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Extending the Standard Model in Hyper-Dimensional Mechanics

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Abstract

According to studies on the precursive time quantum variable, this publication presents an in-depth analysis of the chapter on the correlation between the nuclear mass and electroweak force. This research shows that there is a close correlation between the nuclear mass and the energy of the orbitals which underlies the electroweak interaction.

Keywords

Energy Orbital Level, Atomic Radius Curvature, Time Curvature, Precursive Time, Chronotope

1. Introduction

The concept of the precursive time has been extensively exposed in previous publications both from a theoretical mathematical and topological point of view [1] [2], and the theory was elaborated after studies of a thought experiment of a different representation of the classic "curvature of spacetime" denoted as "time curvature"; however, from a conceptual point of view the scientific discussion has raised some perplexities among peers about the interpretation of imaginary time.

Time curvature has been indicated with the Greek symbol "$\tau\nu$" from the etymological initials from which the term "time" originated, namely: "*tém-nein*" ($\tau\varepsilon\mu - \nu\varepsilon\iota\nu$) Greek term which means "separate" split-up. In the concept of precursive time, there is in fact the original definition of time, understood as "*quantity that quantifies what is separated*". It is essential to emphasize that the precursive time is a quantum variable, it is not a new relativistic reading of time, it is not a Lorentz transformation, and it is not a Wick rotation.

Precursive time is a concrete physical quantity, never characterized, expressed

in quantum parameters that mediate the interaction between matter and spacetime.

Through the concept of precursive time that originates between the event's instantaneous time and its imaginary projection in spacetime, it was possible to establish an important correlation property <mass - spacetime> defined in the following postulate:

Each event having mass $|m > 0|$ implies a splitting of the events timeline of a quantity ($\Delta\tau\nu$) proportional to the corresponding mass.

2. Demonstration

We shall represent this concept in the following Figure 1:

Explanation:

We consider an event with $|m_0 > 0|$ (inertial state) at a precise instant on the normal timeline (denoted by time's arrow).

The event (m_0) is characterized by three space coordinates referred to a precise instantaneous time:

$$m_0(t_0)(x_0, y_0, z_0)$$

The assumption states that: event (m_0) implies a splitting of the timeline events by a quantity $|\tau\nu|$ proportional to its mass (m):

$$\tau\nu \Rightarrow (e_{o-})(\sigma\omega)$$

Theoretically, the splitting of the events time abscissa can be described as the projection of instantaneous time in a conjugate timeline coexistent and simultaneous at the time events.

$$\sigma\omega(x_i, y_j, z_k)$$

Therefore, the real space(+) time coordinates will be related to a set of topologically hyperdimensional coordinates (*ref.* Figure 1):

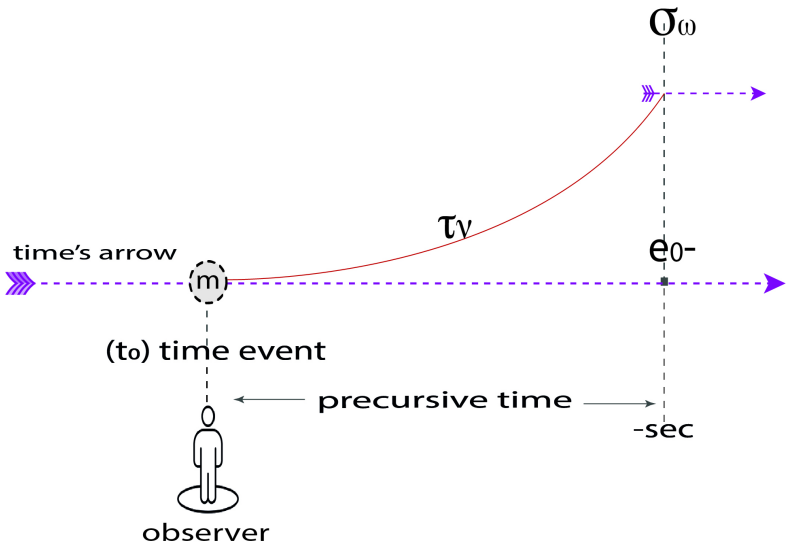

Figure 1. Each event having |mass > 0|, implies a splitting of the events timeline of a quantity ($\tau\nu$) proportional to the respective mass.

