Article

Prespacetime-Premomentumenergy Model II: Genesis of Self-Referential Matrix Law & Mathematics of Ether

Huping Hu* & Maoxin Wu

ABSTRACT

This work is a continuation of prespacetime-premomentumenergy model described recently. Here we show how in this model prespacetime-premomentumenergy generates: (1) four-momentum and four-position relation as transcendental Law of One, (2) self-referential matrix law with four-momentum and four-position relation as the determinant, and (3) Law of Zero in a dual universe comprised of an external spacetime and an internal momentum-energy space. We further show how prespacetime-premomentumenergy may generate, sustain and make evolving elementary particles and composite particles incorporating the genesis of self-referential matrix law. In addition, we will discuss the ontology and mathematics of ether in this model. Illustratively, in the beginning there was prespacetime-premomentumenergy by itself $e^{i0}=1$ materially empty and it began to imagine through primordial self-referential spin $1=e^{i0}=e^{i0}e^{i0}=e^{iL-iL}e^{iM-iM}=e^{iL}e^{iM}e^{-iL}e^{-iM}=e^{-iL}e^{-iM}/e^{-iL}e^{-iM}=e^{iL}e^{iM}/e^{iL}e^{iM}$…such that it created the self-referential matrix law, the external object to be observed and internal object as observed, separated them into external spacetime and internal momentum-energy space, caused them to interact through said matrix law and thus gave birth to the dual universe which it has since sustained and made to evolve.

Key Words: prespacetime, premomentumenergy, principle of existence, spin, hierarchy, self-reference, ether, mathematics, ontology, matrix law, transcendental Law of One, Law of Zero.

1. Introduction

Through all of us prespacetime-premomentumenergy manifests

This article is a continuation of the Principle of Existence [1-7] and the prespacetime-premomentumenergy model [8]. As shown in our recent work [8] and further shown here, the principles and mathematics based on prespacetime-premomentumenergy for creating,

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sustaining and making evolving of elementary particles in a dual universe comprised of an external spacetime and an internal momentum-energy space are beautiful and simple.

First, the prespacetime-premomentumenergy model employs the following ontological principles among others:

(1) Principle of oneness/unity of existence through quantum entanglement in the ether of prespacetime-premomentumenergy.

(2) Principle of hierarchical primordial self-referential spin creating:
- Four-momentum and four-position relation as transcendental Law of One.
- Four-momentum and four-position relation as determinant of matrix law.
- Law of Zero of total phase of external and internal wavefunctions (objects).

Second, prespacetime-premomentumenergy model employs the following mathematical elements & forms among others in order to empower the above ontological principles:

(1) *e*, Euler's Number, for (to empower) ether as foundation/basis/medium of existence (body of prespacetime-premomentumenergy);
(2) *i*, imaginary number, for (to empower) thoughts and imagination in prespacetime-premomentumenergy (ether);
(3) 0, zero, for (to empower) emptiness (undifferentiated/primordial state);
(4) 1, one, for (to empower) oneness/unity of existence;
(5) +, -, *, /, = for (to empower) creation, dynamics, balance & conservation;
(6) Pythagorean Theorem for (to empower) energy, momentum and mass relation, and time, position and intrinsic proper time relation; and
(7) *M*, matrix, for (to empower) the external spacetime and internal momentum-energy space and the interaction of external and internal wavefunctions.

This work is organized as follows. In § 2, we shall illustrate scientific genesis in a nutshell which incorporates the genesis of self-referential matrix law. In § 3, we shall detail the genesis of self-referential matrix law in the order of: (1) Genesis of four-momentum & four-position relation; (2) Self-referential matrix law and its metamorphoses; (3) Imaginary momentum & imaginary position; (4) Games for deriving matrix law; and (5) Hierarchical natural laws. In § 4, we shall incorporate the genesis of self-referential matrix law into scientific genesis of primordial entities (elementary particles) and scientific genesis of composite entities. In § 5, we shall show the mathematics and ontology of ether in the prespacetime-premomentumenergy model. Finally, in § 6, we shall conclude this work.

2. Scientific Genesis in Prespacetime-premomentumenergy in a Nutshell

Prespacetime-premomentumenergy model generate everything through self-referential spin

in the beginning there was prespacetime-premomentumenergy by itself $\boldsymbol{e}^{i0}=1$ materially empty and it began to imagine through primordial self-referential spin $1=e^{i0}=e^{i0}e^{i0}=e^{iL-iL}e^{iM-iM}=e^{iL}e^{iM}e^{-iL}e^{-iM}=e^{-iL}e^{-iM}/e^{-iL}e^{-iM}=e^{iL}e^{iM}/e^{iL}e^{iM}$…such that it created the self-referential matrix law, the external object to be observed and internal object as observed, separated them into external spacetime and internal momentum-energy space, caused them to interact through said matrix law and thus gave birth to the dual universeuniverse which it has since sustained and made to evolve.

We draw below several diagrams illustrating the above processes:

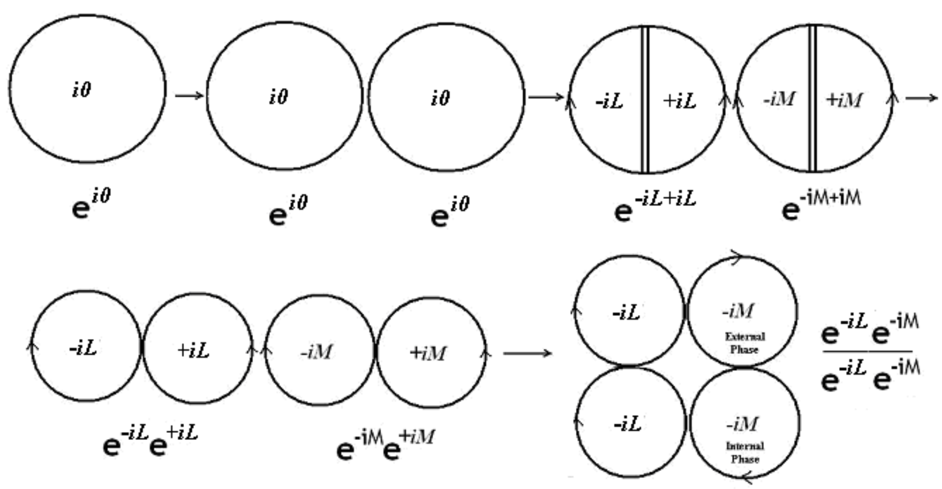

Figure 2.1 Illustration of primordial phase distinction in prespacetime-premomentumenergy

The primordial phase distinction in Figure 2.1 is accompanied by matrixing of prespacetime-premomentumenergy body *e* into: (1) external wave functions as external object in external spacetime and internal wave function as internal object in internal momentum-energy space, and (2) self-acting and self-referential matrix law, which accompany the imaginations in prespacetime-premomentumenergy so as to enforce (maintain) the accounting principle of conservation of zero, as illustrated in Figure 2.2.

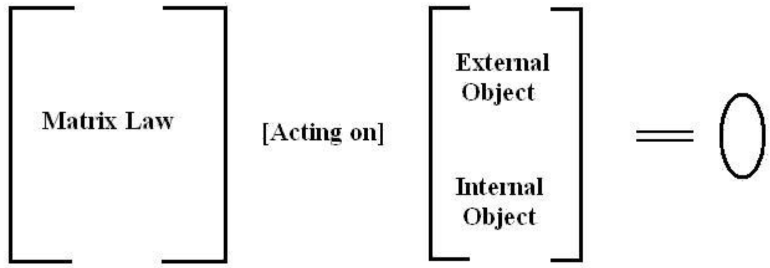

Figure2.2 Prespacetime-premomentumenergy Equation

Figure 2.3 shows from another perspective of the relationship among external object in the external spacetime, internal object in the internal momentum-energy space and the self-acting and self-referential matrix law. According to prespacetime-premomentumenergy model, self-interactions (self-gravity) are quantum entanglement between the external object and the internal object.

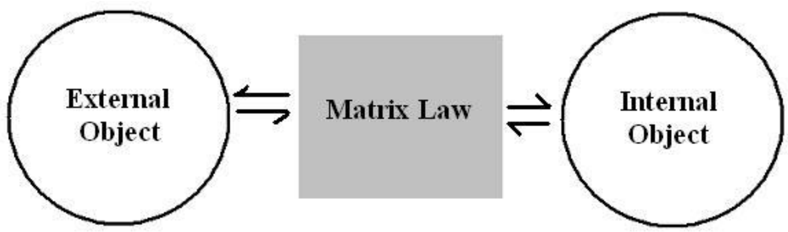

Figure2.3 Self-interaction between external object in the external spacetime and internal object in the internal momentum-energy space

Therefore, prespacetime-premomentumenergy model may create, sustain and cause evolution of primordial entities (elementary particles) in prespacetime-premomentumenergy by self-referential spin as follows:

$$1 = e^{i0} = e^{i0}e^{i0} = e^{-iL+iL}e^{-iM+iM} = L_e L_i^{-1}\left(e^{-iM}\right)\left(e^{-iM}\right)^{-1} \rightarrow$$
$$\begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} A_e e^{-iM} \\ A_i e^{-iM} \end{pmatrix} = L_M \begin{pmatrix} A_e \\ A_i \end{pmatrix} e^{-iM} = L_M \begin{pmatrix} \psi_e \\ \psi_i \end{pmatrix} = L_M \psi = 0 \tag{2.1}$$

In expression (2.1), e is Euler's Number representing prespacetime-premomentumenergy body (ether); i is imaginary unit representing imagination of prespacetime-premomentumenergy; $\pm M$ is immanent content of imagination i such as momentum, energy, space and time; $\pm L$ is immanent law of imagination I;

$L_1 = e^{i0} = e^{-iL+iL} = L_e L_i^{-1} = 1$ is transcendental Law of One in prespacetime-premomentumenergy before matrixization; L_e is external law; L_i is internal law; $L_{M,e}$ is external matrix law; and $L_{M,i}$ is internal matrix law; L_M is the self-referential matrix law in prespacetime-premomentumenergy comprised of the external and internal matrix laws which governs elementary entities and conserves zero; Ψ_e is external wave function (external object) in external spacetime; Ψ_i is internal wave function (internal object) in internal momentum-energy space ; and Ψ is the complete wave function (object/entity in the dual universe comprised of external peacetime and internal momentum-energy space as a whole).

Prespacetime-premomentumenergy spins as $1=e^{i0}=e^{i0}e^{i0}=e^{iL-iL}e^{iM-iM}=e^{iL}e^{iM}e^{-iL}e^{-iM}=e^{-iL}e^{-iM}/e^{-iL}e^{-iM}=e^{iL}e^{iM}/e^{iL}e^{iM}$…before matrixization. Prespacetime-premomentumenergy also spins through self-acting and self-referential matrix law L_M after matrixization which acts on external object and internal object to cause them to interact with each other as further described below.

3. Genesis of Self-Referential Matrix Law in the Prespacetime-premomentumenergy Model

Natural laws are hierarchical

3.1 Genesis of Four-momentum & Four-position Relation

In the prespacetime-premomentumenergy model, the four-momentum $p^\mu = (E/c, \mathbf{p})$ and four-position $x^\mu = (ct, \mathbf{x})$ relation:

$$(E/c)(ct) = \mathbf{p}\cdot\mathbf{x} + (mc)(c\tau) \text{ or } (E/c)(ct) - \mathbf{p}\cdot\mathbf{x} - (mc)(c\tau) = 0 \qquad (3.1)$$

can be generated from the following primordial self-referential spin when $\frac{E/c}{ct} = \frac{mc}{c\tau} = \frac{|\mathbf{p}|}{|\mathbf{x}|}$ and $\mathbf{p}$ parallels to $\mathbf{x}$:

$$1 = e^{i0} = e^{-iL+iL} = L_e L_i^{-1} = (\cos L - i\sin L)(\cos L + i\sin L) =$$
$$\left(\frac{mc}{E/c} - i\frac{|\mathbf{p}|}{E/c}\right)\left(\frac{c\tau}{ct} + i\frac{|\mathbf{x}|}{ct}\right) = \left(\frac{mc - i|\mathbf{p}|}{E/c}\right)\left(\frac{c\tau + i|\mathbf{x}|}{ct}\right) = \left(\frac{(mc)(c\tau) + |\mathbf{p}||\mathbf{x}|}{(E/c)(ct)}\right) \rightarrow$$
$$(E/c)(ct) = \mathbf{p}\cdot\mathbf{x} + (mc)(c\tau) \qquad (3.2)$$

where τ is intrinsic proper time of an elementary particle (e.g., defined through Compton wavelength $\tau = \lambda/c$).

For simplicity, we will set c=$\hbar$=1 throughout this work unless indicated otherwise. So, we have from equation (3.2):

$$Et = \mathbf{p} \cdot \mathbf{x} + m\tau \qquad \text{or} \quad Et - \mathbf{p} \cdot \mathbf{x} - m\tau = 0 \tag{3.3}$$

In the presence of an interacting field such as an electromagnetic potential ($\boldsymbol{A}_{(\boldsymbol{x},t)}, \phi_{(\boldsymbol{x},t)}$) in spacetime (**x**, t) and its dual ($\boldsymbol{A}_{(\boldsymbol{p},E)}, \phi_{(\boldsymbol{p},E)}$) in momentum-energy space (**p**, E), equation (3.3) may be modified as follows for an elementary entity with charge e:

$$1 = e^{i0} = e^{-iL+iL} = (\cos L - i\sin L)(\cos L + i\sin L) =$$

$$\left(\frac{m}{E - e\phi_{(\mathbf{x},t)}} - i\frac{\left|\mathbf{p} - \mathrm{e}\mathbf{A}_{(\mathbf{x},t)}\right|}{E - e\phi_{(\mathbf{x},t)}}\right)\left(\frac{\tau}{t - e\phi_{(\mathbf{p},E)}} + i\frac{\left|\mathbf{x} - \mathrm{e}\mathbf{A}_{(\mathbf{p},E)}\right|}{t - e\phi_{(\mathbf{p},E)}}\right) = \tag{3.4}$$

$$\left(\frac{m\tau + \left(\mathbf{p} - \mathrm{e}\mathbf{A}_{(\mathbf{x},t)}\right)\cdot\left(\mathbf{x} - \mathrm{e}\mathbf{A}_{(\mathbf{p},E)}\right)}{\left(E - e\phi_{(\mathbf{x},t)}\right)\left(t - e\phi_{(\mathbf{p},E)}\right)}\right) \rightarrow \left(E - e\phi_{(\mathbf{x},t)}\right)\left(t - e\phi_{(\mathbf{p},E)}\right) = m\tau + \left(\mathbf{p} - \mathrm{e}\mathbf{A}_{(\mathbf{x},t)}\right)\cdot\left(\mathbf{x} - \mathrm{e}\mathbf{A}_{(\mathbf{p},E)}\right)$$

where $\frac{E - e\phi_{(\mathbf{x},t)}}{t - e\phi_{(\mathbf{p},E)}} = \frac{m}{\tau} = \frac{\left|\mathbf{p} - \mathrm{e}\mathbf{A}_{(\mathbf{x},t)}\right|}{\left|\mathbf{x} - \mathrm{e}\mathbf{A}_{(\mathbf{p},E)}\right|}$; $\left(\mathbf{p} - \mathrm{e}\mathbf{A}_{(\mathbf{x},t)}\right)$ is parallel to $\left(\mathbf{x} - \mathrm{e}\mathbf{A}_{(\mathbf{p},E)}\right)$.

The metamorphoses of (3.1), (3.2), (3.3) & (3.4) are respectively as follows:

$$(ct)(E/c) = \mathbf{x} \cdot \mathbf{p} + (c\tau)(mc) \ \text{or} \ (ct)(E/c) - \mathbf{x} \cdot \mathbf{p} - (c\tau)(mc) = 0 \tag{3.1a}$$

$$1 = e^{i0} = e^{-iL+iL} = L_e L_i^{-1} = (\cos L - i\sin L)(\cos L + i\sin L) =$$

$$\left(\frac{c\tau}{ct} - i\frac{|\mathbf{x}|}{ct}\right)\left(\frac{mc}{E/c} + i\frac{|\mathbf{p}|}{E/c}\right) = \left(\frac{c\tau - i|\mathbf{x}|}{ct}\right)\left(\frac{mc + i|\mathbf{p}|}{E/c}\right) = \left(\frac{(c\tau)(mc) + |\mathbf{x}||\mathbf{p}|}{(ct)(E/c)}\right) \rightarrow$$

$$(ct)(E/c) = \mathbf{x} \cdot \mathbf{p} + (c\tau)(mc) \tag{3.2a}$$

$$tE = \mathbf{x}\cdot\mathbf{p} + \tau m \qquad \text{or} \quad tE - \mathbf{x}\cdot\mathbf{p} - \tau m = 0 \tag{3.3a}$$

$$1 = e^{i0} = e^{-iL+iL} = (\cos L - i\sin L)(\cos L + i\sin L) =$$

$$\left(\frac{\tau}{t - e\phi_{(\mathbf{p},E)}} - i\frac{\left|\mathbf{x}\text{ - e}\mathbf{A}_{(\mathbf{p},E)}\right|}{t - e\phi_{(\mathbf{p},E)}}\right)\left(\frac{m}{E - e\phi_{(\mathbf{x},t)}} + i\frac{\left|\mathbf{p}\text{ - e}\mathbf{A}_{(\mathbf{x},t)}\right|}{E - e\phi_{(\mathbf{x},t)}}\right) = \tag{3.4a}$$

$$\left(\frac{\tau m + \left(\mathbf{x}\text{ - e}\mathbf{A}_{(\mathbf{p},E)}\right)\cdot\left(\mathbf{p}\text{ - e}\mathbf{A}_{(\mathbf{x},t)}\right)}{\left(t - e\phi_{(\mathbf{p},E)}\right)\left(E - e\phi_{(\mathbf{x},t)}\right)}\right) \rightarrow \left(t - e\phi_{(\mathbf{p},E)}\right)\left(E - e\phi_{(\mathbf{x},t)}\right) = \tau m + \left(\mathbf{x}\text{ - e}\mathbf{A}_{(\mathbf{p},E)}\right)\cdot\left(\mathbf{p}\text{ - e}\mathbf{A}_{(\mathbf{x},t)}\right)$$

where $\frac{E/c}{ct} = \frac{mc}{c\tau} = \frac{|\mathbf{p}|}{|\mathbf{x}|}$ (or $\frac{E}{t} = \frac{m}{\tau} = \frac{|\mathbf{p}|}{|\mathbf{x}|}$ when c=1), **p** parallels to **x**; and $\frac{E - e\phi_{(\mathbf{x},t)}}{t - e\phi_{(\mathbf{p},E)}} = \frac{m}{\tau} = \frac{\left|\mathbf{p}\text{ - e}\mathbf{A}_{(\mathbf{x},t)}\right|}{\left|\mathbf{x}\text{ - e}\mathbf{A}_{(\mathbf{p},E)}\right|}$; $\left(\mathbf{p}\text{ - e}\mathbf{A}_{(\mathbf{x},t)}\right)$ is parallel to $\left(\mathbf{x}\text{ - e}\mathbf{A}_{(\mathbf{p},E)}\right)$.

3.2 Self-Referential Matrix Law and Its Metamorphoses

In the prespacetime-premomentumenergy model, one form of matrix law L_M in prespacetime-premomentumenergy is created from the following primordial self-referential spin:

$$1 = e^{i0} = e^{-iL+iL} = L_e L_i^{-1} = (\cos L - i\sin L)(\cos L + i\sin L) =$$

$$\left(\frac{m}{E} - i\frac{|\mathbf{p}|}{E}\right)\left(\frac{\tau}{t} + i\frac{|\mathbf{x}|}{t}\right) = \left(\frac{m - i|\mathbf{p}|}{E}\right)\left(\frac{\tau + i|\mathbf{x}|}{t}\right) = \left(\frac{m\tau + |\mathbf{p}||\mathbf{x}|}{Et}\right)$$

$$= \frac{Et - m\tau}{|\mathbf{p}||\mathbf{x}|} = \left(\frac{E - m}{-|\mathbf{p}|}\right)\left(\frac{-|\mathbf{x}|}{t + \tau}\right)^{-1}$$

$$\rightarrow \frac{E - m}{-|\mathbf{p}|} = \frac{-|\mathbf{x}|}{t + \tau} \rightarrow \frac{E - m}{-|\mathbf{p}|} - \frac{-|\mathbf{x}|}{t + \tau} = 0 \tag{3.5}$$

$$\rightarrow \begin{pmatrix} E - m & -|\mathbf{x}| \\ -|\mathbf{p}| & t + \tau \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M$$

where $\frac{E}{t}=\frac{m}{\tau}=\frac{|\mathbf{p}|}{|\mathbf{x}|}$, **p** parallels to **x** and matrixization step is carried out in such way that

$$\mathrm{Det}(L_M)=Et-ms-\mathbf{p}\cdot\mathbf{x}=0 \tag{3.6}$$

so as to satisfy the fundamental relation (3.3) in the determinant view.

