigma$$

The difference of the order of taking measurements leaves a stable residue of the order of quantum fluctuations. A certain core property of life could well be of this nature, however different from the special relativity style measurements, matrix mechanics does not incorporate time difference of these measurements and it is hard to assess this feature of quantum mechanics on the ongoing discussion.

Dirac spinors related representation of the Lorentz transformations is essentially a commutator of the ($_i$ matrices. The connection of this representation S_{ik} to the space - time representation of the Lorentz transformations is achieved only by an (additional) commutation relation of S_{ik} with the ($_i$:

$$[(_i, S_{\forall \ni}] = (J_{\forall \ni})_i{}^< (_< \quad (8)$$

Here $(J_{\forall \ni})_i{}^<$ is a four - dimensional space - time representation of the Lorentz transformations. This aspect of the Dirac matrices ($_i$ also tells that Dirac equation has a larger scope than four - dimensional space - time. With massless fermions the Dirac equation breaks down into Weyl equations, so fermions getting massive as a result of the shift in the symmetry is also among the initial conditions necessary for the formation of life processes (to have Dirac matrices based actvities present with the matrices' above mentioned features).

Particle masses enter the Lagrangian through covariant derivatives (see Eq.(1)), gauge invariant way, and through mass mass terms which violate gauge invariance. The former has a more complex structure and the latter is the essence of building the space - time around us. Meanwhile both the wave function and its covariant derivative transform the same way under the gauge transformations.

The superposition of states feature of quantum

mechanics should also be one of the necessary conditions for the existence of life activity. Where do all the living creatures get the capacity of decision making from? At base level this capacity could just be choosing some combination of states from the system of states by the living creature influenced by the certain external field, wind. This aspect of living creatures also supports the quantum mechanical - quantum field theory origin hypothesis of life on the Earth.

CONCLUSIONS

The Dirac equation is a bridge between Lorentz invariant world and quantum mechanics world governed by the Heisenberg uncertainty principle. Analysis of the Dirac matrices from the different perspectives consistently point to their certain feature, which one can readily associate with the basic ingredients of life. Signs of the dark matter can also be seen in the elements of the generalized Dirac matrices with this approach to the Dirac equation.

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