$$\forall |m>0| \in \mathbb{R}(x_0, y_0, z_0)(t_0) \subseteq \mathbb{C}(x_i, y_j, z_k)(e_{o-})$$

Summing up, each event is characterized by:

$$m_0\, \mathbb{R}(x_0, y_0, z_0)(t_0), \mathbb{C}(x_i, y_j, z_k)(e_{o-})$$

(e_{0-}) precursive time: is the conjugated imaginary time, coexisting and simultaneous with instantaneous time, is quantified in Joule/Planck time units (J/tp), it also returns a relationship in negative seconds since it is precursive with respect to the real time of the event ($t_0 \leftarrow e_{0-}$).

It should be noted that precursive time is different from the concept of time in advance since it is placed onto imaginary timeline.

($\tau\nu$) indicate the time curvature: is the "time discrepancy" ($\Delta\tau\nu$) that originates between the event's instantaneous time $\langle t_0 \rangle$ and its imaginary projection in spacetime $\langle e_{0-} \rangle$, it's a function of and proportional to its inertial mass. ($\tau\nu$) is energy quantified in Joule/second units (J/s).

It is very important to always keep in mind that: time curvature is a state condition of matter, regardless of it is motion and from observer's frame of reference.

($\sigma\omega$) sigma point: hyperdimensional coordinates (x_i, y_j, z_k), this characterizes and specifies the boundary of spacetime curvature.

3. Theory Characterization and Mathematical Description

The temporal splitting ($\tau\nu$) that is determined between the two-time abscissa (real + imaginary) is function of the mass and is quantified in (Joule/sec) as "time curvature". The splitting of time is always true whatever $|m>0|$.

The equation worked out to calculate this is as follows:

$$\tau\nu = \frac{1}{\sqrt{\frac{h}{mpc^2}}} F \tag{1}$$

($\tau\nu$) time curvature J/s.

(mp) m-> Planck mass.

(h) Planck constant.

(F) Fibonacci factor 1.618.

(F) Fibonacci factor: describes with accuracy the time curvature; it was obtained by spacetime torsion-contraction computer processing, drawing a centripetal cycloid "from the future towards the time event" with a Fibonacci progression ($t_0 \leftarrow e_{o-}$).

4. Statement and Theoretical Demonstration

The goal is to test the plausibility of the theory as applied to nuclear masses.

Let apply the time curvature equation to the standard nucleus' mass

4.1. Atomic Radius as a Function of the Mass of the Nucleus

"The atomic radius is usually understood as the distance from the center of the

nucleus to the outermost isolated electron. Since the boundary is not a well-defined physical entity, there are various non-equivalent definitions of atomic radius".

In this research, the atomic radius is a measure obtained from the space-time curvature specifically from the time curvature (τv) equation.

The equation calculates the extent of curvature up to up to the boundary of the domain space of the specific atom.

Therefore, we define this extent of atomic spacetime curvature as *atomic radius curvature*.

From the (τv) equation we find the following values (Table 1):

$$mp \to \tau\upsilon \to tp \to e_{0-} \to \sigma_{\omega}$$

The value obtained (25.31434 *pm*), partially differ from the Covalent radii in *pm* from analysis of the Cambridge Structural Database; however, it is surprising to find that the values obtained are significantly consistent.

The atomic radius curvature $\Leftrightarrow$ nuclear mass correlation is true for all elements of the table.

As an example (Table 2), shows the correlation ratios of the elements from: 1 ÷ 7, as can be seen, the measurement of the atomic radius curvature turns out to be consistent.

The diagram of Figure 2 shows the comparison between atomic radius, covalent radius, and atomic radius curvature.

If the thesis is correct, it is possible to assume that:

The atomic radius curvature originated by the spacetime time-curvature generated by the mass of the nucleus understood as: <the distance between the nucleus and the domain boundary of the specific atom> is the phenomenon that determines the atomic radius.