After fermionic spinization in spacetime and momentum-energy space respectively:

$$|\mathbf{p}|=\sqrt{\mathbf{p}^2}=\sqrt{-Det(\boldsymbol{\sigma}\cdot\mathbf{p})}\rightarrow\boldsymbol{\sigma}\cdot\mathbf{p}$$
$$|\mathbf{x}|=\sqrt{\mathbf{x}^2}=\sqrt{-Det(\boldsymbol{\sigma}\cdot\mathbf{x})}\rightarrow\boldsymbol{\sigma}\cdot\mathbf{x} \tag{3.7}$$

where $\boldsymbol{\sigma}=(\sigma_1, \sigma_2, \sigma_3)$ are Pauli matrices:

$$\sigma_1=\begin{pmatrix}0 & 1\\ 1 & 0\end{pmatrix} \quad \sigma_2=\begin{pmatrix}0 & -i\\ i & 0\end{pmatrix} \quad \sigma_3=\begin{pmatrix}1 & 0\\ 0 & -1\end{pmatrix} \tag{3.8}$$

the last expressions in (3.5) becomes:

$$\begin{pmatrix}E-m & -\boldsymbol{\sigma}\cdot\mathbf{x}\\ -\boldsymbol{\sigma}\cdot\mathbf{p} & t+\tau\end{pmatrix}=\begin{pmatrix}L_{M,e} & L_{M,i}\end{pmatrix}=L_M \tag{3.9}$$

Expression (3.9) governs fermions in Dirac-like form such as Dirac electron and positron in the dual universe comprised of said external spacetime and internal energy-momentum space. We further propose that last expressions in (3.5) govern the third state of matter (unspinized or spinless entity/particle) with charge e and mass m (intrinsic proper time τ) such as a meson or a meson-like particle in said dual universe.

If we define:

$$Det_\sigma\begin{pmatrix}E-m & -\boldsymbol{\sigma}\cdot\mathbf{x}\\ -\boldsymbol{\sigma}\cdot\mathbf{p} & t+\tau\end{pmatrix}=(E-m)(t+\tau)-(-\boldsymbol{\sigma}\cdot\mathbf{x})(-\boldsymbol{\sigma}\cdot\mathbf{p}) \tag{3.10}$$

where $\frac{E}{t}=\frac{m}{\tau}=\frac{|\mathbf{p}|}{|\mathbf{x}|}$ and **p** parallels to **x**, we get:

$$Det_\sigma\begin{pmatrix}E-m & -\boldsymbol{\sigma}\cdot\mathbf{x}\\ -\boldsymbol{\sigma}\cdot\mathbf{p} & t+\tau\end{pmatrix}=(Et-m\tau-\mathbf{x}\cdot\mathbf{p})I_2=0 \tag{3.11}$$

Thus, fundamental relation (3.1) is satisfied under the determinant view of expression (3.9).

Indeed, we can also obtain the following conventional determinant:

$$Det\begin{pmatrix} E-m & -\boldsymbol{\sigma}\cdot\mathbf{x} \\ -\boldsymbol{\sigma}\cdot\mathbf{p} & t+\tau \end{pmatrix} = \left(Et-m\tau-\mathbf{x}\cdot\mathbf{p}\right)^2 = 0 \tag{3.12}$$

where $\frac{E}{t}=\frac{m}{\tau}=\frac{|\mathbf{p}|}{|\mathbf{x}|}$ and **p** parallels to **x.**

Expressions (3.5), (3.9), (3.10) & (3.11) have the following metamorphoses respectively:

$$\begin{aligned} 1 &= e^{i0} = e^{-iL+iL} = L_e L_i^{-1} = (\cos L - i\sin L)(\cos L + i\sin L) = \\ &\left(\frac{\tau}{t} - i\frac{|\mathbf{x}|}{t}\right)\left(\frac{m}{E} + i\frac{|\mathbf{p}|}{E}\right) = \left(\frac{\tau - i|\mathbf{x}|}{t}\right)\left(\frac{m + i|\mathbf{p}|}{E}\right) = \left(\frac{\tau m + |\mathbf{x}||\mathbf{p}|}{tE}\right) \\ &= \frac{tE - \tau m}{|\mathbf{x}||\mathbf{p}|} = \begin{pmatrix} \frac{t-\tau}{-|\mathbf{x}|} \end{pmatrix}\begin{pmatrix} \frac{-|\mathbf{p}|}{E+m} \end{pmatrix}^{-1} \\ &\rightarrow \frac{t-\tau}{-|\mathbf{x}|} = \frac{-|\mathbf{p}|}{E+m} \rightarrow \frac{t-\tau}{-|\mathbf{x}|} - \frac{-|\mathbf{p}|}{E+m} = 0 \\ &\rightarrow \begin{pmatrix} t-\tau & -|\mathbf{p}| \\ -|\mathbf{x}| & E+m \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \end{aligned} \tag{3.5a}$$

$$\begin{pmatrix} t-\tau & -\boldsymbol{\sigma}\cdot\mathbf{p} \\ -\boldsymbol{\sigma}\cdot\mathbf{x} & E+\tau \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \tag{3.9a}$$

$$Det_\sigma\begin{pmatrix} t-\tau & -\boldsymbol{\sigma}\cdot\mathbf{p} \\ -\boldsymbol{\sigma}\cdot\mathbf{x} & E+\tau \end{pmatrix} = (t-\tau)(E+m) - (-\boldsymbol{\sigma}\cdot\mathbf{p})(-\boldsymbol{\sigma}\cdot\mathbf{x}) \tag{3.10a}$$

$$Det_\sigma\begin{pmatrix} t-\tau & -\boldsymbol{\sigma}\cdot\mathbf{p} \\ -\boldsymbol{\sigma}\cdot\mathbf{x} & E+m \end{pmatrix} = \left(tE-\tau m-\mathbf{p}\cdot\mathbf{x}\right)I_2 = 0 \tag{3.11a}$$

where $\frac{E}{t}=\frac{m}{\tau}=\frac{|\mathbf{p}|}{|\mathbf{x}|}$ and **p** parallels to **x**

Expressions (3.5), (3.9), (3.10) & (3.11) also have the following metamorphoses respectively:

$$
\begin{gathered}
1=e^{i0}=e^{-iL+iL}=L_e L_i^{-1}=\left(\cos L-i\sin L\right)\left(\cos L+i\sin L\right)= \\
\left(\frac{m}{E}-i\frac{|\mathbf{p}|}{E}\right)\left(\frac{\tau}{t}+i\frac{|\mathbf{x}|}{t}\right)=\left(\frac{m-i|\mathbf{p}|}{E}\right)\left(\frac{\tau+i|\mathbf{x}|}{t}\right)=\left(\frac{m\tau+|\mathbf{p}||\mathbf{x}|}{Et}\right)= \\
\frac{Et-|\mathbf{p}||\mathbf{x}|}{m\tau}=\left(\frac{E-|\mathbf{p}|}{-m}\right)\left(\frac{-\tau}{t+|\mathbf{x}|}\right)^{-1}\rightarrow \\
\rightarrow\frac{E-|\mathbf{p}|}{-m}=\frac{-\tau}{t+|\mathbf{x}|}\rightarrow\frac{E-|\mathbf{p}|}{-m}-\frac{-\tau}{t+|\mathbf{x}|}=0 \\
\rightarrow\begin{pmatrix}E-|\mathbf{p}| & -\tau \\ -m & t+|\mathbf{x}|\end{pmatrix}=\begin{pmatrix}L_{M,e} & L_{M,i}\end{pmatrix}=L_M
\end{gathered}
\tag{3.13}
$$

$$
\rightarrow\begin{pmatrix}E-\boldsymbol{\sigma}\cdot\mathbf{p} & -\tau \\ -m & t+\boldsymbol{\sigma}\cdot\mathbf{x}\end{pmatrix}=\begin{pmatrix}L_{M,e} & L_{M,i}\end{pmatrix}=L_M \tag{3.14}
$$

$$
Det_{\sigma}\begin{pmatrix}E-\boldsymbol{\sigma}\cdot\mathbf{p} & -\tau \\ -m & t+\boldsymbol{\sigma}\cdot\mathbf{x}\end{pmatrix}=\left(E-\boldsymbol{\sigma}\cdot\mathbf{p}\right)\left(t+\boldsymbol{\sigma}\cdot\mathbf{x}\right)-\left(-\tau\right)\left(-m\right) \tag{3.15}
$$

$$
Det_{\sigma}\begin{pmatrix}E-\boldsymbol{\sigma}\cdot\mathbf{p} & -\tau \\ -m & t+\boldsymbol{\sigma}\cdot\mathbf{x}\end{pmatrix}=\left(Et-\mathbf{p}\cdot\mathbf{x}-\tau m\right)I_2=0 \tag{3.16}
$$

where $\frac{E}{t}=\frac{m}{\tau}=\frac{|\mathbf{p}|}{|\mathbf{x}|}$, **p** parallels to **x**; or

$$
\begin{gathered}
1=e^{i0}=e^{-iL+iL}=L_e L_i^{-1}=\left(\cos L-i\sin L\right)\left(\cos L+i\sin L\right)= \\
\left(\frac{\tau}{t}-i\frac{|\mathbf{x}|}{t}\right)\left(\frac{m}{E}+i\frac{|\mathbf{p}|}{E}\right)=\left(\frac{\tau-i|\mathbf{x}|}{t}\right)\left(\frac{m+i|\mathbf{p}|}{E}\right)=\left(\frac{\tau m+|\mathbf{x}||\mathbf{p}|}{tE}\right)=
\end{gathered}
$$

$$\frac{tE-|\mathbf{x}||\mathbf{p}|}{\tau m}=\left(\frac{t-|\mathbf{x}|}{-\tau}\right)\left(\frac{-m}{E+|\mathbf{p}|}\right)^{-1}\rightarrow$$

$$\rightarrow\frac{t-|\mathbf{x}|}{-\tau}=\frac{-m}{E+|\mathbf{p}|}\rightarrow\frac{t-|\mathbf{x}|}{-\tau}-\frac{-m}{E+|\mathbf{p}|}=0 \quad (3.13a)$$

$$\rightarrow\begin{pmatrix} t-|\mathbf{x}| & -m \\ -\tau & E+|\mathbf{p}| \end{pmatrix}=\begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}=L_M$$

$$\rightarrow\begin{pmatrix} t-\boldsymbol{\sigma}\cdot\mathbf{x} & -m \\ -\tau & E+\boldsymbol{\sigma}\cdot\mathbf{p} \end{pmatrix}=\begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}=L_M \quad (3.14a)$$

$$Det_{\sigma}\begin{pmatrix} t-\boldsymbol{\sigma}\cdot\mathbf{x} & -m \\ -\tau & E+\boldsymbol{\sigma}\cdot\mathbf{p} \end{pmatrix}=(t-\boldsymbol{\sigma}\cdot\mathbf{x})(E+\boldsymbol{\sigma}\cdot\mathbf{p})-(-m)(-\tau) \quad (3.15a)$$

$$Det_{\sigma}\begin{pmatrix} t-\boldsymbol{\sigma}\cdot\mathbf{x} & -m \\ -\tau & E+\boldsymbol{\sigma}\cdot\mathbf{p} \end{pmatrix}=(tE-\mathbf{x}\cdot\mathbf{p}-m\tau)I_2=0 \quad (3.16a)$$

where $\frac{t}{E}=\frac{\tau}{m}=\frac{|\mathbf{x}|}{|\mathbf{p}|}$, **x** parallels to **p**.

The last expression in (3.13) or (3.13a) is the unspinized matrix law in Weyl-like (chiral-like) form. Expression (3.14) or (3.14a) is spinized matrix law in Weyl-like (chiral-like) form.

Another kind of metamorphosis of expressions (3.5), (3.9), (3.10) & (3.11) is respectively as follows:

$$1=e^{i0}=e^{-iL+iL}=L_eL_i^{-1}=(\cos L-i\sin L)(\cos L+i\sin L)=$$

$$\left(\frac{m}{E}-i\frac{|\mathbf{p}|}{E}\right)\left(\frac{\tau}{t}+i\frac{|\mathbf{x}|}{t}\right)=\left(\frac{m-i|\mathbf{p}|}{E}\right)\left(\frac{s+i|\mathbf{x}|}{t}\right)=\left(\frac{E}{-m+i|\mathbf{p}|}\right)^{-1}\left(\frac{-\tau-i|\mathbf{x}|}{t}\right)$$

$$\rightarrow\frac{E}{-m+i|\mathbf{p}|}=\frac{-\tau-i|\mathbf{x}|}{t}\rightarrow\frac{E}{-m+i|\mathbf{p}|}-\frac{-\tau-i|\mathbf{x}|}{t}=0 \quad (3.17)$$

$$\rightarrow\begin{pmatrix} E & -\tau-i|\mathbf{x}| \\ -m+i|\mathbf{p}| & t \end{pmatrix}=\begin{pmatrix} L_e & L_i \end{pmatrix}=L_M$$

$$\to \begin{pmatrix} E & -\tau - i\boldsymbol{\sigma}\cdot\mathbf{x} \\ -m + i\boldsymbol{\sigma}\cdot\mathbf{p} & t \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \tag{3.18}$$

$$Det_\sigma \begin{pmatrix} E & -\tau - i\boldsymbol{\sigma}\cdot\mathbf{x} \\ -m + i\boldsymbol{\sigma}\cdot\mathbf{p} & t \end{pmatrix} = Et - (-\tau - i\boldsymbol{\sigma}\cdot\mathbf{x})(-m + i\boldsymbol{\sigma}\cdot\mathbf{p}) \tag{3.19}$$

$$Det_\sigma \begin{pmatrix} E & -\tau - i\boldsymbol{\sigma}\cdot\mathbf{x} \\ -m + i\boldsymbol{\sigma}\cdot\mathbf{p} & t \end{pmatrix} = (Et - m\tau - \mathbf{x}\cdot\mathbf{p}) I_2 = 0 \tag{3.20}$$

where $\frac{E}{t} = \frac{m}{\tau} = \frac{|\mathbf{p}|}{|\mathbf{x}|}$, **p** parallels to **x**; or

$$1 = e^{i0} = e^{-iL+iL} = L_e L_i^{-1} = (\cos L - i\sin L)(\cos L + i\sin L) =$$

$$\left(\frac{\tau}{t} - i\frac{|\mathbf{x}|}{t}\right)\left(\frac{m}{E} + i\frac{|\mathbf{p}|}{E}\right) = \left(\frac{\tau - i|\mathbf{x}|}{t}\right)\left(\frac{m + i|\mathbf{p}|}{E}\right) = \left(\frac{t}{-\tau + i|\mathbf{x}|}\right)^{-1}\left(\frac{-m - i|\mathbf{p}|}{E}\right)$$

$$\to \frac{t}{-\tau + i|\mathbf{x}|} = \frac{-m - i|\mathbf{p}|}{E} \to \frac{t}{-\tau + i|\mathbf{x}|} - \frac{-E - i|\mathbf{p}|}{E} = 0 \tag{3.17a}$$

$$\to \begin{pmatrix} t & -m - i|\mathbf{p}| \\ -\tau + i|\mathbf{x}| & E \end{pmatrix} = \begin{pmatrix} L_e & L_i \end{pmatrix} = L_M$$

$$\to \begin{pmatrix} t & -m - i\boldsymbol{\sigma}\cdot\mathbf{p} \\ -\tau + i\boldsymbol{\sigma}\cdot\mathbf{x} & E \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \tag{3.18b}$$

$$Det_\sigma \begin{pmatrix} t & -m - i\boldsymbol{\sigma}\cdot\mathbf{p} \\ -\tau + i\boldsymbol{\sigma}\cdot\mathbf{x} & E \end{pmatrix} = tE - (-m - i\boldsymbol{\sigma}\cdot\mathbf{p})(-\tau + i\boldsymbol{\sigma}\cdot\mathbf{x}) \tag{3.19c}$$

$$Det_\sigma \begin{pmatrix} t & -m - i\boldsymbol{\sigma}\cdot\mathbf{p} \\ -\tau + i\boldsymbol{\sigma}\cdot\mathbf{x} & E \end{pmatrix} = (tE - m\tau - \mathbf{p}\cdot\mathbf{x}) I_2 = 0 \tag{3.20d}$$

where $\frac{t}{E} = \frac{\tau}{m} = \frac{|\mathbf{x}|}{|\mathbf{p}|}$, **x** parallels to **p**.

Define $Q_x = \tau + i\boldsymbol{\sigma}\cdot\mathbf{x}$ and $Q_p{}^* = m - i\boldsymbol{\sigma}\cdot\mathbf{p}$, we can rewrite last expression in (3.18) as:

$$\begin{pmatrix} E & -Q_x \\ -Q_p{}^* & t \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \tag{3.21}$$

If $m=\tau=0$, we have from expression (3.5):

$$1 = e^{i0} = e^{-iL+iL} = L_e L_i^{-1} = (\cos L - i\sin L)(\cos L + i\sin L) =$$
$$\left(\frac{0}{E} - i\frac{|\mathbf{p}|}{E}\right)\left(\frac{0}{t} + i\frac{|\mathbf{x}|}{t}\right) = \left(-i\frac{|\mathbf{p}|}{E}\right)\left(+i\frac{|\mathbf{x}|}{t}\right) = \left(\frac{\mathbf{p}\cdot\mathbf{x}}{Et}\right)$$
$$= \frac{Et}{\mathbf{p}\cdot\mathbf{x}} = \left(\frac{E}{-|\mathbf{p}|}\right)\left(\frac{-|\mathbf{x}|}{t}\right)^{-1} \tag{3.22}$$
$$\rightarrow \frac{E}{-|\mathbf{p}|} = \frac{-|\mathbf{x}|}{t} \rightarrow \frac{E}{-|\mathbf{p}|} - \frac{-|\mathbf{x}|}{t} = 0$$
$$\rightarrow \begin{pmatrix} E & -|\mathbf{x}| \\ -|\mathbf{p}| & t \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M$$

After fermionic spinization $|\mathbf{p}| \longrightarrow \boldsymbol{\sigma}\cdot\mathbf{p}$, $|\mathbf{x}| \longrightarrow \boldsymbol{\sigma}\cdot\mathbf{x}$ in spacetime and momentum-energy space respectively, the last expression in (3.22) or (3.22a) becomes:

$$\begin{pmatrix} E & -\boldsymbol{\sigma}\cdot\mathbf{x} \\ -\boldsymbol{\sigma}\cdot\mathbf{p} & t \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \tag{3.23}$$

which governs massless and proper-time-less fermion-like (neutrino-like) in Dirac-like form.

After bosonic spinization in spacetime and momentum-energy space respectively:

$$|\mathbf{p}| = \sqrt{\mathbf{p}^2} = \sqrt{-(Det(\mathbf{s}\cdot\mathbf{p}+I_3)-Det(I_3))} \rightarrow \mathbf{s}\cdot\mathbf{p}\ , \tag{3.24}$$
$$|\mathbf{x}| = \sqrt{\mathbf{x}^2} = \sqrt{-(Det(\mathbf{s}\cdot\mathbf{x}+I_3)-Det(I_3))} \rightarrow \mathbf{s}\cdot\mathbf{x}$$

the last expression in (3.22) or (3.22a) becomes:

$$\begin{pmatrix} E & -\mathbf{s}\cdot\mathbf{x} \\ -\mathbf{s}\cdot\mathbf{p} & t \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \tag{3.25}$$

where **s** = (s_1, s_2, s_3) are spin operators for spin 1 particle:

$$s_1 = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & -i \\ 0 & i & 0 \end{pmatrix} \quad s_2 = \begin{pmatrix} 0 & 0 & i \\ 0 & 0 & 0 \\ -i & 0 & 0 \end{pmatrix} \quad s_3 = \begin{pmatrix} 0 & -i & 0 \\ i & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix} \tag{3.26}$$

If we define:

$$Det_s \begin{pmatrix} E & -\mathbf{s}\cdot\mathbf{x} \\ -\mathbf{s}\cdot\mathbf{p} & t \end{pmatrix} = (E)(t) - (-\mathbf{s}\cdot\mathbf{x})(-\mathbf{s}\cdot\mathbf{p}) \tag{3.27}$$

We get:

$$Det_s \begin{pmatrix} E & -\mathbf{s}\cdot\mathbf{x} \\ -\mathbf{s}\cdot\mathbf{p} & t \end{pmatrix} = (Et - \mathbf{x}\cdot\mathbf{p})I_3 - \begin{pmatrix} xp_x & yp_x & zp_x \\ xp_y & yp_y & zp_y \\ xp_z & yp_z & zp_z \end{pmatrix} \tag{3.28}$$

To obey fundamental relation (3.1) in determinant view (3.27), we shall require the last term in (3.28) acting on the external and internal wave functions respectively to produce null result (zero) in source-free zone as discussed later. We propose that the last expression in (3.22) governs massless and intrinsic-proper-time-less particle with unobservable spin (spinless). After bosonic spinization, the spinless and massless particle gains its spin 1.

One kind of metamorphosis of expressions (3.22), (3.23), (3.25), (3.27) & (3.28) is respectively as follows:

$$\begin{aligned} 1 &= e^{i0} = e^{-iL+iL} = L_e L_i^{-1} = (\cos L - i\sin L)(\cos L + i\sin L) = \\ &\left(\frac{0}{t} - i\frac{|\mathbf{x}|}{t}\right)\left(\frac{0}{E} + i\frac{|\mathbf{p}|}{E}\right) = \left(-i\frac{|\mathbf{x}|}{t}\right)\left(+i\frac{|\mathbf{p}|}{E}\right) = \left(\frac{\mathbf{x}\cdot\mathbf{p}}{tE}\right) \\ &= \frac{tE}{\mathbf{x}\cdot\mathbf{p}} = \left(\frac{t}{-|\mathbf{x}|}\right)\left(\frac{-|\mathbf{p}|}{E}\right)^{-1} \\ &\rightarrow \frac{t}{-|\mathbf{x}|} = \frac{-|\mathbf{p}|}{E} \rightarrow \frac{t}{-|\mathbf{x}|} - \frac{-|\mathbf{p}|}{E} = 0 \\ &\rightarrow \begin{pmatrix} t & -|\mathbf{p}| \\ -|\mathbf{x}| & E \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \end{aligned} \tag{3.22a}$$

$$\begin{pmatrix} t & -\boldsymbol{\sigma}\cdot\mathbf{p} \\ -\boldsymbol{\sigma}\cdot\mathbf{x} & E \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \tag{3.23a}$$

$$\begin{pmatrix} t & -\mathbf{s}\cdot\mathbf{p} \\ -\mathbf{s}\cdot\mathbf{x} & E \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \tag{3.25a}$$

$$Det_s \begin{pmatrix} t & -\mathbf{s}\cdot\mathbf{p} \\ -\mathbf{s}\cdot\mathbf{x} & E \end{pmatrix} = tE - (-\mathbf{s}\cdot\mathbf{p})(-\mathbf{s}\cdot\mathbf{x}) \tag{3.27a}$$

$$Det_s \begin{pmatrix} t & -\mathbf{s}\cdot\mathbf{p} \\ -\mathbf{s}\cdot\mathbf{x} & E \end{pmatrix} = (tE - \mathbf{p}\cdot\mathbf{x})I_3 - \begin{pmatrix} p_x x & p_x y & p_x z \\ p_y x & p_y y & p_y z \\ p_z x & p_z y & p_z z \end{pmatrix} \tag{3.28a}$$

Further, if |**p**|=0, we have:

$$1 = e^{i0} = e^{-iL+iL} = L_e L_i^{-1} = (\cos L - i\sin L)(\cos L + i\sin L) = \left(\frac{m}{E} - i\frac{0}{E}\right)\left(\frac{\tau}{t} + i\frac{0}{t}\right) = \left(\frac{m}{E}\right)\left(\frac{\tau}{t}\right) = \left(\frac{m\tau}{Et}\right)$$

$$\begin{aligned} &= \frac{Et}{m\tau} = \left(\frac{E}{-m}\right)\left(\frac{-\tau}{t}\right)^{-1} \\ &\rightarrow \frac{E}{-m} = \frac{-\tau}{t} \rightarrow \frac{E}{-m} - \frac{-\tau}{t} = 0 \\ &\rightarrow \begin{pmatrix} E & -\tau \\ -m & t \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \end{aligned} \tag{3.29}$$

We suggest the above spaceless and momentum-less forms of Matrix Law govern the external and internal wave functions (self-fields) which play the roles of spaceless and momentum-less gravitons, that is, they mediate space (distance) independent interactions through proper time (mass) entanglement.

One of the metamorphoses of (3.29) is as follows:

$$1 = e^{i0} = e^{-iL+iL} = L_e L_i^{-1} = (\cos L - i\sin L)(\cos L + i\sin L) = \left(\frac{\tau}{t} - i\frac{0}{t}\right)\left(\frac{m}{E} + i\frac{0}{E}\right) = \left(\frac{\tau}{t}\right)\left(\frac{m}{E}\right) = \left(\frac{\tau m}{tE}\right)$$

$$= \frac{tE}{\tau m} = \left(\frac{t}{-\tau}\right)\left(\frac{-m}{E}\right)^{-1}$$

$$\rightarrow \frac{t}{-\tau} = \frac{-m}{E} \rightarrow \frac{t}{-\tau} - \frac{-m}{E} = 0 \tag{3.29a}$$

$$\rightarrow \begin{pmatrix} t & -m \\ -\tau & E \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M$$

3.3 Imaginary Momentum & Imaginary Position

Prespacetime-premomentumenergy model may create spatial and momentum self-confinement of an elementary entity through imaginary momentum $\mathbf{p}_i$ in external spacetime and imaginary position $\mathbf{x}_i$ in internal momentum-energy space (downward self-reference such that $m\tau > Et$):

$$m\tau - Et = -\mathbf{p}_i \cdot \mathbf{x}_i = -p_{ix}x_i - p_{iy}y_i - p_{iz}z_i = (i\mathbf{p}_i)\cdot(i\mathbf{x}_i) \tag{3.30}$$

that is:

$$Et - m\tau - \mathbf{p}_i \cdot \mathbf{x}_i = 0 \tag{3.31}$$

which can be created by the following primordial self-referential spin:

$$1 = e^{i0} = e^{-iL+iL} = L_e L_i^{-1} = (\cos L - i\sin L)(\cos L + i\sin L) =$$

$$\left(\frac{m}{E} - i\frac{|\mathbf{p}_i|}{E}\right)\left(\frac{\tau}{t} + i\frac{|\mathbf{x}_i|}{t}\right) = \left(\frac{m - i|\mathbf{p}_i|}{E}\right)\left(\frac{s + i|\mathbf{x}_i|}{t}\right) = \left(\frac{m\tau + \mathbf{p}_i \cdot \mathbf{x}_i}{Et}\right) \rightarrow$$

$$Et = m\tau + \mathbf{p}_i \cdot \mathbf{x}_i \text{ or } Et - m\tau - \mathbf{p}_i \cdot \mathbf{x}_i = 0 \tag{3.32}$$

where $\frac{E}{t} = \frac{m}{\tau} = \frac{|\mathbf{p_i}|}{|\mathbf{x_i}|}$, $\mathbf{p}_i$ parallels to $\mathbf{x}_i$.

Therefore, allowing imaginary momentum $\mathbf{p}_i$ in external spacetime and imaginary position $\mathbf{x}_i$ in internal momentum-energy space (downward self-reference) for an elementary entity, we can derive the following matrix law in Dirac-like form:

$$\begin{pmatrix} E-m & -|\mathbf{x}_i| \\ -|\mathbf{p}_i| & t+\tau \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \tag{3.33}$$

$$\begin{pmatrix} E-m & -\sigma\cdot\mathbf{x}_i \\ -\sigma\cdot\mathbf{p}_i & t+\tau \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \tag{3.34}$$

Also, we can derive the following matrix law in Weyl-like (chiral-like) form:

$$\begin{pmatrix} E-|\mathbf{p}_i| & -\tau \\ -m & t+|\mathbf{x}_i| \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \tag{3.35}$$

$$\begin{pmatrix} E-\sigma\cdot\mathbf{p}_i & -\tau \\ -m & t+\sigma\cdot\mathbf{x}_i \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \tag{3.36}$$

It is suggested that the above additional forms of self-referential matrix law govern proton in Dirac-like and Weyl-like form respectively in said dual universe.

One kind of metamorphoses of (3.30) – (3.36) is respectively as follows:

$$\tau m - tE = -\mathbf{x}_i \cdot \mathbf{p}_i = -x_i p_{ix} - y_i p_{iy} - z_i p_{iz} = (i\mathbf{x}_i)\cdot(i\mathbf{p}_i) \tag{3.30a}$$

$$tE - \tau m - \mathbf{x}_i \cdot \mathbf{p}_i = 0 \tag{3.31a}$$

$$1 = e^{i0} = e^{-iL+iL} = L_e L_i^{-1} = (\cos L - i\sin L)(\cos L + i\sin L) =$$

$$\left(\frac{\tau}{t} - i\frac{|\mathbf{x}_i|}{t}\right)\left(\frac{m}{E} + i\frac{|\mathbf{p}_i|}{E}\right) = \left(\frac{\tau - i|\mathbf{x}_i|}{t}\right)\left(\frac{m + i|\mathbf{p}_i|}{E}\right) = \left(\frac{\tau m + \mathbf{x}_i \cdot \mathbf{p}_i}{tE}\right) \rightarrow$$

$$tE = \tau m + \mathbf{x}_i \cdot \mathbf{p}_i \text{ or } tE - \tau m - \mathbf{x}_i \cdot \mathbf{p}_i = 0 \tag{3.32a}$$

$$\begin{pmatrix} E-\tau & -|\mathbf{p}_i| \\ -|\mathbf{x}_i| & E+m \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \tag{3.33a}$$

$$\begin{pmatrix} t-\tau & -\sigma\cdot\mathbf{p}_i \\ -\sigma\cdot\mathbf{x}_i & E+m \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \tag{3.34a}$$

$$\begin{pmatrix} t-|\mathbf{x}_i| & -m \\ -\tau & E+|\mathbf{p}_i| \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \tag{3.35a}$$

$$\begin{pmatrix} t-\sigma\cdot\mathbf{x}_i & -m \\ -\tau & E+\sigma\cdot\mathbf{p}_i \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} = L_M \tag{3.36a}$$

where $\frac{t}{E} = \frac{\tau}{m} = \frac{|\mathbf{x_i}|}{|\mathbf{p_i}|}$, $\mathbf{x}_i$ parallels to $\mathbf{p}_i$.

3.4 Games for Deriving Matrix Law

The games for deriving various forms of the matrix law prior to spinization in the prespacetime-premomentumenergy model can be summarized as follows:

$$\begin{aligned} 0 = Et - m\tau - \mathbf{p}\cdot\mathbf{x} &= \left(DetM_{Et} + DetM_{m\tau} + DetM_{px}\right) \\ &= Det(M_{Et} + M_{m\tau} + M_{px}) = Det(L_M) \end{aligned} \tag{3.37}$$

where *Det* means determinant and M_{Et}, $M_{m\tau}$ and M_{px} are respectively matrices with $\pm E$ & $\pm t$ (or $\pm iE$ & $\pm it$), $\pm m$ & $\pm\tau$ (or $\pm im$ & $\pm i\tau$) and $\pm|\mathbf{p}|$ & $\pm|\mathbf{x}|$ (or $\pm i|\mathbf{p}|$ & $\pm i|\mathbf{x}|$) as elements respectively, and Et, $-m\tau$ and $-|\mathbf{p}||\mathbf{x}|$ as determinant respectively, and L_M is the matrix law so derived.

For example, the matrix law in Dirac-like form prior to spinization:

$$L_M = \begin{pmatrix} E-m & -|\mathbf{x}| \\ -|\mathbf{p}| & t+\tau \end{pmatrix} \tag{3.38}$$

can be derived as follows:

$$0 = Et - m\tau - \mathbf{p}\cdot\mathbf{x} = Det\begin{pmatrix} E & 0 \\ 0 & t \end{pmatrix} + Det\begin{pmatrix} -m & 0 \\ 0 & \tau \end{pmatrix} + Det\begin{pmatrix} 0 & -|\mathbf{x}| \\ -|\mathbf{p}| & 0 \end{pmatrix} =$$

$$Det\left(\begin{pmatrix} E & 0 \\ 0 & t \end{pmatrix}+\begin{pmatrix} -m & 0 \\ 0 & \tau \end{pmatrix}+\begin{pmatrix} 0 & -|\mathbf{x}| \\ -|\mathbf{p}| & 0 \end{pmatrix}\right)=Det\begin{pmatrix} E-m & -|\mathbf{x}| \\ -|\mathbf{p}| & t+\tau \end{pmatrix}=Det(L_M) \quad (3.39)$$

where $\frac{E}{t}=\frac{m}{\tau}=\frac{|\mathbf{p}|}{|\mathbf{x}|}$.

For a second example, the matrix law in Weyl-like form prior to spinization:

$$L_M=\begin{pmatrix} E-|\mathbf{p}| & -\tau \\ -m & t+|\mathbf{x}| \end{pmatrix} \quad (3.40)$$

can be derived as follows:

$$0=Et-m\tau-\mathbf{p}\cdot\mathbf{x}=Det\begin{pmatrix} E & 0 \\ 0 & t \end{pmatrix}+Det\begin{pmatrix} 0 & -\tau \\ -m & 0 \end{pmatrix}+Det\begin{pmatrix} -|\mathbf{p}| & 0 \\ 0 & |\mathbf{x}| \end{pmatrix}=$$

$$Det\left(\begin{pmatrix} E & 0 \\ 0 & t \end{pmatrix}+\begin{pmatrix} 0 & -\tau \\ -m & 0 \end{pmatrix}+\begin{pmatrix} -|\mathbf{p}| & 0 \\ 0 & |\mathbf{x}| \end{pmatrix}\right)=Det\begin{pmatrix} E-|\mathbf{p}| & -\tau \\ -m & t+|\mathbf{x}| \end{pmatrix}=Det(L_M) \quad (3.41)$$

where $\frac{E}{t}=\frac{m}{\tau}=\frac{|\mathbf{p}|}{|\mathbf{x}|}$.

For a third example, the matrix law in quaternion form prior to spinization:

$$L_M=\begin{pmatrix} E & -\tau-i|\mathbf{x}| \\ -m+i|\mathbf{p}| & t \end{pmatrix} \quad (3.42)$$

can be derived as follows:

$$0=Et-m\tau-\mathbf{p}\cdot\mathbf{x}=Det\begin{pmatrix} E & 0 \\ 0 & t \end{pmatrix}+Det\begin{pmatrix} 0 & -\tau \\ -m & 0 \end{pmatrix}+Det\begin{pmatrix} 0 & -i|\mathbf{x}| \\ i|\mathbf{p}| & 0 \end{pmatrix}=$$

$$Det\left(\begin{pmatrix} E & 0 \\ 0 & t \end{pmatrix}+\begin{pmatrix} 0 & -\tau \\ -m & 0 \end{pmatrix}+\begin{pmatrix} 0 & -i|\mathbf{x}| \\ i|\mathbf{p}| & 0 \end{pmatrix}\right)=Det\begin{pmatrix} E & -\tau-i|\mathbf{x}| \\ -m+i|\mathbf{p}| & t \end{pmatrix}=Det(L_M) \quad (3.43)$$

where $\frac{E}{t}=\frac{m}{\tau}=\frac{|\mathbf{p}|}{|\mathbf{x}|}$.

One kind of metamorphoses of (3.37)-(3.43) is respectively as follows:

$$0 = tE - \tau m - \mathbf{x}\cdot\mathbf{p} = \left(DetM_{tE} + DetM_{\tau m} + DetM_{xp}\right) = Det(M_{tE} + M_{\tau m} + M_{xp}) = Det(L_M) \tag{3.37a}$$

$$L_M = \begin{pmatrix} t-\tau & -|\mathbf{p}| \\ -|\mathbf{x}| & E+m \end{pmatrix} \tag{3.38a}$$

$$0 = tE - \tau m - \mathbf{x}\cdot\mathbf{p} = Det\begin{pmatrix} t & 0 \\ 0 & E \end{pmatrix} + Det\begin{pmatrix} -\tau & 0 \\ 0 & m \end{pmatrix} + Det\begin{pmatrix} 0 & -|\mathbf{p}| \\ -|\mathbf{x}| & 0 \end{pmatrix} =$$

$$Det\left(\begin{pmatrix} t & 0 \\ 0 & E \end{pmatrix} + \begin{pmatrix} -\tau & 0 \\ 0 & m \end{pmatrix} + \begin{pmatrix} 0 & -|\mathbf{p}| \\ -|\mathbf{x}| & 0 \end{pmatrix}\right) = Det\begin{pmatrix} t-\tau & -|\mathbf{p}| \\ -|\mathbf{x}| & E+m \end{pmatrix} = Det(L_M) \tag{3.39a}$$

$$L_M = \begin{pmatrix} t-|\mathbf{x}| & -\tau \\ -\tau & E+|\mathbf{p}| \end{pmatrix} \tag{3.40a}$$

$$0 = tE - \tau m - \mathbf{x}\cdot\mathbf{p} = Det\begin{pmatrix} t & 0 \\ 0 & E \end{pmatrix} + Det\begin{pmatrix} 0 & -m \\ -\tau & 0 \end{pmatrix} + Det\begin{pmatrix} -|\mathbf{x}| & 0 \\ 0 & |\mathbf{p}| \end{pmatrix} =$$

$$Det\left(\begin{pmatrix} E & 0 \\ 0 & t \end{pmatrix} + \begin{pmatrix} 0 & -\tau \\ -m & 0 \end{pmatrix} + \begin{pmatrix} -|\mathbf{p}| & 0 \\ 0 & |\mathbf{x}| \end{pmatrix}\right) = Det\begin{pmatrix} E-|\mathbf{p}| & -\tau \\ -m & t+|\mathbf{x}| \end{pmatrix} = Det\left(L_M\right) \tag{3.41a}$$

$$L_M = \begin{pmatrix} t & -m-i|\mathbf{p}| \\ -\tau+i|\mathbf{x}| & E \end{pmatrix} \tag{3.42a}$$

$$0 = tE - \tau m - \mathbf{x}\cdot\mathbf{p} = Det\begin{pmatrix} t & 0 \\ 0 & E \end{pmatrix} + Det\begin{pmatrix} 0 & -m \\ -\tau & 0 \end{pmatrix} + Det\begin{pmatrix} 0 & -i|\mathbf{p}| \\ i|\mathbf{x}| & 0 \end{pmatrix} =$$

$$Det\left(\begin{pmatrix} t & 0 \\ 0 & E \end{pmatrix} + \begin{pmatrix} 0 & -m \\ -\tau & 0 \end{pmatrix} + \begin{pmatrix} 0 & -i|\mathbf{p}| \\ i|\mathbf{x}| & 0 \end{pmatrix}\right) = Det\begin{pmatrix} t & -\tau-i|\mathbf{p}| \\ -\tau+i|\mathbf{x}| & E \end{pmatrix} = Det(L_M) \tag{3.43a}$$

where $\frac{t}{E} = \frac{\tau}{m} = \frac{|\mathbf{x}|}{|\mathbf{p}|}$.

3.5 Hierarchical Natural Laws

The natural laws created in accordance with the prespacetime-premomentumenergy model are hierarchical and comprised of: (1) immanent Law of Conservation manifesting and governing in the external spacetime and internal momentum-energy space respectively which may or may not hold; (2) immanent Law of Zero conserving total phase of external and internal wavefunctions to zero and manifesting and governing in the dual universe as a whole; and (3) transcendental Law of One manifesting and governing in prespacetime-premomentumenergy. By ways of examples, conservations of energy, momentum and mass and conservations of time, position and intrinsic proper time are immanent (and approximate) laws manifesting and governing respectively in external spacetime and internal momentum-energy space. Conservations of zero conserving total phase of external and internal wavefunctions to zero in the dual universe comprised of the external spacetime and internal momentum-energy space are immanent law manifesting and governing in the dual universe as a whole. Conservation of One (Unity) based on four-momentum and four-position relation is transcendental law manifesting and governing in prespacetime-premomentumenergy which is the foundation of external spacetime and internal momentum-energy space.

4. Scientific Genesis in Prespacetime-premomentumenergy

4.1 Scientific Genesis of Elementary Particles

Prespacetime-premomentumenergy model creates, sustains and causes evolution of a free plane-wave fermion particle such as an electron in Dirac-like form in the dual universe comprised of the external spacetime and the internal energy-momentum space as follows:

$$1 = e^{i0} = e^{i0}e^{i0} = e^{-iL+iL}e^{-iM+iM}$$

$$(\cos L - i\sin L)(\cos L + i\sin L)e^{-iM+iM} =$$

$$\left(\frac{m}{E} - i\frac{|\mathbf{p}|}{E}\right)\left(\frac{\tau}{t} + i\frac{|\mathbf{x}|}{t}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}$$

$$= \left(\frac{m - i|\mathbf{p}|}{E}\right)\left(\frac{\tau + i|\mathbf{x}|}{t}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}$$

$$= \left(\frac{m\tau + |\mathbf{p}||\mathbf{x}|}{Et}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}} = \frac{Et - m\tau}{|\mathbf{p}||\mathbf{x}|}e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}$$

$$= \left(\frac{E-m}{-|\mathbf{p}|}\right)\left(\frac{-|\mathbf{x}|}{t+\tau}\right)^{-1}\left(e^{-ip^{\mu}x_{\mu}}\right)\left(e^{-ip^{\mu}x_{\mu}}\right)^{-1} \rightarrow$$

$$\frac{E-m}{-|\mathbf{p}|}e^{-ip^{\mu}x_{\mu}} = \frac{-|\mathbf{x}|}{t+\tau}e^{-ip^{\mu}x_{\mu}} \rightarrow \frac{E-m}{-|\mathbf{p}|}e^{-ip^{\mu}x_{\mu}} - \frac{-|\mathbf{x}|}{t+\tau}e^{-ip^{\mu}x_{\mu}} = 0 \tag{4.1}$$

$$\rightarrow \begin{pmatrix} E-m & -|\mathbf{x}| \\ -|\mathbf{p}| & t+\tau \end{pmatrix}\begin{pmatrix} a_{e,+}e^{-ip^{\mu}x_{\mu}} \\ a_{i,-}e^{-ip^{\mu}x_{\mu}} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,+} \\ \psi_{i,-} \end{pmatrix} = L_M\psi = 0$$

$$\rightarrow \begin{pmatrix} E-m & -\boldsymbol{\sigma}\cdot\mathbf{x} \\ -\boldsymbol{\sigma}\cdot\mathbf{p} & t+\tau \end{pmatrix}\begin{pmatrix} A_{e,+}e^{-ip^{\mu}x_{\mu}} \\ A_{i,-}e^{-ip^{\mu}x_{\mu}} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,+} \\ \psi_{i,-} \end{pmatrix} = L_M\psi = 0$$

where $\frac{E}{t} = \frac{m}{\tau} = \frac{|\mathbf{p}|}{|\mathbf{x}|}$, **p** parallels to **x,** that is:

$$\begin{pmatrix} (E-m)\psi_{e,+} = \boldsymbol{\sigma}\cdot\mathbf{x}\psi_{i,-} \\ (t+s)\psi_{i,-} = \boldsymbol{\sigma}\cdot\mathbf{p}\psi_{e,+} \end{pmatrix} \text{or} \begin{pmatrix} i\partial_t\psi_{e,+} - m\psi_{e,+} = -i\boldsymbol{\sigma}\cdot\nabla_p\psi_{i,-} \\ i\partial_E\psi_{i,-} + \tau\psi_{i,-} = -i\boldsymbol{\sigma}\cdot\nabla_x\psi_{e,+} \end{pmatrix} \tag{4.2}$$

where substitutions $E \rightarrow i\partial_t$ & $\mathbf{p} \rightarrow -i\nabla_x$ and $t \rightarrow i\partial_E$ & $\mathbf{x} \rightarrow -i\nabla_P$ have been made so that components of L_M can act on the external and internal wave functions.