Table 1. Correlation nuclear mass -> atomic radius curvature as a function of the "time curvature".

nucleus mass (*u.*)	*Planck masses* (*mp*)	τv *time curvature* (*J*/*s*)	e_{0-} *boundary time frame reference* (*tp*)	$\sigma\omega$ *boundary curvature* (*m*)
1.008	7.691×10^{-20} *mp*	5.2244804×10^{15}	$2.8166000 \times 10^{-28}$	$2.5314338 \times 10^{-11}$

(τv: time curvature); (e_{0-}: precursive time, boundary' time position); ($\sigma\omega$: space time curvature boundary == atomic radius curvature (meters)).

Table 2. Nuclear mass - atomic radius - atomic radius curvature (picometers).

elements	***H* (1)**	***Li* (3)**	***Na* (11)**	***K* (19)**	***Rb* (37)**	***Cs* (55)**	***Fr* (87)**
nuclear mass	1.0079400E+00	6.9400000E+00	2.2989769E+01	3.9098300E+01	8.5467800E+01	1.3290545E+02	2.2300000E+02
τv (J/s)	5.2244804E+15	1.3709225E+16	2.4951389E+16	3.2539177E+16	4.8110186E+16	5.9992770E+16	7.7701981E+16
atomic radius curvature	25.314	66.427	120.901	157.669	233.110	290.693	376.498
Covalent radius	25.00	128.00	166.00	200.00	201.00	245.00	260.00
Atomic radius CSD	25.00	145.00	180.00	220.00	235.00	260.00	-

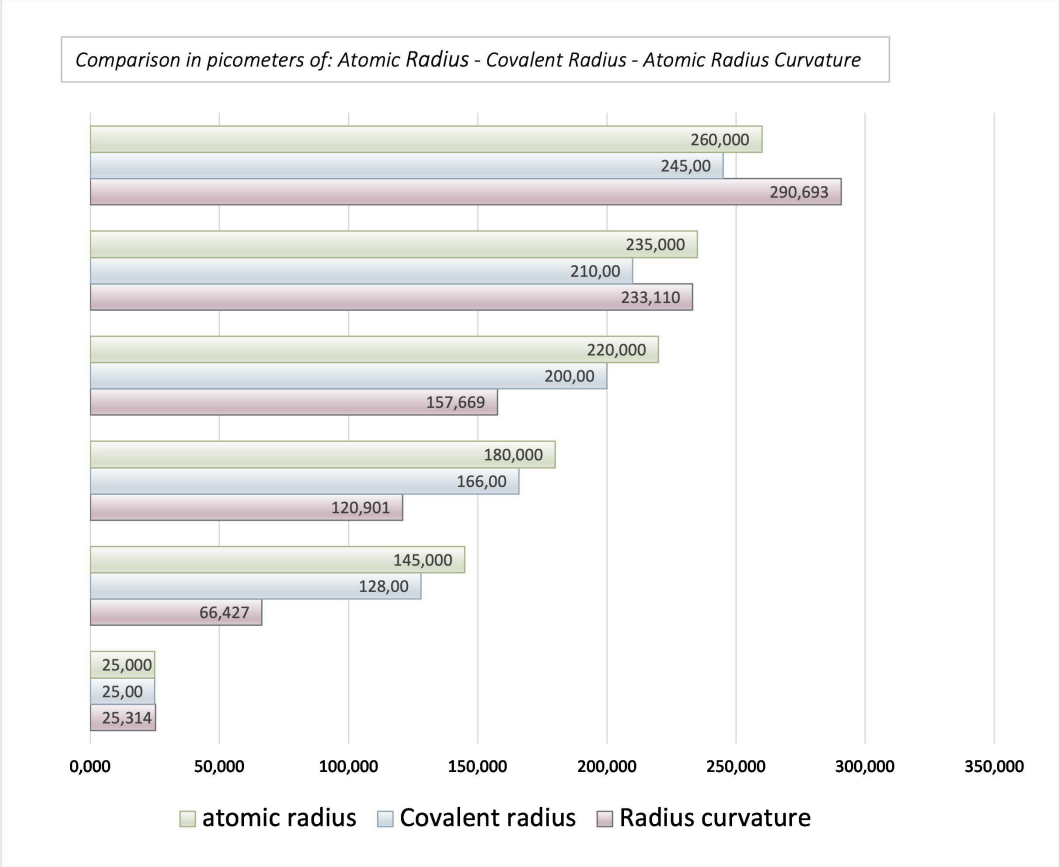

Figure 2. (ref. **Table 2**)—The diagram shows the comparison between atomic radius, covalent radius, and atomic radius curvature.

4.2. Integrated Energy System

In quantum mechanics an atomic orbital is a function describing the location and wave-like behavior of an electron in an atom.

In this research the "atomic orbital position" does not mean the electron location but the distance between its energy orbital level and the nucleus.

The energy orbital level (s^n) is the sphere orbital plane in which the total energy of the electrons referred to the energy levels of the periodic table of elements is stored (electron shell 1 ÷ 7), each energy orbital level is isotropic with respect to position in the spacetime (t_{-n}, S^n). (**Figure 3**)

$$\left(s^n\right) = t_{-n}\left(x_{ni}, y_{nj}, z_{nk}\right)$$

The discrepancy time that arises between ($t_0 \Rightarrow t_{-n}$) is an energy

$$\nabla \tau v = \left(t_0 - t_{-n}\right) \text{J/s} \tag{2}$$

The radius curvature and the mass of the nucleus are proportionally related; it then follows that the energy τv originate by the time curvature is the energy of the system (**Figure 4**)

The commutative energy diagram: {nucleus mass -> spacetime curv. -> energy} (**Figure 5**) shows that the overall energy of the atomic layout is the synthesis of a

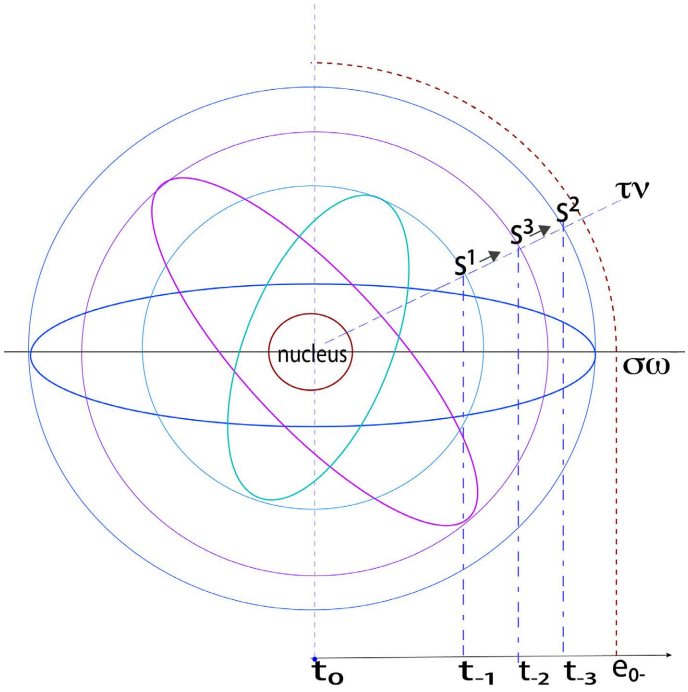

Figure 3. Energy orbital level ($s^1 \ldots s^7$) is the total energy of the electrons referred to the energy levels of the periodic table of elements.