One kind of metamorphoses of (4.1) & (4.2) in which the dual universe is comprised of an external energy-momentum space and an internal spacetime is respectively as follows:

$$1 = e^{i0} = e^{i0}e^{i0} = e^{-iL+iL}e^{-iM+iM}$$

$$(\cos L - i\sin L)(\cos L + i\sin L)e^{-iM+iM} =$$

$$\left(\frac{\tau}{t} - i\frac{|\mathbf{x}|}{t}\right)\left(\frac{m}{E} + i\frac{|\mathbf{p}|}{E}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}$$

$$= \left(\frac{\tau - i|\mathbf{x}|}{t}\right)\left(\frac{m+i|\mathbf{p}|}{E}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}$$

$$= \left(\frac{\tau m + |\mathbf{x}||\mathbf{p}|}{tE}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}} = \frac{tE - \tau m}{|\mathbf{x}||\mathbf{p}|}e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}$$

$$= \left(\frac{t-\tau}{-|\mathbf{x}|}\right)\left(\frac{-|\mathbf{p}|}{E+m}\right)^{-1}\left(e^{-ip^{\mu}x_{\mu}}\right)\left(e^{-ip^{\mu}x_{\mu}}\right)^{-1} \rightarrow$$

$$\frac{t-\tau}{-|\mathbf{x}|}e^{-ip^{\mu}x_{\mu}} = \frac{-|\mathbf{p}|}{E+m}e^{-ip^{\mu}x_{\mu}} \rightarrow \frac{t-\tau}{-|\mathbf{x}|}e^{-ip^{\mu}x_{\mu}} - \frac{-|\mathbf{p}|}{E+m}e^{-ip^{\mu}x_{\mu}} = 0 \qquad (4.1a)$$

$$\rightarrow \begin{pmatrix} t-\tau & -|\mathbf{p}| \\ -|\mathbf{x}| & E+m \end{pmatrix}\begin{pmatrix} a_{e,+}e^{-ip^{\mu}x_{\mu}} \\ a_{i,-}e^{-ip^{\mu}x_{\mu}} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,+} \\ \psi_{i,-} \end{pmatrix} = L_M \psi = 0$$

$$\rightarrow \begin{pmatrix} t-\tau & -\boldsymbol{\sigma}\cdot\mathbf{x} \\ -\boldsymbol{\sigma}\cdot\mathbf{x} & E+m \end{pmatrix}\begin{pmatrix} A_{e,+}e^{-ip^{\mu}x_{\mu}} \\ A_{i,-}e^{-ip^{\mu}x_{\mu}} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,+} \\ \psi_{i,-} \end{pmatrix} = L_M \psi = 0$$

$$\begin{pmatrix} (t-\tau)\psi_{e,+} = \boldsymbol{\sigma}\cdot\mathbf{p}\,\psi_{i,-} \\ (E+m)\psi_{i,-} = \boldsymbol{\sigma}\cdot\mathbf{x}\,\psi_{e,+} \end{pmatrix} \text{or} \begin{pmatrix} i\partial_E\psi_{e,+} - \tau\psi_{e,+} = -i\boldsymbol{\sigma}\cdot\nabla_x\psi_{i,-} \\ i\partial_t\psi_{i,-} + m\psi_{i,-} = -i\boldsymbol{\sigma}\cdot\nabla_p\psi_{e,+} \end{pmatrix} \qquad (4.2a)$$

where $\frac{t}{E} = \frac{\tau}{m} = \frac{|\mathbf{x}|}{|\mathbf{p}|}$, **x** parallels to **p**.

Prespacetime-premomentumenergy model creates, sustains and causes evolution of a free plane-wave antifermion such as a positron in Dirac form in said dual universe comprised of said external spacetime and said internal energy-momentum space as follows:

$$1 = e^{i0} = e^{i0}e^{i0} = e^{+iL-iL}e^{+iM-iM}$$

$$(\cos L + i\sin L)(\cos L - i\sin L)e^{+iM-iM} =$$

$$\left(\frac{m}{E} + i\frac{|\mathbf{p}|}{E}\right)\left(\frac{\tau}{t} - i\frac{|\mathbf{x}|}{t}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}$$

$$= \left(\frac{m+i|\mathbf{p}|}{E}\right)\left(\frac{\tau - i|\mathbf{x}|}{t}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}$$

$$= \left(\frac{m\tau + |\mathbf{p}||\mathbf{x}|}{Et}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}} = \frac{Et - m\tau}{|\mathbf{p}||\mathbf{x}|}e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}$$

$$= \left(\frac{E-m}{-|\mathbf{p}|}\right)\left(\frac{-|\mathbf{x}|}{t+\tau}\right)^{-1}\left(e^{+ip^{\mu}x_{\mu}}\right)\left(e^{+ip^{\mu}x_{\mu}}\right)^{-1} \rightarrow$$

$$\frac{E-m}{-|\mathbf{p}|}e^{+ip^{\mu}x_{\mu}} = \frac{-|\mathbf{x}|}{t+\tau}e^{+ip^{\mu}x_{\mu}} \rightarrow \frac{E-m}{-|\mathbf{p}|}e^{+ip^{\mu}x_{\mu}} - \frac{-|\mathbf{x}|}{t+\tau}e^{+ip^{\mu}x_{\mu}} = 0 \tag{4.3}$$

$$\rightarrow \begin{pmatrix} E-m & -|\mathbf{x}| \\ -|\mathbf{p}| & t+\tau \end{pmatrix}\begin{pmatrix} a_{e,-}e^{+ip^{\mu}x_{\mu}} \\ a_{i,+}e^{+ip^{\mu}x_{\mu}} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,-} \\ \psi_{i,+} \end{pmatrix} = L_M\psi = 0$$

$$\rightarrow \begin{pmatrix} E-m & -\boldsymbol{\sigma}\cdot\mathbf{x} \\ -\boldsymbol{\sigma}\cdot\mathbf{p} & t+\tau \end{pmatrix}\begin{pmatrix} A_{e,-}e^{+ip^{\mu}x_{\mu}} \\ A_{i,+}e^{+ip^{\mu}x_{\mu}} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,-} \\ \psi_{i,+} \end{pmatrix} = L_M\psi = 0$$

where $\frac{E}{t} = \frac{m}{\tau} = \frac{|\mathbf{p}|}{|\mathbf{x}|}$, **p** parallels to **x**.

One kind of metamorphoses of (4.3) in which the dual universe is comprised of said external energy-momentum space and said internal spacetime is as follows:

$$1 = e^{i0} = e^{i0}e^{i0} = e^{+iL-iL}e^{+iM-iM}$$

$$(\cos L + i\sin L)(\cos L - i\sin L)e^{+iM-iM} =$$

$$\left(\frac{\tau}{t} + i\frac{|\mathbf{x}|}{t}\right)\left(\frac{m}{E} - i\frac{|\mathbf{p}|}{E}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}$$

$$= \left(\frac{\tau + i|\mathbf{x}|}{t}\right)\left(\frac{m - i|\mathbf{p}|}{E}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}$$

$$= \left(\frac{\tau m + |\mathbf{x}||\mathbf{p}|}{tE}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}} = \frac{tE - \tau m}{|\mathbf{x}||\mathbf{p}|}e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}$$

$$= \left(\frac{t-\tau}{-|\mathbf{x}|}\right)\left(\frac{-|\mathbf{p}|}{E+m}\right)^{-1}\left(e^{+ip^{\mu}x_{\mu}}\right)\left(e^{+ip^{\mu}x_{\mu}}\right)^{-1} \rightarrow$$

$$\frac{t-\tau}{-|\mathbf{x}|}e^{+ip^{\mu}x_{\mu}} = \frac{-|\mathbf{p}|}{E+m}e^{+ip^{\mu}x_{\mu}} \rightarrow \frac{t-\tau}{-|\mathbf{x}|}e^{+ip^{\mu}x_{\mu}} - \frac{-|\mathbf{p}|}{E+m}e^{+ip^{\mu}x_{\mu}} = 0 \tag{4.3a}$$

$$\rightarrow \begin{pmatrix} t-\tau & -|\mathbf{p}| \\ -|\mathbf{x}| & E+m \end{pmatrix} \begin{pmatrix} a_{e,-} e^{+ip^{\mu}x_{\mu}} \\ a_{i,+} e^{+ip^{\mu}x_{\mu}} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} \begin{pmatrix} \psi_{e,-} \\ \psi_{i,+} \end{pmatrix} = L_M \psi = 0$$

$$\rightarrow \begin{pmatrix} t-\tau & -\boldsymbol{\sigma}\cdot\mathbf{p} \\ -\boldsymbol{\sigma}\cdot\mathbf{x} & E+m \end{pmatrix} \begin{pmatrix} A_{e,-} e^{+ip^{\mu}x_{\mu}} \\ A_{i,+} e^{+ip^{\mu}x_{\mu}} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} \begin{pmatrix} \psi_{e,-} \\ \psi_{i,+} \end{pmatrix} = L_M \psi = 0$$

where $\frac{t}{E} = \frac{\tau}{m} = \frac{|\mathbf{x}|}{|\mathbf{p}|}$, **x** parallels to **p**.

Similarly, prespacetime-premomentumenergy create, sustain and cause evolution of a free plane-wave fermion in Weyl (chiral) form in a dual universe comprised of an external spacetime and an internal energy-momentum space as follows:

$$1 = e^{i0} = e^{i0}e^{i0} = e^{-iL+iL}e^{-iM+iM}$$

$$(\cos L - i\sin L)(\cos L + i\sin L)e^{-iM+iM} =$$

$$\left(\frac{m}{E} - i\frac{|\mathbf{x}|}{E}\right)\left(\frac{\tau}{t} + i\frac{|\mathbf{x}|}{t}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}$$

$$= \left(\frac{m - i|\mathbf{p}|}{E}\right)\left(\frac{\tau + i|\mathbf{x}|}{t}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}$$

$$= \left(\frac{m\tau + |\mathbf{p}||\mathbf{x}|}{Et}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}} = \frac{Et - |\mathbf{p}||\mathbf{x}|}{m\tau}e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}$$

$$= \left(\frac{E-|\mathbf{p}|}{-m}\right)\left(\frac{-\tau}{t+|\mathbf{x}|}\right)^{-1}\left(e^{-ip^{\mu}x_{\mu}}\right)\left(e^{-ip^{\mu}x_{\mu}}\right)^{-1} \rightarrow \tag{4.4}$$

$$\frac{E-|\mathbf{p}|}{-m}e^{-ip^{\mu}x_{\mu}} = \frac{-\tau}{t+|\mathbf{x}|}e^{-ip^{\mu}x_{\mu}} \rightarrow \frac{E-|\mathbf{p}|}{-m}e^{-ip^{\mu}x_{\mu}} - \frac{-\tau}{t+|\mathbf{x}|}e^{-ip^{\mu}x_{\mu}} = 0$$

$$\rightarrow\begin{pmatrix} E-|\mathbf{p}| & -\tau \\ -m & t+|\mathbf{x}| \end{pmatrix}\begin{pmatrix} a_{e,l}e^{-ip^{\mu}x_{\mu}} \\ a_{i,r}e^{-ip^{\mu}x_{\mu}} \end{pmatrix}=\begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,l} \\ \psi_{i,r} \end{pmatrix}=L_M\psi=0$$

$$\rightarrow\begin{pmatrix} E-\boldsymbol{\sigma}\cdot\mathbf{p} & -\tau \\ -m & t+\boldsymbol{\sigma}\cdot\mathbf{x} \end{pmatrix}\begin{pmatrix} A_{e,l}e^{-ip^{\mu}x_{\mu}} \\ A_{i,r}e^{-ip^{\mu}x_{\mu}} \end{pmatrix}=\begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,l} \\ \psi_{i,r} \end{pmatrix}=L_M\psi=0$$

where $\frac{E}{t}=\frac{m}{\tau}=\frac{|\mathbf{p}|}{|\mathbf{x}|}$, **p** parallels to **x,**

that is:

$$\begin{pmatrix} (E-\boldsymbol{\sigma}\cdot\mathbf{p})\psi_{e,l}=\tau\psi_{i,r} \\ (t+\boldsymbol{\sigma}\cdot\mathbf{x})\psi_{i,r}=m\psi_{e,l} \end{pmatrix} \text{ or } \begin{pmatrix} i\partial_t\psi_{e,l}+i\boldsymbol{\sigma}\cdot\nabla_x\psi_{e,l}=\tau\psi_{i,r} \\ i\partial_E\psi_{i,r}-i\boldsymbol{\sigma}\cdot\nabla_p\psi_{i,-}=m\psi_{e,l} \end{pmatrix} \tag{4.5}$$

One kind of metamorphoses of (4.4) & (4.5) in which the dual universe is comprised of said external energy-momentum space and said internal spacetime is respectively as follows:

$$1=e^{i0}=e^{i0}e^{i0}=e^{-iL+iL}e^{-iM+iM}$$

$$(\cos L-i\sin L)(\cos L+i\sin L)e^{-iM+iM}=$$

$$\left(\frac{m}{E}-i\frac{|\mathbf{x}|}{E}\right)\left(\frac{\tau}{t}+i\frac{|\mathbf{x}|}{t}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}$$

$$=\left(\frac{m-i|\mathbf{p}|}{E}\right)\left(\frac{\tau+i|\mathbf{x}|}{t}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}$$

$$=\left(\frac{m\tau+|\mathbf{p}||\mathbf{x}|}{Et}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}=\frac{Et-|\mathbf{p}||\mathbf{x}|}{m\tau}e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}$$

$$=\left(\frac{E-|\mathbf{p}|}{-m}\right)\left(\frac{-\tau}{t+|\mathbf{x}|}\right)^{-1}\left(e^{-ip^{\mu}x_{\mu}}\right)\left(e^{-ip^{\mu}x_{\mu}}\right)^{-1}\rightarrow \tag{4.4a}$$

$$\frac{E-|\mathbf{p}|}{-m}e^{-ip^{\mu}x_{\mu}}=\frac{-\tau}{t+|\mathbf{x}|}e^{-ip^{\mu}x_{\mu}}\rightarrow\frac{E-|\mathbf{p}|}{-m}e^{-ip^{\mu}x_{\mu}}-\frac{-\tau}{t+|\mathbf{x}|}e^{-ip^{\mu}x_{\mu}}=0$$

$$\rightarrow\begin{pmatrix} E-|\mathbf{p}| & -\tau \\ -m & t+|\mathbf{x}| \end{pmatrix}\begin{pmatrix} a_{e,l}e^{-ip^{\mu}x_{\mu}} \\ a_{i,r}e^{-ip^{\mu}x_{\mu}} \end{pmatrix}=\begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,l} \\ \psi_{i,r} \end{pmatrix}=L_M\psi=0$$

$$\rightarrow\begin{pmatrix} E-\boldsymbol{\sigma}\cdot\mathbf{p} & -\tau \\ -m & t+\boldsymbol{\sigma}\cdot\mathbf{x} \end{pmatrix}\begin{pmatrix} A_{e,l}e^{-ip^{\mu}x_{\mu}} \\ A_{i,r}e^{-ip^{\mu}x_{\mu}} \end{pmatrix}=\begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,l} \\ \psi_{i,r} \end{pmatrix}=L_M\psi=0$$

$$\begin{pmatrix} (E-\boldsymbol{\sigma}\cdot\mathbf{p})\psi_{e,l}=\tau\psi_{i,r} \\ (t+\boldsymbol{\sigma}\cdot\mathbf{x})\psi_{i,r}=m\psi_{e,l} \end{pmatrix} \text{ or } \begin{pmatrix} i\partial_t\psi_{e,l}+i\boldsymbol{\sigma}\cdot\nabla_x\psi_{e,l}=\tau\psi_{i,r} \\ i\partial_E\psi_{i,r}-i\boldsymbol{\sigma}\cdot\nabla_p\psi_{i,-}=m\psi_{e,l} \end{pmatrix} \tag{4.5a}$$

where $\frac{t}{E}=\frac{\tau}{m}=\frac{|\mathbf{x}|}{|\mathbf{p}|}$, $\mathbf{x}$ parallels to $\mathbf{p}$.

Prespacetime-premomentumenergy model creates, sustains and causes evolution of a free plane-wave fermion in another form in a dual universe comprised of an external spacetime and an internal energy-momentum space as follows:

$$1=e^{i0}=e^{i0}e^{i0}=e^{-iL+iL}e^{-iM+iM}$$

$$(\cos L-i\sin L)(\cos L+i\sin L)e^{-iM+iM}=$$

$$\left(\frac{m}{E}-i\frac{|\mathbf{p}|}{E}\right)\left(\frac{\tau}{t}+i\frac{|\mathbf{x}|}{t}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}$$

$$=\left(\frac{m-i|\mathbf{p}|}{E}\right)\left(\frac{\tau+i|\mathbf{x}|}{t}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}$$

$$=\left(\frac{E}{-m+i\varepsilon|\mathbf{p}|}\right)\left(\frac{-\tau-i|\mathbf{x}|}{t}\right)^{-1}\left(e^{-ip^{\mu}x_{\mu}}\right)\left(e^{-ip^{\mu}x_{\mu}}\right)^{-1} \tag{4.6}$$

$$\rightarrow\frac{E}{-m+i|\mathbf{p}|}e^{-ip^{\mu}x_{\mu}}=\frac{-\tau-i|\mathbf{x}|}{t}e^{-ip^{\mu}x_{\mu}}$$

$$\rightarrow\frac{E}{-m+i|\mathbf{p}|}e^{-ip^{\mu}x_{\mu}}-\frac{-\tau-i|\mathbf{x}|}{t}e^{-ip^{\mu}x_{\mu}}=0$$

$$\rightarrow\begin{pmatrix} E & -\tau-i|\mathbf{x}| \\ -m+i|\mathbf{p}| & t \end{pmatrix}\begin{pmatrix} A_e e^{-ip^\mu x_\mu} \\ A_i e^{-ip^\mu x_\mu} \end{pmatrix}=\begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_e \\ \psi_i \end{pmatrix}=L_M\psi=0$$

$$\rightarrow\begin{pmatrix} E & -Q_x \\ -Q_p{}^* & t \end{pmatrix}\begin{pmatrix} A_e e^{-ip^\mu x_\mu} \\ A_i e^{-ip^\mu x_\mu} \end{pmatrix}=\begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_e \\ \psi_i \end{pmatrix}=L_M\psi=0$$

where $Q_p{}^*=m-i\boldsymbol{\sigma}\cdot\mathbf{p}$ and $Q_x=\tau+i\boldsymbol{\sigma}\cdot\mathbf{x}$ and where $\frac{E}{t}=\frac{m}{\tau}=\frac{|\mathbf{p}|}{|\mathbf{x}|}$, **p** parallels to **x**,

that is:

$$\begin{pmatrix} E\psi_e=(\tau+i\boldsymbol{\sigma}\cdot\mathbf{x})\psi_i \\ t\psi_i=(m-i\boldsymbol{\sigma}\cdot\mathbf{p})\psi_e \end{pmatrix} \text{ or } \begin{pmatrix} i\partial_t\psi_e=\tau\psi_i+\boldsymbol{\sigma}\cdot\nabla_p\psi_i \\ i\partial_E\psi_i=m\psi_e-\boldsymbol{\sigma}\cdot\nabla_x\psi_i \end{pmatrix} \tag{4.7}$$

One kind of metamorphoses of (4.6) & (4.7) in which the dual universe is comprised of said external energy-momentum space and said internal spacetime is respectively as follows:

$$1=e^{i0}=e^{i0}e^{i0}=e^{-iL+iL}e^{-iM+iM}$$

$$(\cos L-i\sin L)(\cos L+i\sin L)e^{-iM+iM}=$$

$$\left(\frac{\tau}{t}-i\frac{|\mathbf{x}|}{t}\right)\left(\frac{m}{E}+i\frac{|\mathbf{p}|}{E}\right)e^{-ip^\mu x_\mu+ip^\mu x_\mu}$$

$$=\left(\frac{\tau-i|\mathbf{x}|}{t}\right)\left(\frac{m+i|\mathbf{p}|}{E}\right)e^{-ip^\mu x_\mu+ip^\mu x_\mu}$$

$$=\left(\left(\frac{t}{-\tau+i\varepsilon|\mathbf{x}|}\right)\left(\frac{-m-i|\mathbf{p}|}{E}\right)\right)^{-1}\left(\left(e^{-ip^\mu x_\mu}\right)\left(e^{-ip^\mu x_\mu}\right)\right)^{-1} \tag{4.6a}$$

$$\rightarrow\frac{t}{-\tau+i|\mathbf{x}|}e^{-ip^\mu x_\mu}=\frac{-m-i|\mathbf{p}|}{E}e^{-ip^\mu x_\mu}$$

$$\rightarrow\frac{t}{-\tau+i|\mathbf{x}|}e^{-ip^\mu x_\mu}-\frac{-m-i|\mathbf{p}|}{E}e^{-ip^\mu x_\mu}=0$$

$$\rightarrow\begin{pmatrix} t & -m-i|\mathbf{p}| \\ -\tau+i|\mathbf{x}| & E \end{pmatrix}\begin{pmatrix} A_e e^{-ip^\mu x_\mu} \\ A_i e^{-ip^\mu x_\mu} \end{pmatrix}=\begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_e \\ \psi_i \end{pmatrix}=L_M\psi=0$$

$$\rightarrow\begin{pmatrix} t & -Q_p \\ -Q_x{}^* & E \end{pmatrix}\begin{pmatrix} A_e e^{-ip^\mu x_\mu} \\ A_i e^{-ip^\mu x_\mu} \end{pmatrix}=\begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_e \\ \psi_i \end{pmatrix}=L_M\psi=0$$

$$\begin{pmatrix} t\psi_e=(m+i\boldsymbol{\sigma}\cdot\mathbf{p})\psi_i \\ E\psi_i=(\tau-i\boldsymbol{\sigma}\cdot\mathbf{x})\psi_e \end{pmatrix} \text{ or } \begin{pmatrix} i\partial_E\psi_e=m\psi_i+\boldsymbol{\sigma}\cdot\nabla_x\psi_i \\ i\partial_t\psi_i=\tau\psi_e-\boldsymbol{\sigma}\cdot\nabla_p\psi_i \end{pmatrix} \tag{4.7a}$$

where $\frac{t}{E}=\frac{\tau}{m}=\frac{|\mathbf{x}|}{|\mathbf{p}|}$, **x** parallels to **p**, $Q_x{}^*=\tau-i\boldsymbol{\sigma}\cdot\mathbf{x}$ and $Q_p=m+i\boldsymbol{\sigma}\cdot\mathbf{p}$.