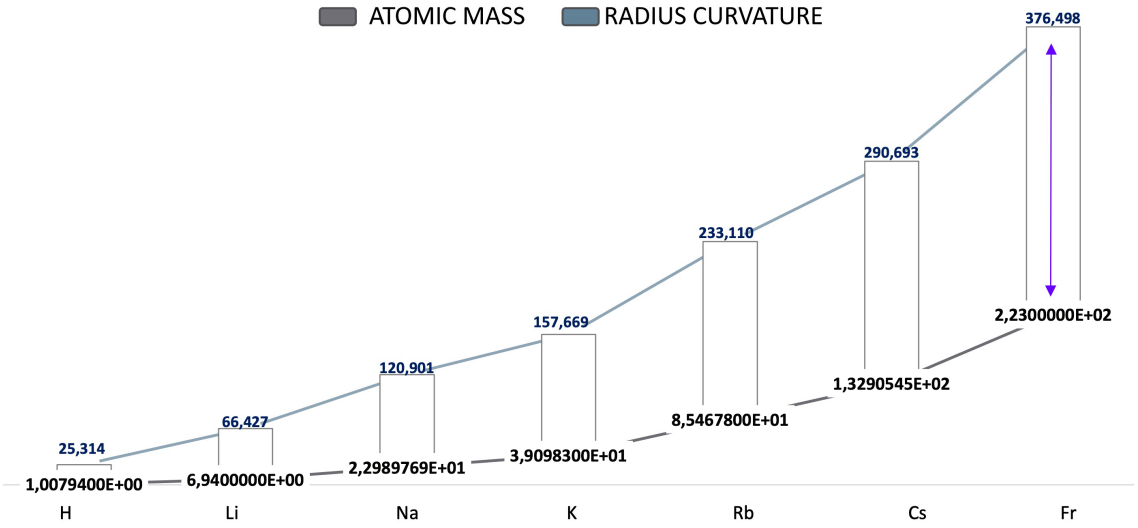

Figure 4. Radius curvature and the mass of the nucleus are proportionally correlated.

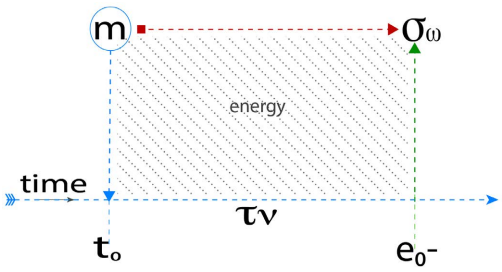

Figure 5. The overall energy of the atomic layout is the synthesis of a complex configuration in which nucleus (m) and atomic orbitals constitute a single energy entity.

complex configuration in which nucleus and orbitals levels constitute a single energy entity:

$$\tau\upsilon \to tp \to \left(e_{0-} \leftrightarrow \sigma_{\omega}\right) = \text{GeV/s}$$

It follows that the overall energy orbital levels are a function of the time curvature induced by the nuclear mass:

$$e = mc^2 = mpc\varpi = 1.503451\times10^{-10}\ \text{J}\cdot\text{s} = 0.9383\ \text{GeV/s} \quad (3)$$

(ϖ) is a coefficient named "*Quantum Compensation Spacetime*" was developed by space-time torsion-contraction computer processing, it has a value of: (π^{P}); it can be regarded as a four-dimensional time curvature moment.

5. Correlation between the Nuclear Mass and the Overall Energy of the Electronic Orbitals

To corroborate the thesis, for example, Table 3 shows how the overall energy of the electronic orbitals is directly related to the nuclear mass. Elements 1 to 7 were used in the different atomic number configurations.

Diagram exposition

The diagram Figure 6 shows the proportionality relation between the nuclear

Table 3. Correlation between the nuclear mass and the total energy of the electronic orbitals.

elements	*H* (1)	*Li* (3)	*Na* (11)	*K* (19)	*Rb* (37)	*Cs* (55)	*Fr* (87)
nuclear mass (*u*)	1.0079400E+00	6.9400000E+00	2.2989769E+01	3.9098300E+01	8.5467800E+01	1.3290545E+02	2.2300000E+02
total orbital's energy levels (*MeV*)	0.5104115	1.5312345	5.6145265	9.6978185	18.8852255	28.0726325	44.4058005