Prespacetime-premomentumenergy model creates, sustains and causes evolution of a linear plane-wave photon in a dual universe comprised of an external spacetime and an internal energy-momentum space as follows:

$$1=e^{i0}=e^{i0}e^{i0}=e^{-iL+iL}e^{-iM+iM}$$

$$(\cos L-i\sin L)(\cos L+i\sin L)e^{-iM+iM}=$$

$$\left(\frac{0}{E}-i\frac{|\mathbf{p}|}{E}\right)\left(\frac{0}{t}+i\frac{|\mathbf{x}|}{t}\right)e^{-ip^\mu x_\mu+ip^\mu x_\mu}$$

$$=\left(-i\frac{|\mathbf{p}|}{E}\right)\left(+i\frac{|\mathbf{x}|}{t}\right)e^{-ip^\mu x_\mu+ip^\mu x_\mu}$$

$$\left(\frac{|\mathbf{p}||\mathbf{x}|}{Et}\right)e^{-ip^\mu x_\mu+ip^\mu x_\mu}=\left(\frac{Et}{|\mathbf{p}||\mathbf{x}|}\right)e^{-ip^\mu x_\mu+ip^\mu x_\mu}= \tag{4.8}$$

$$\left(\frac{E}{-|\mathbf{p}|}\right)\left(\frac{-|\mathbf{x}|}{t}\right)^{-1}\left(e^{-ip^\mu x_\mu}\right)\left(e^{-ip^\mu x_\mu}\right)^{-1}\rightarrow$$

$$\frac{E}{-|\mathbf{p}|}e^{-ip^\mu x_\mu}=\frac{-|\mathbf{x}|}{t}e^{-ip^\mu x_\mu}\rightarrow\frac{E}{-|\mathbf{p}|}e^{-ip^\mu x_\mu}-\frac{-|\mathbf{x}|}{t}e^{-ip^\mu x_\mu}=0$$

$$\rightarrow\begin{pmatrix} E & -|\mathbf{x}| \\ -|\mathbf{p}| & t \end{pmatrix}\begin{pmatrix} a_{e,+}e^{-ip^{\mu}x_{\mu}} \\ a_{i,-}e^{-ip^{\mu}x_{\mu}} \end{pmatrix}=\begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,+} \\ \psi_{i,-} \end{pmatrix}=L_M\psi=0$$

$$\rightarrow\begin{pmatrix} E & -\mathbf{s}\cdot\mathbf{x} \\ -\mathbf{s}\cdot\mathbf{p} & t \end{pmatrix}\begin{pmatrix} \mathbf{E}_{0e,+}e^{-ip^{\mu}x_{\mu}} \\ i\mathbf{B}_{0i,-}e^{-ip^{\mu}x_{\mu}} \end{pmatrix}=\begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,+} \\ \psi_{i,-} \end{pmatrix}=L_M\psi_{photon}=0$$

This photon wave function can be written as:

$$\psi_{photon}=\begin{pmatrix} \psi_{e,+} \\ \psi_{i,-} \end{pmatrix}=\begin{pmatrix} \mathbf{E}_{(\mathbf{x},\ t)} \\ i\mathbf{B}_{(\mathbf{p},\ E)} \end{pmatrix}=\begin{pmatrix} \mathbf{E}_0 e^{-i(\omega t-\mathbf{k}\cdot\mathbf{x})} \\ i\mathbf{B}_0 e^{-i(\omega t-\mathbf{k}\cdot\mathbf{x})} \end{pmatrix}=\begin{pmatrix} \mathbf{E}_0 \\ i\mathbf{B}_0 \end{pmatrix}e^{-i(\omega t-\mathbf{k}\cdot\mathbf{x})} \tag{4.9}$$

After the substitutions $E\rightarrow i\partial_t$ & $\mathbf{p}\rightarrow -i\nabla_x$ and $t\rightarrow i\partial_E$ & $\mathbf{x}\rightarrow -i\nabla_p$, we have from the last expression in (4.8):

$$\begin{pmatrix} i\partial_t & i\mathbf{S}\cdot\nabla_p \\ i\mathbf{S}\cdot\nabla_x & i\partial_E \end{pmatrix}\begin{pmatrix} \mathbf{E}_{(\mathbf{x},\ t)} \\ i\mathbf{B}_{(\mathbf{p},\ E)} \end{pmatrix}=0\rightarrow\begin{pmatrix} \partial_t\mathbf{E}_{(\mathbf{x},\ t)}=-\nabla_p\times\mathbf{B}_{(\mathbf{p},\ E)} \\ \partial_E\mathbf{B}_{(\mathbf{p},\ E)}=\nabla_x\times\mathbf{E}_{(\mathbf{x},\ t)} \end{pmatrix} \tag{4.10}$$

where we have used the relationship $\mathbf{S}\cdot(-i\nabla_x)=\nabla_x\times$ and $\mathbf{S}\cdot(-i\nabla_p)=\nabla_p\times$ to derive the latter equations which together with $\nabla_x\cdot\mathbf{E}=0$ and $\nabla_p\cdot\mathbf{B}=0$ are the Maxwell-like equations in the source-free vacuum in the dual universe comprising of said external spacetime and internal energy-momentum space.

Prespacetime-premomentumenergy model creates a neutrino in Dirac form by replacing the last step of expression (4.8) with the following:

$$\rightarrow\begin{pmatrix} E & -\sigma\cdot\mathbf{x} \\ -\sigma\cdot\mathbf{p} & t \end{pmatrix}\begin{pmatrix} a_{e,+}e^{-ip^{\mu}x_{\mu}} \\ a_{i,-}e^{-ip^{\mu}x_{\mu}} \end{pmatrix}=\begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,+} \\ \psi_{i,-} \end{pmatrix}=L_M\psi=0 \tag{4.11}$$

One kind of metamorphoses of (4.8)-(4.11) in which the dual universe is comprised of said external energy-momentum space and said internal spacetime is respectively as follows:

$$1 = e^{i0} = e^{i0}e^{i0} = e^{-iL+iL}e^{-iM+iM}$$
$$(\cos L - i\sin L)(\cos L + i\sin L)e^{-iM+iM} =$$
$$\left(\frac{0}{t} - i\frac{|\mathbf{x}|}{t}\right)\left(\frac{0}{E} + i\frac{|\mathbf{p}|}{E}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}$$
$$= \left(-i\frac{|\mathbf{x}|}{t}\right)\left(+i\frac{|\mathbf{p}|}{E}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}$$
$$\left(\frac{|\mathbf{x}||\mathbf{p}|}{tE}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}} = \left(\frac{tE}{|\mathbf{x}||\mathbf{p}|}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}} = \tag{4.8a}$$
$$\left(\frac{t}{-|\mathbf{x}|}\right)\left(\frac{-|\mathbf{p}|}{E}\right)^{-1}\left(e^{-ip^{\mu}x_{\mu}}\right)\left(e^{-ip^{\mu}x_{\mu}}\right)^{-1} \rightarrow$$
$$\frac{t}{-|\mathbf{x}|}e^{-ip^{\mu}x_{\mu}} = \frac{-|\mathbf{p}|}{E}e^{-ip^{\mu}x_{\mu}} \rightarrow \frac{t}{-|\mathbf{x}|}e^{-ip^{\mu}x_{\mu}} - \frac{-|\mathbf{p}|}{E}e^{-ip^{\mu}x_{\mu}} = 0$$
$$\rightarrow \begin{pmatrix} t & -|\mathbf{p}| \\ -|\mathbf{x}| & E \end{pmatrix}\begin{pmatrix} a_{e,+}e^{-ip^{\mu}x_{\mu}} \\ a_{i,-}e^{-ip^{\mu}x_{\mu}} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,+} \\ \psi_{i,-} \end{pmatrix} = L_M\psi = 0$$
$$\rightarrow \begin{pmatrix} t & -\mathbf{s}\cdot\mathbf{p} \\ -\mathbf{s}\cdot\mathbf{x} & E \end{pmatrix}\begin{pmatrix} \mathbf{E}_{0e,+}e^{-ip^{\mu}x_{\mu}} \\ i\mathbf{B}_{0i,-}e^{-ip^{\mu}x_{\mu}} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,+} \\ \psi_{i,-} \end{pmatrix} = L_M\psi_{photon} = 0$$

$$\psi_{photon} = \begin{pmatrix} \psi_{e,+} \\ \psi_{i,-} \end{pmatrix} = \begin{pmatrix} \mathbf{E}_{(\mathbf{p},\ \mathrm{E})} \\ i\mathbf{B}_{(\mathbf{x},\ \mathrm{t})} \end{pmatrix} = \begin{pmatrix} \mathbf{E}_0 e^{-i(\omega t-\mathbf{k}\cdot\mathbf{x})} \\ i\mathbf{B}_0 e^{-i(\omega t-\mathbf{k}\cdot\mathbf{x})} \end{pmatrix} = \begin{pmatrix} \mathbf{E}_0 \\ i\mathbf{B}_0 \end{pmatrix}e^{-i(\omega t-\mathbf{k}\cdot\mathbf{x})} \tag{4.9a}$$

$$\begin{pmatrix} i\partial_E & i\mathbf{S}\cdot\nabla_x \\ i\mathbf{S}\cdot\nabla_p & i\partial_t \end{pmatrix}\begin{pmatrix} \mathbf{E}_{(\mathbf{p},\ \mathrm{E})} \\ i\mathbf{B}_{(\mathbf{x},\ \mathrm{t})} \end{pmatrix} = 0 \rightarrow \begin{pmatrix} \partial_E\mathbf{E}_{(\mathbf{p},\ \mathrm{E})} = -\nabla_x \times \mathbf{B}_{(\mathbf{x},\ \mathrm{t})} \\ \partial_t\mathbf{B}_{(\mathbf{x},\ \mathrm{t})} = \nabla_p \times \mathbf{E}_{(\mathbf{p},\ \mathrm{E})} \end{pmatrix} \tag{4.10a}$$

$$\rightarrow \begin{pmatrix} t & -\sigma\cdot\mathbf{p} \\ -\sigma\cdot\mathbf{x} & E \end{pmatrix}\begin{pmatrix} a_{e,+}e^{-ip^{\mu}x_{\mu}} \\ a_{i,-}e^{-ip^{\mu}x_{\mu}} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,+} \\ \psi_{i,-} \end{pmatrix} = L_M\psi = 0 \tag{4.11a}$$

Prespacetime-premomentumenergy model creates, sustains and causes evolution of a linear plane-wave antiphoton in a dual universe comprised of an external spacetime and an internal energy-momentum space as follows:

$$1 = e^{i0} = e^{i0}e^{i0} = e^{+iL-iL}e^{+iM-iM}$$
$$(\cos L + i\sin L)(\cos L - i\sin L)e^{+iM-iM} =$$
$$\left(\frac{0}{E} + i\frac{|\mathbf{p}|}{E}\right)\left(\frac{0}{t} - i\frac{|\mathbf{x}|}{t}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}$$
$$= \left(+i\frac{|\mathbf{p}|}{E}\right)\left(-i\frac{|\mathbf{x}|}{t}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}$$
$$\left(\frac{|\mathbf{p}||\mathbf{x}|}{Et}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}} = \left(\frac{Et}{|\mathbf{p}||\mathbf{x}|}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}} =$$
$$\left(\frac{E}{-|\mathbf{p}|}\right)\left(\frac{-|\mathbf{x}|}{t}\right)^{-1}\left(e^{+ip^{\mu}x_{\mu}}\right)\left(e^{+ip^{\mu}x_{\mu}}\right)^{-1} \rightarrow$$
$$\frac{E}{-|\mathbf{p}|}e^{+ip^{\mu}x_{\mu}} = \frac{-|\mathbf{x}|}{t}e^{+ip^{\mu}x_{\mu}} \rightarrow \frac{E}{-|\mathbf{p}|}e^{+ip^{\mu}x_{\mu}} - \frac{-|\mathbf{x}|}{t}e^{+ip^{\mu}x_{\mu}} = 0 \tag{4.12}$$
$$\rightarrow \begin{pmatrix} E & -|\mathbf{x}| \\ -|\mathbf{p}| & t \end{pmatrix}\begin{pmatrix} \psi_{e,-} \\ \psi_{i,+} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,-} \\ \psi_{i,+} \end{pmatrix} = L_M\psi = 0$$
$$\rightarrow \begin{pmatrix} E & -\mathbf{s}\cdot\mathbf{x} \\ -\mathbf{s}\cdot\mathbf{p} & t \end{pmatrix}\begin{pmatrix} i\mathbf{B}_{0e,-}e^{+ip^{\mu}x_{\mu}} \\ \mathbf{E}_{0i,+}e^{+ip^{\mu}x_{\mu}} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,-} \\ \psi_{i,+} \end{pmatrix} = L_M\psi_{antiphoton} = 0$$

This antiphoton wave function can also be written as:

$$\psi_{antiphoton} = \begin{pmatrix} \psi_{e,-} \\ \psi_{i,+} \end{pmatrix} = \begin{pmatrix} i\mathbf{B}_{(\mathbf{x},\,t)} \\ \mathbf{E}_{(\mathbf{p},\,E)} \end{pmatrix} = \begin{pmatrix} i\mathbf{B}_{\mathbf{0}(\mathbf{x},\,t)}e^{+i(\omega t-\mathbf{k}\cdot\mathbf{x})} \\ \mathbf{E}_{\mathbf{0}(\mathbf{p},\,E)}e^{+i(\omega t-\mathbf{k}\cdot\mathbf{x})} \end{pmatrix} = \begin{pmatrix} i\mathbf{B}_{\mathbf{0}(\mathbf{x},\,t)} \\ \mathbf{E}_{\mathbf{0}(\mathbf{p},\,E)} \end{pmatrix}e^{-i(\omega t-\mathbf{k}\cdot\mathbf{x})} \tag{4.13}$$

Prespacetime-premomentumenergy model creates an antineutrino in Dirac form by replacing the last step of expression (4.12) with the following:

$$\rightarrow\begin{pmatrix} E & -\sigma\cdot\mathbf{x} \\ -\sigma\cdot\mathbf{p} & t \end{pmatrix}\begin{pmatrix} a_{e,-}e^{+ip^{\mu}x_{\mu}} \\ a_{i,+}e^{+ip^{\mu}x_{\mu}} \end{pmatrix}=\begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,-} \\ \psi_{i,+} \end{pmatrix}=L_M\psi=0 \tag{4.14}$$

One kind of metamorphoses of (4.12)-(4.14) in which the dual universe is comprised of said external energy-momentum space and said internal spacetime is respectively as follows:

$$1=e^{i0}=e^{i0}e^{i0}=e^{+iL-iL}e^{+iM-iM}$$

$$(\cos L+i\sin L)(\cos L-i\sin L)e^{+iM-iM}=$$

$$\left(\frac{0}{t}+i\frac{|\mathbf{x}|}{t}\right)\left(\frac{0}{E}-i\frac{|\mathbf{p}|}{E}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}$$

$$=\left(+i\frac{|\mathbf{x}|}{t}\right)\left(-i\frac{|\mathbf{p}|}{E}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}$$

$$\left(\frac{|\mathbf{x}||\mathbf{p}|}{tE}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}=\left(\frac{tE}{|\mathbf{x}||\mathbf{p}|}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}=$$

$$\left(\frac{t}{-|\mathbf{x}|}\right)\left(\frac{-|\mathbf{p}|}{E}\right)^{-1}\left(e^{+ip^{\mu}x_{\mu}}\right)\left(e^{+ip^{\mu}x_{\mu}}\right)^{-1}\rightarrow$$

$$\frac{t}{-|\mathbf{x}|}e^{+ip^{\mu}x_{\mu}}=\frac{-|\mathbf{p}|}{E}e^{+ip^{\mu}x_{\mu}}\rightarrow\frac{t}{-|\mathbf{x}|}e^{+ip^{\mu}x_{\mu}}-\frac{-|\mathbf{p}|}{E}e^{+ip^{\mu}x_{\mu}}=0 \tag{4.12a}$$

$$\rightarrow\begin{pmatrix} t & -|\mathbf{p}| \\ -|\mathbf{x}| & E \end{pmatrix}\begin{pmatrix} \psi_{e,-} \\ \psi_{i,+} \end{pmatrix}=\begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,-} \\ \psi_{i,+} \end{pmatrix}=L_M\psi=0$$

$$\rightarrow\begin{pmatrix} t & -\mathbf{s}\cdot\mathbf{p} \\ -\mathbf{s}\cdot\mathbf{x} & E \end{pmatrix}\begin{pmatrix} i\mathbf{B}_{0e,-}e^{+ip^{\mu}x_{\mu}} \\ \mathbf{E}_{0i,+}e^{+ip^{\mu}x_{\mu}} \end{pmatrix}=\begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,-} \\ \psi_{i,+} \end{pmatrix}=L_M\psi_{antiphoton}=0$$

$$\psi_{antiphoton}=\begin{pmatrix} \psi_{e,-} \\ \psi_{i,+} \end{pmatrix}=\begin{pmatrix} i\mathbf{B}_{(\mathbf{p},\mathrm{E})} \\ \mathbf{E}_{(\mathbf{x},\mathrm{t})} \end{pmatrix}=\begin{pmatrix} i\mathbf{B}_{0(\mathbf{p},\mathrm{E})}e^{+i(\omega t-\mathbf{k}\cdot\mathbf{x})} \\ \mathbf{E}_{0(\mathbf{x},\mathrm{t})}e^{+i(\omega t-\mathbf{k}\cdot\mathbf{x})} \end{pmatrix}=\begin{pmatrix} i\mathbf{B}_{0(\mathbf{p},\mathrm{E})} \\ \mathbf{E}_{0(\mathbf{x},\mathrm{t})} \end{pmatrix}e^{-i(\omega t-\mathbf{k}\cdot\mathbf{x})} \tag{4.13a}$$

$$\rightarrow \begin{pmatrix} E & -\sigma\cdot\mathbf{x} \\ -\sigma\cdot\mathbf{p} & t \end{pmatrix} \begin{pmatrix} a_{e,-}e^{+ip^{\mu}x_{\mu}} \\ a_{i,+}e^{+ip^{\mu}x_{\mu}} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} \begin{pmatrix} \psi_{e,-} \\ \psi_{i,+} \end{pmatrix} = L_M \psi = 0 \qquad (4.14a)$$

Similarly, prespacetime-premomentumenergy model creates and sustains spaceless and momentum-less (space/momentum independent) external and internal wave functions of a mass *m* and intrinsic proper time τ in Weyl (chiral) form as follows:

$$1 = e^{i0} = e^{i0}e^{i0} = e^{-iL+iL}e^{-iM+iM}$$

$$(\cos L - i\sin L)(\cos L + i\sin L)e^{-iM+iM} =$$

$$\left(\frac{m}{E} - i\frac{0}{E}\right)\left(\frac{\tau}{t} + i\frac{0}{t}\right)e^{-iEt+iEt}$$

$$= \left(\frac{m}{E}\right)\left(\frac{\tau}{t}\right)e^{-iEt+iEt}$$

$$\left(\frac{m\tau}{Et}\right)e^{-iEt+iEt} = \left(\frac{Et}{m\tau}\right)e^{-iEt+iEt} =$$

$$\left(\frac{E}{-m}\right)\left(\frac{-\tau}{t}\right)^{-1}\left(e^{-iEt}\right)\left(e^{-iEt}\right)^{-1} \rightarrow$$

$$\frac{E}{-m}e^{-iEt} = \frac{-\tau}{t}e^{-iEt} \rightarrow \frac{E}{-m}e^{-iEt} - \frac{-\tau}{t}e^{-iEt} = 0$$

$$(4.15)$$

$$\rightarrow \begin{pmatrix} E & -\tau \\ -m & t \end{pmatrix} \begin{pmatrix} g_{W,e}e^{-iEt} \\ g_{W,i}e^{-iEt} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix} \begin{pmatrix} V_{W,e} \\ V_{W,i} \end{pmatrix} = L_M V_W = 0$$

One kind of metamorphoses of (4.15) in which the dual universe is comprised of said external energy-momentum space and said internal spacetime is as follows:

$$1 = e^{i0} = e^{i0}e^{i0} = e^{-iL+iL}e^{-iM+iM}$$

$$(\cos L - i\sin L)(\cos L + i\sin L)e^{-iM+iM} =$$

$$\left(\frac{\tau}{t} - i\frac{0}{t}\right)\left(\frac{\tau}{E} + i\frac{0}{E}\right)e^{-iEt+iEt}$$

$$= \left(\frac{\tau}{t}\right)\left(\frac{m}{E}\right)e^{-iEt+iEt}$$

$$\left(\frac{\tau m}{tE}\right)e^{-iEt+iEt} = \left(\frac{tE}{\tau E}\right)e^{-iEt+iEt} =$$

$$\left(\frac{t}{-\tau}\right)\left(\frac{-m}{E}\right)^{-1}\left(e^{-iEt}\right)\left(e^{-iEt}\right)^{-1} \rightarrow$$

$$\frac{t}{-\tau}e^{-iEt} = Ee^{-iEt} \rightarrow \frac{t}{-\tau}e^{-iEt} - \frac{-m}{E}e^{-iEt} = 0 \tag{4.15a}$$

$$\rightarrow \begin{pmatrix} t & -m \\ -\tau & E \end{pmatrix}\begin{pmatrix} g_{W,e}e^{-iEt} \\ g_{W,i}e^{-iEt} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} V_{W,e} \\ V_{W,i} \end{pmatrix} = L_M V_W = 0$$

Prespacetime-premomentumenergy model creates, sustains and causes evolution of a spatially self-confined entity such as a proton through imaginary momentum $\mathbf{p}_i$ and imaginary position $\mathbf{x}_i$ (downward self-reference such that $m\tau > Et$) in Dirac form in a dual universe comprised of an external spacetime and an internal energy-momentum space as follows:

$$1 = e^{i0} = e^{i0}e^{i0} = e^{+iL-iL}e^{+iM-iM}$$

$$(\cos L + i\sin L)(\cos L - i\sin L)e^{+iM-iM} =$$

$$\left(\frac{m}{E} + i\frac{|\mathbf{p}_i|}{E}\right)\left(\frac{\tau}{t} - i\frac{|\mathbf{x}_i|}{t}\right)e^{+ip^\mu x_\mu - ip^\mu x_\mu}$$

$$= \left(\frac{m + i|\mathbf{p}_i|}{E}\right)\left(\frac{\tau - i|\mathbf{x}_i|}{t}\right)e^{+ip^\mu x_\mu - ip^\mu x_\mu}$$

$$=\left(\frac{m\tau+|\mathbf{p}_i||\mathbf{x}_i|}{Et}\right)e^{+ip^\mu x_\mu-ip^\mu x_\mu}=\frac{Et-m\tau}{|\mathbf{p}_i||\mathbf{x}_i|}e^{+ip^\mu x_\mu-ip^\mu x_\mu}$$

$$=\left(\frac{E-m}{-|\mathbf{p}_i|}\right)\left(\frac{-|\mathbf{x}_i|}{t+\tau}\right)^{-1}\left(e^{+ip^\mu x_\mu}\right)\left(e^{+ip^\mu x_\mu}\right)^{-1}\rightarrow$$

$$\frac{E-m}{-|\mathbf{p}_i|}e^{+ip^\mu x_\mu}=\frac{-|\mathbf{x}_i|}{t+\tau}e^{+ip^\mu x_\mu}\rightarrow\frac{E-m}{-|\mathbf{p}_i|}e^{+ip^\mu x_\mu}-\frac{-|\mathbf{x}_i|}{t+\tau}e^{+ip^\mu x_\mu}=0$$

$$\rightarrow\begin{pmatrix}E-m & -|\mathbf{x}_i|\\ -|\mathbf{p}_i| & t+\tau\end{pmatrix}\begin{pmatrix}s_{e,-}e^{+iEt}\\ s_{i,+}e^{+iEt}\end{pmatrix}=\begin{pmatrix}L_{M,e} & L_{M,i}\end{pmatrix}\begin{pmatrix}\psi_{e,-}\\ \psi_{i,+}\end{pmatrix}=L_M\psi=0 \tag{4.16}$$

After spinization of the last expression in (4.16), we have:

$$\rightarrow\begin{pmatrix}E-m & -\boldsymbol{\sigma}\cdot\mathbf{x}_i\\ -\boldsymbol{\sigma}\cdot\mathbf{p}_i & t+\tau\end{pmatrix}\begin{pmatrix}S_{e,-}e^{+iEt}\\ S_{i,+}e^{+iEt}\end{pmatrix}=\begin{pmatrix}L_{M,e} & L_{M,i}\end{pmatrix}\begin{pmatrix}\psi_{e,-}\\ \psi_{i,+}\end{pmatrix}=L_M\psi=0 \tag{4.17}$$

As discussed previously, it is likely that the last expression in (4.16) governs the confinement structure of the unspinized proton in Dirac form through imaginary momentum $\mathbf{p}_i$ and imaginary momentum $\mathbf{x}_i$ and, on the other hand, expression (4.17) governs the confinement structure of spinized proton through $\mathbf{p}_i$ and $\mathbf{x}_i$ in the dual universe comprising of said external spacetime and internal energy-momentum space.

Thus, an unspinized and spinized antiproton in Dirac form in the dual universe comprising of said external spacetime and internal energy-momentum space may be respectively governed as follows:

$$\begin{pmatrix}E-m & -|\mathbf{x}_i|\\ -|\mathbf{p}_i| & t+\tau\end{pmatrix}\begin{pmatrix}s_{e,+}e^{-iEt}\\ s_{i,-}e^{-iEt}\end{pmatrix}=\begin{pmatrix}L_{M,e} & L_{M,i}\end{pmatrix}\begin{pmatrix}\psi_{D,e}\\ \psi_{D,i}\end{pmatrix}=L_M\psi_D=0 \tag{4.18}$$

$$\begin{pmatrix}E-m & -\sigma\cdot\mathbf{x}_i\\ -\sigma\cdot\mathbf{p}_i & t+\tau\end{pmatrix}\begin{pmatrix}S_{e,+}e^{-iEt}\\ S_{i,-}e^{-iEt}\end{pmatrix}=\begin{pmatrix}L_{M,e} & L_{M,i}\end{pmatrix}\begin{pmatrix}\psi_{D,e}\\ \psi_{D,i}\end{pmatrix}=L_M\psi_D=0 \tag{4.19}$$

One kind of metamorphoses of (4.16)-(4.19) in which the dual universe is comprised of said external energy-momentum space and said internal spacetime is respectively as follows:

$$1 = e^{i0} = e^{i0}e^{i0} = e^{+iL-iL}e^{+iM-iM}$$

$$(\cos L + i\sin L)(\cos L - i\sin L)e^{+iM-iM} =$$

$$\left(\frac{\tau}{t} + i\frac{|\mathbf{x}_i|}{t}\right)\left(\frac{m}{E} - i\frac{|\mathbf{p}_i|}{E}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}$$

$$= \left(\frac{\tau + i|\mathbf{x}_i|}{t}\right)\left(\frac{m - i|\mathbf{p}_i|}{E}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}$$

$$= \left(\frac{\tau m + |\mathbf{x}_i||\mathbf{p}_i|}{tE}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}} = \frac{tE - \tau m}{|\mathbf{x}_i||\mathbf{p}_i|}e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}$$

$$= \left(\frac{t-\tau}{-|\mathbf{x}_i|}\right)\left(\frac{-|\mathbf{p}_i|}{E+m}\right)^{-1}\left(e^{+ip^{\mu}x_{\mu}}\right)\left(e^{+ip^{\mu}x_{\mu}}\right)^{-1} \rightarrow$$

$$\frac{t-\tau}{-|\mathbf{x}_i|}e^{+ip^{\mu}x_{\mu}} = \frac{-|\mathbf{p}_i|}{E+m}e^{+ip^{\mu}x_{\mu}} \rightarrow \frac{t-\tau}{-|\mathbf{x}_i|}e^{+ip^{\mu}x_{\mu}} - \frac{-|\mathbf{p}_i|}{E+m}e^{+ip^{\mu}x_{\mu}} = 0$$

$$\rightarrow \begin{pmatrix} t-\tau & -|\mathbf{p}_i| \\ -|\mathbf{x}_i| & E+m \end{pmatrix}\begin{pmatrix} s_{e,-}e^{+iEt} \\ s_{i,+}e^{+iEt} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,-} \\ \psi_{i,+} \end{pmatrix} = L_M\psi = 0 \tag{4.16a}$$

$$\rightarrow \begin{pmatrix} t-\tau & -\boldsymbol{\sigma}\cdot\mathbf{p}_i \\ -\boldsymbol{\sigma}\cdot\mathbf{x}_i & E+m \end{pmatrix}\begin{pmatrix} S_{e,-}e^{+iEt} \\ S_{i,+}e^{+iEt} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,-} \\ \psi_{i,+} \end{pmatrix} = L_M\psi = 0 \tag{4.17a}$$

$$\begin{pmatrix} t-\tau & -|\mathbf{p}_i| \\ -|\mathbf{x}_i| & E+m \end{pmatrix}\begin{pmatrix} s_{e,+}e^{-iEt} \\ s_{i,-}e^{-iEt} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{D,e} \\ \psi_{D,i} \end{pmatrix} = L_M\psi_D = 0 \tag{4.18a}$$

$$\begin{pmatrix} t-\tau & -\sigma\cdot\mathbf{p}_i \\ -\sigma\cdot\mathbf{x}_i & E+m \end{pmatrix}\begin{pmatrix} S_{e,+}e^{-iEt} \\ S_{i,-}e^{-iEt} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{D,e} \\ \psi_{D,i} \end{pmatrix} = L_M\psi_D = 0 \tag{4.19a}$$

Similarly, prespacetime-premomentumenergy model creates, sustains and causes evolution of a spatially and momentumly self-confined entity such as a proton through imaginary momentum $\mathbf{p}_i$ and imaginary position $\mathbf{x}_i$ (downward self-reference) in Weyl (chiral) form in the dual universe comprising of said external spacetime and internal energy-momentum space as follows:

$$1 = e^{i0} = e^{i0}e^{i0} = e^{+iL-iL}e^{+iM-iM}$$

$$(\cos L + i\sin L)(\cos L - i\sin L)e^{+iM-iM} =$$

$$\left(\frac{m}{E} + i\frac{|\mathbf{p}_i|}{E}\right)\left(\frac{\tau}{t} - i\frac{|\mathbf{x}_i|}{t}\right)e^{+ip^\mu x_\mu - ip^\mu x_\mu}$$

$$= \left(\frac{m + i|\mathbf{p}_i|}{E}\right)\left(\frac{\tau - i|\mathbf{x}_i|}{t}\right)e^{+ip^\mu x_\mu - ip^\mu x_\mu}$$

$$= \left(\frac{m\tau + \mathbf{p}_i \cdot \mathbf{x}_i}{Et}\right)e^{+ip^\mu x_\mu - ip^\mu x_\mu} = \frac{Et - \mathbf{p}_i \cdot \mathbf{x}_i}{m\tau}e^{+ip^\mu x_\mu - ip^\mu x_\mu} =$$

$$\left(\frac{E - |\mathbf{p}_i|}{-m}\right)\left(\frac{-\tau}{t + |\mathbf{x}_i|}\right)^{-1}\left(e^{+ip^\mu x_\mu}\right)\left(e^{+ip^\mu x_\mu}\right)^{-1} \rightarrow$$

$$\frac{E - |\mathbf{p}_i|}{-m}e^{+ip^\mu x_\mu} = \frac{-\tau}{t + |\mathbf{x}_i|}e^{+ip^\mu x_\mu} \rightarrow \frac{E - |\mathbf{p}_i|}{-m}e^{+ip^\mu x_\mu} - \frac{-\tau}{t + |\mathbf{x}_i|}e^{+ip^\mu x_\mu} = 0$$

$$\rightarrow \begin{pmatrix} E - |\mathbf{p}_i| & -\tau \\ -m & t + |\mathbf{x}_i| \end{pmatrix}\begin{pmatrix} s_{e,r}e^{+iEt} \\ s_{i,l}e^{+iEt} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,r} \\ \psi_{i,l} \end{pmatrix} = L_M\psi = 0 \qquad (4.20)$$

where $\frac{E}{t} = \frac{m}{\tau} = \frac{|\mathbf{p_i}|}{|\mathbf{x_i}|}$, $\mathbf{p}_i$ parallels to $\mathbf{x}_i$.

After spinization of expression (3.114), we have:

$$\rightarrow \begin{pmatrix} E - \boldsymbol{\sigma}\cdot\mathbf{p}_i & -\tau \\ -m & t + \boldsymbol{\sigma}\cdot\mathbf{x}_i \end{pmatrix}\begin{pmatrix} S_{e,r}e^{+iEt} \\ S_{i,l}e^{+iEt} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,r} \\ \psi_{i,l} \end{pmatrix} = L_M\psi = 0 \qquad (4.21)$$

The last expression in (4.20) may govern the structure of the unspinized proton in Weyl form and expression (4.21) governs the structure of spinized proton in Weyl form.

Thus, an unspinized and spinized antiproton in Weyl form in the dual universe comprising of said external spacetime and internal energy-momentum space may be respectively governed as follows:

$$\begin{pmatrix} E - |\mathbf{p}_i| & -\tau \\ -m & t + |\mathbf{x}_i| \end{pmatrix}\begin{pmatrix} s_{e,l}e^{-iEt} \\ s_{i,r}e^{-iEt} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,l} \\ \psi_{i,r} \end{pmatrix} = L_M\psi = 0 \qquad (4.22)$$

$$\begin{pmatrix} E-\sigma\cdot\mathbf{p}_i & -\tau \\ -m & t+\sigma\cdot\mathbf{x}_i \end{pmatrix}\begin{pmatrix} S_{e,l}e^{-iEt} \\ S_{i,r}e^{-iEt} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,l} \\ \psi_{i,r} \end{pmatrix} = L_M\psi = 0 \tag{4.23}$$

One kind of metamorphoses of (4.20)-(4.23) in which the dual universe is comprised of said external energy-momentum space and said internal spacetime is respectively as follows:

$$1 = e^{i0} = e^{i0}e^{i0} = e^{+iL-iL}e^{+iM-iM}$$

$$(\cos L + i\sin L)(\cos L - i\sin L)e^{+iM-iM} =$$

$$\left(\frac{\tau}{t} + i\frac{|\mathbf{x}_i|}{t}\right)\left(\frac{m}{E} - i\frac{|\mathbf{p}_i|}{E}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}$$

$$= \left(\frac{\tau + i|\mathbf{x}_i|}{t}\right)\left(\frac{m - i|\mathbf{p}_i|}{E}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}$$

$$= \left(\frac{\tau m + |\mathbf{x}_i||\mathbf{p}_i|}{tE}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}} = \frac{tE - |\mathbf{x}_i||\mathbf{p}_i|}{\tau E}e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}} =$$

$$\left(\frac{t - |\mathbf{x}_i|}{-\tau}\right)\left(\frac{-m}{E + |\mathbf{p}_i|}\right)^{-1}\left(e^{+ip^{\mu}x_{\mu}}\right)\left(e^{+ip^{\mu}x_{\mu}}\right)^{-1} \rightarrow$$

$$\frac{t - |\mathbf{x}_i|}{-\tau}e^{+ip^{\mu}x_{\mu}} = \frac{-m}{E + |\mathbf{p}_i|}e^{+ip^{\mu}x_{\mu}} \rightarrow \frac{t - |\mathbf{x}_i|}{-\tau}e^{+ip^{\mu}x_{\mu}} - \frac{-m}{E + |\mathbf{p}_i|}e^{+ip^{\mu}x_{\mu}} = 0$$

$$\rightarrow \begin{pmatrix} t-|\mathbf{x}_i| & -m \\ -\tau & E+|\mathbf{p}_i| \end{pmatrix}\begin{pmatrix} s_{e,r}e^{+iEt} \\ s_{i,l}e^{+iEt} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,r} \\ \psi_{i,l} \end{pmatrix} = L_M\psi = 0 \tag{4.20a}$$

$$\rightarrow \begin{pmatrix} t-\boldsymbol{\sigma}\cdot\mathbf{x}_i & -m \\ -\tau & E+\boldsymbol{\sigma}\cdot\mathbf{p}_i \end{pmatrix}\begin{pmatrix} S_{e,r}e^{+iEt} \\ S_{i,l}e^{+iEt} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,r} \\ \psi_{i,l} \end{pmatrix} = L_M\psi = 0 \tag{4.21a}$$

$$\begin{pmatrix} t-|\mathbf{x}_i| & -m \\ -\tau & E+|\mathbf{p}_i| \end{pmatrix}\begin{pmatrix} s_{e,l}e^{-iEt} \\ s_{i,r}e^{-iEt} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,l} \\ \psi_{i,r} \end{pmatrix} = L_M\psi = 0 \tag{4.22a}$$

$$\begin{pmatrix} t-\sigma\cdot\mathbf{x}_i & -m \\ -\tau & E+\sigma\cdot\mathbf{p}_i \end{pmatrix}\begin{pmatrix} S_{e,l}e^{-iEt} \\ S_{i,r}e^{-iEt} \end{pmatrix} = \begin{pmatrix} L_{M,e} & L_{M,i} \end{pmatrix}\begin{pmatrix} \psi_{e,l} \\ \psi_{i,r} \end{pmatrix} = L_M\psi = 0 \tag{4.23a}$$