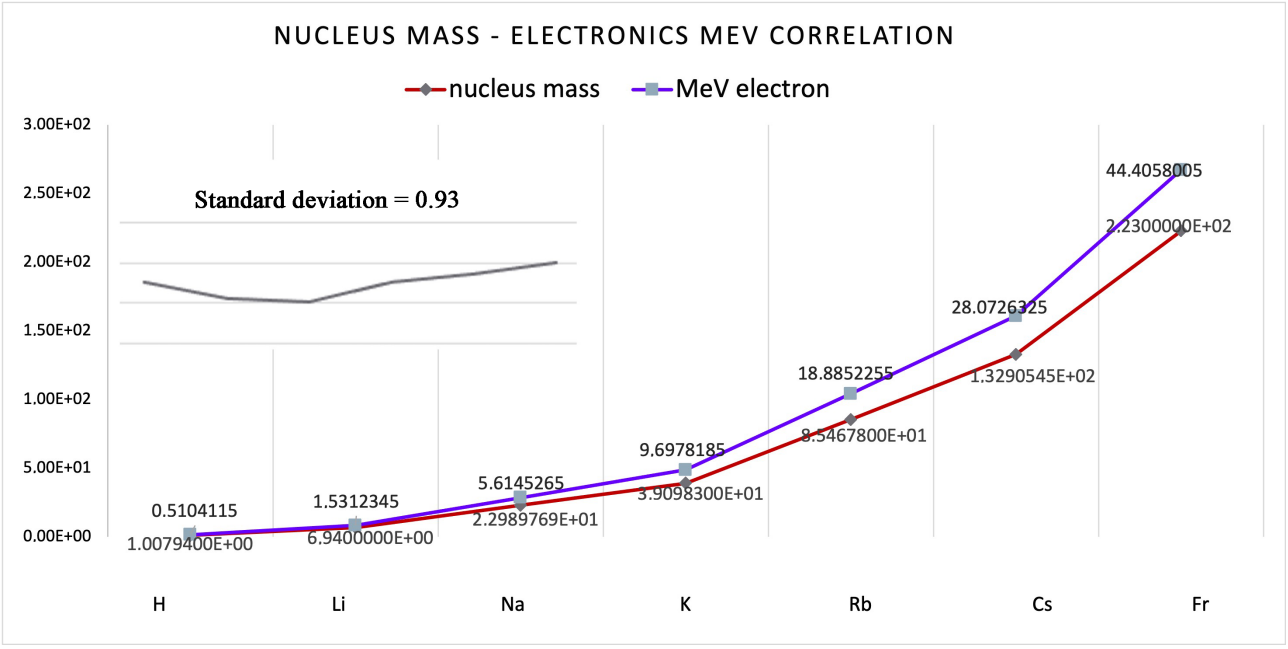

Figure 6. Proportionality relationship [overall energy of the electronic orbitals $\propto$ nuclear mass].

masses and the overall energy of the electronic orbitals is proportionally correlated.

If the analysis is correct, it is plausible to assume that:

1) A nucleus and the energy of its orbital levels are intrinsically connected.

2) Time curvature is a real phenomenon.

This suggests that the electroweak force is not properly a "force", but an energy component yielded by nucleus space-time curvature.

6. Where Are the Electrons inside the Atom?

It is relevant to note that the (e_0-; $\sigma\omega$) coordinates are "hyperdimensional" since they are not in chronotypal[1] axis with respect to the nucleus (t_0, *observer*¬ ⊥ e_{0-}) as shown in Figure 7.

$\left(\overline{e_{q+}}; \overline{e_{q-}}\right)$ denote an imaginary straight line[2] <future to present> passing through the $\{t_0\}$.

An imaginary observer placed inside the nucleus would see nothing but a strange phenomenon of alteration of spacetime around it. However, both frames of reference (t_0, e_{0-}) are always coexistent, simultaneous, and instantaneous with respect to the event time.