4.2 Scientific Genesis of Composite Entities

Prespacetime-premomentumenergy model create, sustain and cause evolution of a neutron in Dirac form in the dual universe comprising of said external spacetime and internal energy-momentum space which is comprised of an unspinized proton:

$$\left(\begin{pmatrix} E-e\phi_{(\mathbf{r},t)}-m & -\left|\mathbf{x}_i-e\mathbf{A}_{(\mathbf{p},E)}\right| \\ -\left|\mathbf{p}_i-e\mathbf{A}_{(\mathbf{r},t)}\right| & t-e\phi_{(\mathbf{p},E)}+\tau \end{pmatrix}\begin{pmatrix} s_{e,-}e^{+iEt} \\ s_{i,+}e^{+iEt} \end{pmatrix}=0\right)_p \tag{4.24}$$

and a spinized electron:

$$\left(\begin{pmatrix} E+e\phi_{(\mathbf{r},t)}-V-m & -\boldsymbol{\sigma}\cdot\left(\mathbf{x}+e\mathbf{A}_{(\mathbf{p},E)}\right) \\ -\boldsymbol{\sigma}\cdot\left(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},t)}\right) & t+e\phi_{(\mathbf{p},E)}-V_{(\mathbf{p},E)}+\tau \end{pmatrix}\begin{pmatrix} S_{e,+}e^{-iEt} \\ S_{i,-}e^{-iEt} \end{pmatrix}=0\right)_e \tag{4.25}$$

as follows:

$$1=e^{i0}=e^{i0}e^{i0}e^{i0}e^{i0}=\left(e^{i0}e^{i0}\right)_p\left(e^{i0}e^{i0}\right)_e=\left(e^{+iL-iM}e^{+iM-iM}\right)_p\left(e^{-iL+iL}e^{-iM+iM}\right)_e$$

$$=\left((\cos L+i\sin L)(\cos L-i\sin L)e^{+iM-iM}\right)_p\left((\cos L-i\sin L)(\cos L+i\sin L)e^{-iM+iM}\right)_e$$

$$=\left(\left(\frac{m}{E}+i\frac{|\mathbf{p}_i|}{E}\right)\left(\frac{\tau}{t}-i\frac{|\mathbf{x}_i|}{t}\right)e^{+ip^\mu x_\mu-ip^\mu x_\mu}\right)_p\left(\left(\frac{m}{E}-i\frac{|\mathbf{p}|}{E}\right)\left(\frac{\tau}{t}+i\frac{|\mathbf{x}|}{t}\right)e^{-ip^\mu x_\mu+ip^\mu x_\mu}\right)_e$$

$$=\left(\frac{Et-m\tau}{|\mathbf{p}_i||\mathbf{x}_i|}e^{+ip^\mu x_\mu-ip^\mu x_\mu}\right)_p\left(\frac{Et-m\tau}{|\mathbf{p}||\mathbf{x}|}e^{-ip^\mu x_\mu+ip^\mu x_\mu}\right)_e=$$

$$\left(\left(\frac{E-m}{-|\mathbf{p}_i|}\right)\left(\frac{-|\mathbf{x}_i|}{t+\tau}\right)^{-1}\left(e^{+ip^\mu x_\mu}\right)\left(e^{+ip^\mu x_\mu}\right)^{-1}\right)_p\left(\left(\frac{E-m}{-|\mathbf{p}|}\right)\left(\frac{-|\mathbf{s}|}{t+\tau}\right)^{-1}\left(e^{-ip^\mu x_\mu}\right)\left(e^{-ip^\mu x_\mu}\right)^{-1}\right)_e$$

$$\to\left(\begin{pmatrix} E-m & -|\mathbf{x}_i| \\ -|\mathbf{p}_i| & t+\tau \end{pmatrix}\begin{pmatrix} s_{e,-}e^{+iEt} \\ s_{i,+}e^{+iEt} \end{pmatrix}=0\right)_p\left(\begin{pmatrix} E-m & -|\mathbf{x}| \\ -|\mathbf{p}| & t+\tau \end{pmatrix}\begin{pmatrix} s_{e,+}e^{-iEt} \\ s_{i,-}e^{-iEt} \end{pmatrix}=0\right)_e$$

$$\to\begin{pmatrix} \left(\begin{pmatrix} E-e\phi_{(\mathbf{r},t)}-m & -\left|\mathbf{x}_i-e\mathbf{A}_{(\mathbf{p},E)}\right| \\ -\left|\mathbf{p}_i-e\mathbf{A}_{(\mathbf{r},t)}\right| & t-e\phi_{(\mathbf{p},E)}+\tau \end{pmatrix}\begin{pmatrix} s_{e,-}e^{+iEt} \\ s_{i,+}e^{+iEt} \end{pmatrix}=0\right)_p \\ \left(\begin{pmatrix} E+e\phi_{(\mathbf{r},t)}-V_{(\mathbf{r},t)}-m & -\boldsymbol{\sigma}\cdot\left(\mathbf{x}+e\mathbf{A}_{(\mathbf{p},E)}\right) \\ -\boldsymbol{\sigma}\cdot\left(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},t)}\right) & t+e\phi_{(\mathbf{p},E)}-V_{(\mathbf{p},E)}+\tau \end{pmatrix}\begin{pmatrix} S_{e,+}e^{-iEt} \\ S_{i,-}e^{-iEt} \end{pmatrix}=0\right)_e \end{pmatrix} \tag{4.26}$$

In expressions (4.24), (4.25) and (4.26), $(\ )_p$, $(\ )_e$ and $(\ )_n$ indicate proton, electron and neutron respectively. Further, unspinized proton has charge e, electron has charge –e, $\left(A^\mu=(\phi,\mathbf{A})\right)_p$ and $\left(A^\mu=(\phi,\mathbf{A})\right)_e$ are the electromagnetic potentials acting on unspinized proton and tightly bound spinized electron respectively, and $(V)_e$ is a binding potential from the unspinized proton acting on the spinized electron causing tight binding as discussed later.

If $\left(A^\mu=(\phi,\mathbf{A})\right)_p$ is negligible due to the fast motion of the tightly bound spinized electron, we have from the last expression in (4.26):

$$\left(\begin{array}{l}\left(\begin{pmatrix}E-m & -|\mathbf{x}_i| \\ -|\mathbf{p}_i| & t+\tau\end{pmatrix}\begin{pmatrix}s_{e,-}e^{+iEt} \\ s_{i,+}e^{+iEt}\end{pmatrix}=0\right)_p \\ \left(\begin{pmatrix}E+e\phi_{(\mathbf{r},\mathrm{t})}-V_{(\mathbf{r},\mathrm{t})}-m & -\boldsymbol{\sigma}\cdot\left(\mathbf{x}+e\mathbf{A}_{(\mathbf{p},\mathrm{E})}\right) \\ -\boldsymbol{\sigma}\cdot\left(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},\mathrm{t})}\right) & t+e\phi_{(\mathbf{p},\mathrm{E})}-V_{(\mathbf{p},\mathrm{E})}+\tau\end{pmatrix}\begin{pmatrix}S_{e,+}e^{-iEt} \\ S_{i,-}e^{-iEt}\end{pmatrix}=0\right)_e\end{array}\right) \tag{4.27}$$

Experimental data on charge distribution and *g*-factor of neutron seem to support a neutron comprising of an unspinized proton and a tightly bound spinized electron.

The Weyl (chiral) form of the last expression in (4.26) and expression (4.27) are respectively as follows:

$$\left(\begin{array}{l}\left(\begin{pmatrix}E-e\phi_{(\mathbf{r},\mathrm{t})}-|\mathbf{p}_i-e\mathbf{A}_{(\mathbf{r},\mathrm{t})}| & -\tau \\ -m & t-e\phi_{(\mathbf{p},\mathrm{E})}+|\mathbf{x}_i-e\mathbf{A}_{(\mathbf{p},\mathrm{E})}|\end{pmatrix}\begin{pmatrix}s_{e,r}e^{+iEt} \\ s_{i,l}e^{+iEt}\end{pmatrix}=0\right)_p \\ \left(\begin{pmatrix}E+e\phi_{(\mathbf{r},\mathrm{t})}-V_{(\mathbf{r},\mathrm{t})}-\boldsymbol{\sigma}\cdot\left(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},\mathrm{t})}\right) & -\tau \\ -m & t+e\phi_{(\mathbf{p},\mathrm{E})}-V_{(\mathbf{p},\mathrm{E})}+\boldsymbol{\sigma}\cdot\left(\mathbf{x}+e\mathbf{A}_{(\mathbf{p},\mathrm{E})}\right)\end{pmatrix}\begin{pmatrix}S_{e,l}e^{-iEt} \\ S_{i,r}e^{-iEt}\end{pmatrix}=0\right)_e\end{array}\right)_n \tag{4.28}$$

$$\left(\begin{array}{l}\left(\begin{pmatrix}E-|\mathbf{p}_i| & -m \\ -m & t+|\mathbf{x}_i|\end{pmatrix}\begin{pmatrix}s_{e,r}e^{+iEt} \\ s_{i,l}e^{+iEt}\end{pmatrix}=0\right)_p \\ \left(\begin{pmatrix}E+e\phi_{(\mathbf{r},\mathrm{t})}-V_{(\mathbf{r},\mathrm{t})}-\boldsymbol{\sigma}\cdot\left(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},\mathrm{t})}\right) & -m \\ -m & t+e\phi_{(\mathbf{p},\mathrm{E})}-V_{(\mathbf{p},\mathrm{E})}+\boldsymbol{\sigma}\cdot\left(\mathbf{x}+e\mathbf{A}_{(\mathbf{p},\mathrm{E})}\right)\end{pmatrix}\begin{pmatrix}S_{e,l}e^{-iEt} \\ S_{i,r}e^{-iEt}\end{pmatrix}=0\right)_e\end{array}\right)_n \tag{4.29}$$

One kind of metamorphoses of (4.24)-(4.29) in which the dual universe is comprised of said external energy-momentum space and said internal spacetime is respectively as follows:

$$\left(\begin{pmatrix} t-e\phi_{(\mathbf{p},\mathrm{E})}-\tau & -\left|\mathbf{p}_i-e\mathbf{A}_{(\mathbf{r},\mathrm{t})}\right| \\ -\left|\mathbf{x}_i-e\mathbf{A}_{(\mathbf{p},\mathrm{E})}\right| & E-e\phi_{(\mathbf{r},\mathrm{t})}+m \end{pmatrix}\begin{pmatrix} s_{e,-}e^{+iEt} \\ s_{i,+}e^{+iEt}\end{pmatrix}=0\right)_p \tag{4.24a}$$

$$\left(\begin{pmatrix} t+e\phi_{(\mathbf{p},\mathrm{E})}-V_{(\mathbf{p},\mathrm{E})}-\tau & -\boldsymbol{\sigma}\cdot\left(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},\mathrm{t})}\right) \\ -\boldsymbol{\sigma}\cdot\left(\mathbf{x}+e\mathbf{A}_{(\mathbf{p},\mathrm{E})}\right) & E+e\phi_{(\mathbf{r},\mathrm{t})}-V_{(\mathbf{r},\mathrm{t})}+m \end{pmatrix}\begin{pmatrix} S_{e,+}e^{-iEt} \\ S_{i,-}e^{-iEt}\end{pmatrix}=0\right)_e \tag{4.25a}$$

$$1=e^{i0}=e^{i0}e^{i0}e^{i0}e^{i0}=\left(e^{i0}e^{i0}\right)_p\left(e^{i0}e^{i0}\right)_e=\left(e^{+iL-iM}e^{+iM-iM}\right)_p\left(e^{-iL+iL}e^{-iM+iM}\right)_e$$

$$=\left((\cos L+i\sin L)(\cos L-i\sin L)e^{+iM-iM}\right)_p\left((\cos L-i\sin L)(\cos L+i\sin L)e^{-iM+iM}\right)_e$$

$$=\left(\left(\frac{\tau}{t}+i\frac{|\mathbf{x}_i|}{t}\right)\left(\frac{m}{E}-i\frac{|\mathbf{p}_i|}{E}\right)e^{+ip^\mu x_\mu-ip^\mu x_\mu}\right)_p\left(\left(\frac{\tau}{t}-i\frac{|\mathbf{x}|}{t}\right)\left(\frac{m}{E}+i\frac{|\mathbf{p}|}{E}\right)e^{-ip^\mu x_\mu+ip^\mu x_\mu}\right)_e$$

$$=\left(\frac{tE-\tau m}{|\mathbf{x}_i||\mathbf{p}_i|}e^{+ip^\mu x_\mu-ip^\mu x_\mu}\right)_p\left(\frac{tE-\tau m}{|\mathbf{x}||\mathbf{p}|}e^{-ip^\mu x_\mu+ip^\mu x_\mu}\right)_e=$$

$$\left(\left(\frac{t-\tau}{-|\mathbf{x}_i|}\right)\left(\frac{-|\mathbf{p}_i|}{E+m}\right)^{-1}\left(e^{+ip^\mu x_\mu}\right)\left(e^{+ip^\mu x_\mu}\right)^{-1}\right)_p\left(\left(\frac{t-\tau}{-|\mathbf{x}|}\right)\left(\frac{-|\mathbf{p}|}{E+m}\right)^{-1}\left(e^{-ip^\mu x_\mu}\right)\left(e^{-ip^\mu x_\mu}\right)^{-1}\right)_e$$

$$\to\left(\begin{pmatrix} t-\tau & -|\mathbf{p}_i| \\ -|\mathbf{x}_i| & E+m\end{pmatrix}\begin{pmatrix} s_{e,-}e^{+iEt} \\ s_{i,+}e^{+iEt}\end{pmatrix}=0\right)_p\left(\begin{pmatrix} t-\tau & -|\mathbf{p}| \\ -|\mathbf{x}| & E+m\end{pmatrix}\begin{pmatrix} s_{e,+}e^{-iEt} \\ s_{i,-}e^{-iEt}\end{pmatrix}=0\right)_e$$

$$\to\begin{pmatrix}\left(\begin{pmatrix} t-e\phi_{(\mathbf{p},\mathrm{E})}-\tau & -\left|\mathbf{p}_i-e\mathbf{A}_{(\mathbf{r},\mathrm{t})}\right| \\ -\left|\mathbf{x}_i-e\mathbf{A}_{(\mathbf{p},\mathrm{E})}\right| & E-e\phi_{(\mathbf{r},\mathrm{t})}+m \end{pmatrix}\begin{pmatrix} s_{e,-}e^{+iEt} \\ s_{i,+}e^{+iEt}\end{pmatrix}=0\right)_p \\ \left(\begin{pmatrix} t+e\phi_{(\mathbf{p},\mathrm{E})}-V_{(\mathbf{p},\mathrm{E})}-m & -\boldsymbol{\sigma}\cdot\left(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},\mathrm{t})}\right) \\ -\boldsymbol{\sigma}\cdot\left(\mathbf{x}+e\mathbf{A}_{(\mathbf{p},\mathrm{E})}\right) & E+e\phi_{(\mathbf{r},\mathrm{t})}-V_{(\mathbf{r},\mathrm{t})}+m \end{pmatrix}\begin{pmatrix} S_{e,+}e^{-iEt} \\ S_{i,-}e^{-iEt}\end{pmatrix}=0\right)_e\end{pmatrix} \tag{4.26a}$$

$$\left(\begin{array}{l}\left(\begin{pmatrix} t-\tau & -|\mathbf{p}_i| \\ -|\mathbf{x}_i| & E+m \end{pmatrix}\begin{pmatrix} s_{e,-}e^{+iEt} \\ s_{i,+}e^{+iEt} \end{pmatrix}=0\right)_p \\ \left(\begin{pmatrix} t+e\phi_{(\mathbf{p},\mathrm{E})}-V_{(\mathbf{p},\mathrm{E})}-\tau & -\boldsymbol{\sigma}\cdot(\mathbf{x}+e\mathbf{A}_{(\mathbf{r},\mathrm{t})}) \\ -\boldsymbol{\sigma}\cdot(\mathbf{x}+e\mathbf{A}_{(\mathbf{p},\mathrm{E})}) & E+e\phi_{(\mathbf{r},\mathrm{t})}-V_{(\mathbf{r},\mathrm{t})}+m \end{pmatrix}\begin{pmatrix} S_{e,+}e^{-iEt} \\ S_{i,-}e^{-iEt} \end{pmatrix}=0\right)_e \end{array}\right) \tag{4.27a}$$

$$\left(\begin{array}{l}\left(\begin{pmatrix} t-e\phi_{(\mathbf{p},\mathrm{E})}-|\mathbf{x}_i-e\mathbf{A}_{(\mathbf{p},\mathrm{E})}| & -m \\ -\tau & E-e\phi_{(\mathbf{r},\mathrm{t})}+|\mathbf{p}_i-e\mathbf{A}_{(\mathbf{r},\mathrm{t})}| \end{pmatrix}\begin{pmatrix} s_{e,r}e^{+iEt} \\ s_{i,l}e^{+iEt} \end{pmatrix}=0\right)_p \\ \left(\begin{pmatrix} t+e\phi_{(\mathbf{p},\mathrm{E})}-V_{(\mathbf{p},\mathrm{E})}-\boldsymbol{\sigma}\cdot(\mathbf{x}+e\mathbf{A}_{(\mathbf{p},\mathrm{E})}) & -m \\ -\tau & E+e\phi_{(\mathbf{r},\mathrm{t})}-V_{(\mathbf{r},\mathrm{t})}+\boldsymbol{\sigma}\cdot(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},\mathrm{t})}) \end{pmatrix}\begin{pmatrix} S_{e,l}e^{-iEt} \\ S_{i,r}e^{-iEt} \end{pmatrix}=0\right)_e \end{array}\right)_n \tag{4.28a}$$

$$\left(\begin{array}{l}\left(\begin{pmatrix} t-|\mathbf{x}_i| & -m \\ -\tau & E+|\mathbf{p}_i| \end{pmatrix}\begin{pmatrix} s_{e,r}e^{+iEt} \\ s_{i,l}e^{+iEt} \end{pmatrix}=0\right)_p \\ \left(\begin{pmatrix} t+e\phi_{(\mathbf{p},\mathrm{E})}-V_{(\mathbf{p},\mathrm{E})}-\boldsymbol{\sigma}\cdot(\mathbf{x}+e\mathbf{A}_{(\mathbf{p},\mathrm{E})}) & -m \\ -\tau & E+e\phi_{(\mathbf{r},\mathrm{t})}-V_{(\mathbf{r},\mathrm{t})}+\boldsymbol{\sigma}\cdot(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},\mathrm{t})}) \end{pmatrix}\begin{pmatrix} S_{e,l}e^{-iEt} \\ S_{i,r}e^{-iEt} \end{pmatrix}=0\right)_e \end{array}\right)_n \tag{4.29a}$$

Prespacetime-premomentumenergy model create, sustain and cause evolution of a hydrogen atom, in the dual universe comprising of said external spacetime and internal energy-momentum space, which comprises of a spinized proton:

$$\left(\begin{pmatrix} E-e\phi_{(\mathbf{r},\mathrm{t})}-m & -\boldsymbol{\sigma}\cdot(\mathbf{x}_i-e\mathbf{A}_{(\mathbf{p},\mathrm{E})}) \\ -\boldsymbol{\sigma}\cdot(\mathbf{p}_i-e\mathbf{A}_{(\mathbf{r},\mathrm{t})}) & t-e\phi_{(\mathbf{p},\mathrm{E})}+\tau \end{pmatrix}\begin{pmatrix} S_{e,-}e^{+iEt} \\ S_{i,+}e^{+iEt} \end{pmatrix}=0\right)_p \tag{4.30}$$

and a spinized electron:

$$\left(\begin{pmatrix} E+e\phi_{(\mathbf{r},\mathrm{t})}-m & -\boldsymbol{\sigma}\cdot(\mathbf{x}+e\mathbf{A}_{(\mathbf{p},\mathrm{E})}) \\ -\boldsymbol{\sigma}\cdot(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},\mathrm{t})}) & t+e\phi_{(\mathbf{p},\mathrm{E})}+\tau \end{pmatrix}\begin{pmatrix} S_{e,+}e^{-iEt} \\ S_{i,-}e^{-iEt} \end{pmatrix}=0\right)_e \tag{4.31}$$

in Dirac form as follows:

$$1=e^{i0}=e^{i0}e^{i0}e^{i0}e^{i0}=\left(e^{i0}e^{i0}\right)_p\left(e^{i0}e^{i0}\right)_e=\left(e^{+iL-iM}e^{+iM-iM}\right)_p\left(e^{-iL+iL}e^{-iM+iM}\right)_e$$

$$=\left((\cos L+i\sin L)(\cos L-i\sin L)e^{+iM-iM}\right)_p\left((\cos L-i\sin L)(\cos L+i\sin L)e^{-iM+iM}\right)_e$$

$$=\left(\left(\frac{m}{E}+i\frac{|\mathbf{p}_i|}{E}\right)\left(\frac{\tau}{t}-i\frac{|\mathbf{x}_i|}{t}\right)e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}\right)_p\left(\left(\frac{m}{E}-i\frac{|\mathbf{p}|}{E}\right)\left(\frac{\tau}{t}+i\frac{|\mathbf{x}|}{t}\right)e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}\right)_e$$

$$=\left(\frac{Et-m\tau}{|\mathbf{p}_i||\mathbf{x}_i|}e^{+ip^{\mu}x_{\mu}-ip^{\mu}x_{\mu}}\right)_p\left(\frac{Et-m\tau}{|\mathbf{p}||\mathbf{x}|}e^{-ip^{\mu}x_{\mu}+ip^{\mu}x_{\mu}}\right)_e =$$

$$\left(\left(\frac{E-m}{-|\mathbf{p}_i|}\right)\left(\frac{-|\mathbf{x}_i|}{t+\tau}\right)^{-1}\left(e^{+ip^{\mu}x_{\mu}}\right)\left(e^{+ip^{\mu}x_{\mu}}\right)^{-1}\right)_p\left(\left(\frac{E-m}{-|\mathbf{p}|}\right)\left(\frac{-|\mathbf{x}|}{t+\tau}\right)^{-1}\left(e^{-ip^{\mu}x_{\mu}}\right)\left(e^{-ip^{\mu}x_{\mu}}\right)^{-1}\right)_e$$

$$\to\left(\begin{pmatrix}E-m & -|\mathbf{x}_i|\\ -|\mathbf{p}_i| & t+\tau\end{pmatrix}\begin{pmatrix}s_{e,-}e^{+iEt}\\ s_{i,+}e^{+iEt}\end{pmatrix}=0\right)_p\left(\begin{pmatrix}E-m & -|\mathbf{x}|\\ -|\mathbf{p}| & t+\tau\end{pmatrix}\begin{pmatrix}s_{e,+}e^{-iEt}\\ s_{i,-}e^{-iEt}\end{pmatrix}=0\right)_e$$

$$\to\begin{pmatrix}\left(\begin{pmatrix}E-e\phi_{(\mathbf{r},\mathrm{t})}-m & -\boldsymbol{\sigma}\cdot(\mathbf{x}_i-e\mathbf{A}_{(\mathbf{p},\mathrm{E})})\\ -\boldsymbol{\sigma}\cdot(\mathbf{p}_i-e\mathbf{A}_{(\mathbf{r},\mathrm{t})}) & t-e\phi_{(\mathbf{p},\mathrm{E})}+\tau\end{pmatrix}\begin{pmatrix}S_{e,-}e^{+iEt}\\ S_{i,+}e^{+iEt}\end{pmatrix}=0\right)_p\\ \left(\begin{pmatrix}E+e\phi_{(\mathbf{r},\mathrm{t})}-m & -\boldsymbol{\sigma}\cdot(\mathbf{x}+e\mathbf{A}_{(\mathbf{p},\mathrm{E})})\\ -\boldsymbol{\sigma}\cdot(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},\mathrm{t})}) & t+e\phi_{(\mathbf{p},\mathrm{E})}+\tau\end{pmatrix}\begin{pmatrix}S_{e,+}e^{-iEt}\\ S_{i,-}e^{-iEt}\end{pmatrix}=0\right)_e\end{pmatrix} \quad (4.32)$$

In expressions (4.30), (4.31) and (4.32), $(\ )_p$, $(\ )_e$ and $(\ )_h$ indicate proton, electron and hydrogen atom respectively. Again, proton has charge e, electron has charge –e, and $\left(A^{\mu}=(\phi,\mathbf{A})\right)_p$ and $\left(A^{\mu}=(\phi,\mathbf{A})\right)_e$ are the electromagnetic potentials acting on spinized proton and spinized electron respectively.

Again, if $\left(A^{\mu}=(\phi,\mathbf{A})\right)_p$ is negligible due to fast motion of the orbiting spinized electron, we have from the last expression in (3.129):

$$\begin{pmatrix}\left(\begin{pmatrix}E-m & -\boldsymbol{\sigma}\cdot\mathbf{x}_i\\ -\boldsymbol{\sigma}\cdot\mathbf{p}_i & t+\tau\end{pmatrix}\begin{pmatrix}S_{e,-}e^{+iEt}\\ S_{i,+}e^{+iEt}\end{pmatrix}=0\right)_p\\ \left(\begin{pmatrix}E+e\phi_{(\mathbf{r},\mathrm{t})}-m & -\boldsymbol{\sigma}\cdot(\mathbf{x}+e\mathbf{A}_{(\mathbf{p},\mathrm{E})})\\ -\boldsymbol{\sigma}\cdot(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},\mathrm{t})}) & t+e\phi_{(\mathbf{p},\mathrm{E})}+\tau\end{pmatrix}\begin{pmatrix}S_{e,+}e^{-iEt}\\ S_{i,-}e^{-iEt}\end{pmatrix}=0\right)_e\end{pmatrix} \quad (4.33)$$

The Weyl (chiral) form of the last expression in (4.32) and expression (4.33) are respectively as follows:

$$\begin{pmatrix} \left(\begin{pmatrix} E-e\phi_{(\mathbf{r},t)}-\boldsymbol{\sigma}\cdot(\mathbf{p}_i-e\mathbf{A}_{(\mathbf{r},t)}) & -m \\ -m & E-e\phi_{(\mathbf{p},E)}+\boldsymbol{\sigma}\cdot(\mathbf{p}_i-e\mathbf{A}_{(\mathbf{p},E)}) \end{pmatrix} \begin{pmatrix} S_{e,r}e^{+iEt} \\ S_{i,l}e^{+iEt} \end{pmatrix} = 0 \right)_p \\ \left(\begin{pmatrix} E+e\phi_{(\mathbf{r},t)}-\boldsymbol{\sigma}\cdot(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},t)}) & -m \\ -m & E+e\phi_{(\mathbf{p},E)}+\boldsymbol{\sigma}\cdot(\mathbf{p}+e\mathbf{A}_{(\mathbf{p},E)}) \end{pmatrix} \begin{pmatrix} S_{e,l}e^{-iEt} \\ S_{i,r}e^{-iEt} \end{pmatrix} = 0 \right)_e \end{pmatrix}_h \quad (4.34)$$

$$\begin{pmatrix} \left(\begin{pmatrix} E-\boldsymbol{\sigma}\cdot\mathbf{p}_i & -m \\ -m & E+\boldsymbol{\sigma}\cdot\mathbf{p}_i \end{pmatrix} \begin{pmatrix} S_{e,r}e^{+iEt} \\ S_{i,l}e^{+iEt} \end{pmatrix} = 0 \right)_p \\ \left(\begin{pmatrix} E+e\phi_{(\mathbf{r},t)}-\boldsymbol{\sigma}\cdot(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},t)}) & -m \\ -m & E+e\phi_{(\mathbf{p},E)}+\boldsymbol{\sigma}\cdot(\mathbf{p}+e\mathbf{A}_{(\mathbf{p},E)}) \end{pmatrix} \begin{pmatrix} S_{e,l}e^{-iEt} \\ S_{i,r}e^{-iEt} \end{pmatrix} = 0 \right)_e \end{pmatrix}_h \quad (4.35)$$

One kind of metamorphoses of (4.30)-(4.35) in which the dual universe is comprised of said external energy-momentum space and said internal spacetime is respectively as follows:

$$\left(\begin{pmatrix} t-e\phi_{(\mathbf{p},E)}-\tau & -\boldsymbol{\sigma}\cdot(\mathbf{p}_i-e\mathbf{A}_{(\mathbf{r},t)}) \\ -\boldsymbol{\sigma}\cdot(\mathbf{x}_i-e\mathbf{A}_{(\mathbf{p},E)}) & E-e\phi_{(\mathbf{r},t)}+m \end{pmatrix} \begin{pmatrix} S_{e,-}e^{+iEt} \\ S_{i,+}e^{+iEt} \end{pmatrix} = 0 \right)_p \quad (4.30a)$$

$$\left(\begin{pmatrix} t+e\phi_{(\mathbf{p},E)}-\tau & -\boldsymbol{\sigma}\cdot(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},t)}) \\ -\boldsymbol{\sigma}\cdot(\mathbf{x}+e\mathbf{A}_{(\mathbf{p},E)}) & t+e\phi_{(\mathbf{r},t)}+m \end{pmatrix} \begin{pmatrix} S_{e,+}e^{-iEt} \\ S_{i,-}e^{-iEt} \end{pmatrix} = 0 \right)_e \quad (4.31a)$$

$$1 = e^{i0} = e^{i0}e^{i0}e^{i0}e^{i0} = \left(e^{i0}e^{i0}\right)_p \left(e^{i0}e^{i0}\right)_e = \left(e^{+iL-iM}e^{+iM-iM}\right)_p \left(e^{-iL+iL}e^{-iM+iM}\right)_e$$

$$= \left((\cos L + i\sin L)(\cos L - i\sin L)e^{+iM-iM}\right)_p \left((\cos L - i\sin L)(\cos L + i\sin L)e^{-iM+iM}\right)_e$$

$$= \left(\left(\frac{\tau}{t} + i\frac{|\mathbf{x}_i|}{t}\right)\left(\frac{m}{E} - i\frac{|\mathbf{p}_i|}{E}\right) e^{+ip^\mu x_\mu - ip^\mu x_\mu} \right)_p \left(\left(\frac{\tau}{t} - i\frac{|\mathbf{x}|}{t}\right)\left(\frac{m}{E} + i\frac{|\mathbf{p}|}{E}\right) e^{-ip^\mu x_\mu + ip^\mu x_\mu} \right)_e$$

$$= \left(\frac{tE - \tau m}{|\mathbf{x}_i||\mathbf{p}_i|} e^{+ip^\mu x_\mu - ip^\mu x_\mu} \right)_p \left(\frac{tE - \tau m}{|\mathbf{x}||\mathbf{p}|} e^{-ip^\mu x_\mu + ip^\mu x_\mu} \right)_e =$$

$$\left(\left(\frac{t-\tau}{-|\mathbf{x}_i|}\right)\left(\frac{-|\mathbf{p}_i|}{E+m}\right)^{-1}\left(e^{+ip^{\mu}x_{\mu}}\right)\left(e^{+ip^{\mu}x_{\mu}}\right)^{-1}\right)_p\left(\left(\frac{t-\tau}{-|\mathbf{x}|}\right)\left(\frac{-|\mathbf{p}|}{E+m}\right)^{-1}\left(e^{-ip^{\mu}x_{\mu}}\right)\left(e^{-ip^{\mu}x_{\mu}}\right)^{-1}\right)_e$$

$$\rightarrow\left(\begin{pmatrix} t-\tau & -|\mathbf{p}_i| \\ -|\mathbf{x}_i| & E+m \end{pmatrix}\begin{pmatrix} s_{e,-}e^{+iEt} \\ s_{i,+}e^{+iEt} \end{pmatrix}=0\right)_p\left(\begin{pmatrix} t-\tau & -|\mathbf{p}| \\ -|\mathbf{x}| & E+m \end{pmatrix}\begin{pmatrix} s_{e,+}e^{-iEt} \\ s_{i,-}e^{-iEt} \end{pmatrix}=0\right)_e$$

$$\rightarrow\begin{pmatrix} \left(\begin{pmatrix} t-e\phi_{(\mathbf{p},\mathrm{E})}-\tau & -\boldsymbol{\sigma}\cdot\left(\mathbf{p}_i-e\mathbf{A}_{(\mathbf{r},\mathrm{t})}\right) \\ -\boldsymbol{\sigma}\cdot\left(\mathbf{x}_i-e\mathbf{A}_{(\mathbf{p},\mathrm{E})}\right) & E-e\phi_{(\mathbf{r},\mathrm{t})}+m \end{pmatrix}\begin{pmatrix} S_{e,-}e^{+iEt} \\ S_{i,+}e^{+iEt} \end{pmatrix}=0\right)_p \\ \left(\begin{pmatrix} t+e\phi_{(\mathbf{p},\mathrm{E})}-\tau & -\boldsymbol{\sigma}\cdot\left(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},\mathrm{t})}\right) \\ -\boldsymbol{\sigma}\cdot\left(\mathbf{x}+e\mathbf{A}_{(\mathbf{p},\mathrm{E})}\right) & E+e\phi_{(\mathbf{r},\mathrm{t})}+m \end{pmatrix}\begin{pmatrix} S_{e,+}e^{-iEt} \\ S_{i,-}e^{-iEt} \end{pmatrix}=0\right)_e \end{pmatrix} \quad (4.32a)$$

$$\begin{pmatrix} \left(\begin{pmatrix} t-\tau & -\boldsymbol{\sigma}\cdot\mathbf{p}_i \\ -\boldsymbol{\sigma}\cdot\mathbf{x}_i & E+m \end{pmatrix}\begin{pmatrix} S_{e,-}e^{+iEt} \\ S_{i,+}e^{+iEt} \end{pmatrix}=0\right)_p \\ \left(\begin{pmatrix} t+e\phi_{(\mathbf{p},\mathrm{E})}-\tau & -\boldsymbol{\sigma}\cdot\left(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},\mathrm{t})}\right) \\ -\boldsymbol{\sigma}\cdot\left(\mathbf{x}+e\mathbf{A}_{(\mathbf{p},\mathrm{E})}\right) & t+e\phi_{(\mathbf{r},\mathrm{t})}+\tau \end{pmatrix}\begin{pmatrix} S_{e,+}e^{-iEt} \\ S_{i,-}e^{-iEt} \end{pmatrix}=0\right)_e \end{pmatrix} \quad (4.33a)$$

$$\begin{pmatrix} \left(\begin{pmatrix} t-e\phi_{(\mathbf{rp},\mathrm{E})}-\boldsymbol{\sigma}\cdot\left(\mathbf{x}_i-e\mathbf{A}_{(\mathbf{p},\mathrm{E})}\right) & -m \\ -\tau & E-e\phi_{(\mathbf{r},\mathrm{t})}+\boldsymbol{\sigma}\cdot\left(\mathbf{p}_i-e\mathbf{A}_{(\mathbf{r},\mathrm{t})}\right) \end{pmatrix}\begin{pmatrix} S_{e,r}e^{+iEt} \\ S_{i,l}e^{+iEt} \end{pmatrix}=0\right)_p \\ \left(\begin{pmatrix} E+e\phi_{(\mathbf{r},\mathrm{t})}-\boldsymbol{\sigma}\cdot\left(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},\mathrm{t})}\right) & -m \\ -m & E+e\phi_{(\mathbf{r},\mathrm{t})}+\boldsymbol{\sigma}\cdot\left(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},\mathrm{t})}\right) \end{pmatrix}\begin{pmatrix} S_{e,l}e^{-iEt} \\ S_{i,r}e^{-iEt} \end{pmatrix}=0\right)_e \end{pmatrix}_h \quad (4.34a)$$

$$\begin{pmatrix} \left(\begin{pmatrix} t-\boldsymbol{\sigma}\cdot\mathbf{x}_i & -m \\ -\tau & E+\boldsymbol{\sigma}\cdot\mathbf{p}_i \end{pmatrix}\begin{pmatrix} S_{e,r}e^{+iEt} \\ S_{i,l}e^{+iEt} \end{pmatrix}=0\right)_p \\ \left(\begin{pmatrix} t+e\phi_{(\mathbf{p},\mathrm{E})}-\boldsymbol{\sigma}\cdot\left(\mathbf{x}+e\mathbf{A}_{(\mathbf{p},\mathrm{E})}\right) & -m \\ -\tau & E+e\phi_{(\mathbf{r},\mathrm{t})}+\boldsymbol{\sigma}\cdot\left(\mathbf{p}+e\mathbf{A}_{(\mathbf{r},\mathrm{t})}\right) \end{pmatrix}\begin{pmatrix} S_{e,l}e^{-iEt} \\ S_{i,r}e^{-iEt} \end{pmatrix}=0\right)_e \end{pmatrix}_h \quad (4.35a)$$

5. Mathematics & Ontology of Ether

Ether is Mathematical, Immanent & Transcendental

5.1 Mathematical Aspect of Ether

In the prespacetime-premomentumenergy model, it is our comprehension that:

(1) The mathematical representation of the primordial ether in prespacetime-premomentumenergy is the Euler's Number *e* which makes the Euler's identity possible:

$$e^{i\pi}+1=0 \tag{5.1}$$

(2) Euler's Number *e* is the foundation of primordial distinction in prespacetime-premomentumenergy:

$$1=e^{i0}=e^{i0}e^{i0}=e^{iL-iL}e^{iM-iM}=e^{iL}e^{iM}e^{-iL}e^{-iM}=e^{-iL}e^{-iM}/e^{-iL}e^{-iM}=e^{iL}e^{iM}/e^{iL}e^{iM}\ldots \tag{5.2}$$

(3) Euler's Number *e* is the foundation of the genesis of four-momentum and four-position relation in prespacetime-premomentumenergy:

$$1=e^{i0}=e^{-iL+iL}=L_eL_i^{-1}=(\cos L-i\sin L)(\cos L+i\sin L)=$$
$$\left(\frac{m}{E}-i\frac{|\mathbf{p}|}{E}\right)\left(\frac{\tau}{t}+i\frac{|\mathbf{x}|}{t}\right)=\left(\frac{m-i|\mathbf{p}|}{E}\right)\left(\frac{\tau+i|\mathbf{x}|}{t}\right)=\left(\frac{m\tau+\mathbf{p}\cdot\mathbf{x}}{Et}\right)\rightarrow \tag{5.3}$$
$$Et=m\tau+\mathbf{p}\cdot\mathbf{x}$$

when $\frac{E}{t}=\frac{m}{\tau}=\frac{|\mathbf{p}|}{|\mathbf{x}|}$ and **p** parallels to **x**.

(4) Euler's Number *e* is the foundation of the genesis, sustenance and evolution of an elementary particle in prespacetime-premomentumenergy:

$$1=e^{i0}=e^{i0}e^{i0}=e^{-iL+iL}e^{-iM+iM}=L_eL_i^{-1}\left(e^{-iM}\right)\left(e^{-iM}\right)^{-1}\rightarrow \tag{5.4}$$
$$\begin{pmatrix}L_{M,e} & L_{M,i}\end{pmatrix}\begin{pmatrix}A_e e^{-iM}\\ A_i e^{-iM}\end{pmatrix}=L_M\begin{pmatrix}A_e\\ A_i\end{pmatrix}e^{-iM}=L_M\begin{pmatrix}\psi_e\\ \psi_i\end{pmatrix}=L_M\psi=0$$

(5) Euler's Number *e* is also the foundation of quantum entanglement or gravity in prespacetime-premomentumenergy.

(6) Euler's Number is immanent in the sense that it is the ingredient of equations (5.1) to (5.5) thus all "knowing" and all "present."

(7) Euler's Number is also transcendental in the sense that is the foundation of existence thus "omnipotent" and behind creation.

5.2 Immanent Aspect of Ether

In the prespacetime-premomentumenergy model, the immanent aspect of ether associated with individual entity ("i-ether") has following attributes:

i-ether is the ingredient of atoms, of molecules, of cells, of a body;
i-ether is in space, time, motion, rest;
i-ether is governed by the laws of physics, chemistry, biology;
i-ether is the ingredient of this world, the Earth, the Solar System.

i-ether is the ingredient of awareness, feeling, imagination, free will;
i-ether is in love, passion, hope, despair;
i-ether is governed by the laws of psychology, economics, sociology;
i-ether is the ingredient of mind, soul, spirit.

In the prespacetime model, the immanent of ether associated with the universal entity ("I-ETHER") has following attributes:

I-ETHER IS atoms, molecules, cells, body;
I-ETHER IS space, time, motion, rest;
I-ETHER IS laws of physics, chemistry, biology, physiology;
I-ETHER IS this World, the Earth, the Solar System;

I-ETHER IS awareness, feeling, imagination, free will;
I-ETHER IS love, passion, hope, despair;
I-ETHER IS the laws of psychology, economics, sociology;
I-ETHER IS mind, soul, spirit.

5.3 Transcendental Aspect of Ether

In the prespacetime model, the transcendental aspect of ether associated with individual/entity ("t-ether") has following attributes:

t-ether is not the ingredient of atoms, of molecules, of cells, of a body;
t-ether is not in space, time, motion, rest;

t-ether is not governed by the laws of physics, chemistry, biology;
t-ether is not the ingredient of this world, the Earth, the Solar System.

t-ether is beyond awareness, feeling, imagination, free will;
t-ether is beyond love, passion, hope, despair;
t-ether is beyond the laws of psychology, economics, sociology;
t-ether is beyond mind, soul, spirit.

In the prespacetime model, the transcendental aspect of ether associated with the universal entity ("T-ETHER") has following attributes:

T-ETHER IS NOT the atoms, molecules, cells, body;
T-ETHER IS NOT the space, time, motion, rest;
T-ETHER IS NOT the laws of physics, chemistry, biology;
T-ETHER IS NOT this world, the Earth, the Solar System;

T-ETHER IS NOT awareness, feeling, imagination, free will;
T-ETHER IS NOT love, passion, hope, despair;
T-ETHER IS NOT the laws of psychology, economics, sociology;
T-ETHER IS NOT mind, soul, spirit.

6. Conclusions

This work is a continuation of prespacetime-premomentumenergy model described recently. Here we have shown how in this model prespacetime-premomentumenergy generates: (1) four-momentum and four-position relation as transcendental Law of One, (2) self-referential matrix law with four-momentum and four-position relation as the determinant, and (3) Law of Zero in a dual universe comprised of an external spacetime and an internal momentum-energy space. We have further shown how prespacetime-premomentumenergy may generate, sustain and make evolving elementary particles and composite particles incorporating the genesis of self-referential matrix law. In addition, we will discuss the ontology and mathematics of ether in this model.

Illustratively, in the beginning there was prespacetime-premomentumenergy by itself $\boldsymbol{e}^{i0}=1$ materially empty and it began to imagine through primordial self-referential spin $1=e^{i0}=e^{i0}e^{i0}=e^{iL-iL}e^{iM-iM}=e^{iL}e^{iM}e^{-iL}e^{-iM}=e^{-iL}e^{-iM}/e^{-iL}e^{-iM}=e^{iL}e^{iM}/e^{iL}e^{iM}$…such that it created the self-referential matrix law, the external object to be observed and internal object as observed, separated them into external spacetime and internal momentum-energy space, caused them to interact through said matrix law and thus gave birth to the dual universeuniverse which it has since sustained and made to evolve.

Prespacetime-premomentumenergy model employs the following ontological principles among others:

(1) Principle of oneness/unity of existence through quantum entanglement in the ether of prespacetime-premomentumenergy.

(2) Principle of hierarchical primordial self-referential spin creating:
- Four-momentum and four-position relation as transcendental Law of One.
- Four-momentum and four-position relation as determinant of matrix law.
- Law of Zero of total phase of external and internal wavefunctions (objects).

Further, prespacetime-premomentumenergy model employs the following mathematical elements & forms among others in order to empower the above ontological principles:

(3) *e*, Euler's Number, for (to empower) ether as foundation/basis/medium of existence (body of prespacetime-premomentumenergy);
(4) *i*, imaginary number, for (to empower) thoughts and imagination in prespacetime-premomentumenergy (ether);
(3) 0, zero, for (to empower) emptiness (undifferentiated/primordial state);
(4) 1, one, for (to empower) oneness/unity of existence;
(5) +, -, *, /, = for (to empower) creation, dynamics, balance & conservation;
(6) Pythagorean Theorem for (to empower) energy, momentum and mass relation, and time, position and intrinsic proper time relation; and
(7) *M*, matrix, for (to empower) the external spacetime and internal momentum-energy space and the interaction of external and internal wavefunctions.

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