7. Why Are There No Electrons but Only Energy Orbital Levels?

As elaborated on in this paper, the energy orbital level is understood as the

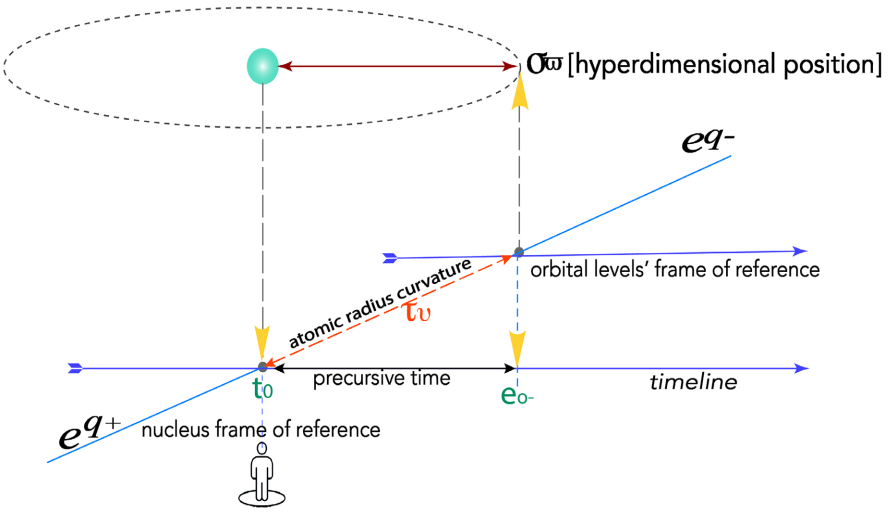

Figure 7. Spacetime coordinates (e_0^-, σω) are positioned in hyperdimensional frame of reference with respect to the nucleus.

[1]Chronotypal axis is an orthogonal half-line placed on a four-dimensional plane that establishes a correlation between the space coordinates and the instantaneous time referred to the event "$m, \mathbb{R}(x_0, y_0, z_0), (t_0)$". Chronotope is a different concept from "frame of reference" because it refers to instantaneous time regardless of the motion of the system. The chronotropic coordinates of an event establish the inviolability defined by the "Pauli exclusion principle". The chronotope representation on 4-dimensional space (M4) was the synthesis of the study developed by Hermann Minkowski to provide a consistent geometry for the of GR spacetime theory [3] [4] [5] [6].

[2]The straight line (eq^+, e_0, eq^-) corresponding to the hypersphere circumference passing through the projection center t_0. Description is given in chapter 5, Time-space fundamental Specificity of the Theory, Vacuum-Matter Interaction through Hyper-Dimensional Time-Space Shifting.

overall energy of a discrete area of the curvature of spacetime induced by the presence of the nucleus.

Therefore, the absence of electrons in particle form is not a shortcoming of the theory, since based on the theoretical assumptions set forth, sticking to the processed data, it is strongly presumable that there can be no electrons in the particle state in the atom, only an energy of orbital levels with different energies as a function of the time curvature caused by the nucleus mass.

In essence, the electroweak interaction is inferred to be an interaction between the nucleus and the spacetime it originates from. The "spread" ($t_0 \leftarrow e_{o-}$) indicated as (τv), is the energy in the form of quantized energy levels from which the electroweak force draws.

This correlation indicates that the electron $\left(+e^{-}\right)\left(-e^{-}\right)$ is given by a fluctuation of the orbital radius equivalent to the energy of an electron:

$$\Delta\tau v_n = \frac{me^4}{8\varepsilon_0^2 h^2}\tau_{vn} \to \left(\left(+e^{-}\right)\left(-e^{-}\right)\right) \tag{4}$$

The ponderability of electrons in the "particle e^{-}" form will be established by interaction among atoms, such as electrochemical reactions, or interference in electromagnetic interactions.

The transfer energy-to-mass is consequent to the hyperdimensional leap from $\left|e_{eo-}\right|$ to instantaneous event $|t_e|$: $\left\langle \mathbb{C}\left(x_{ie}, y_{je}, z_{ke}\right)\left(e_{eo-}\right)\right\rangle \Rightarrow \left\langle \mathbb{R}\left(x_e, y_e, z_e\right)\left(t_e\right)\right\rangle$ |from wave form into particle state|

The overall energy required for the jump state is provided by the ($\Delta\tau v_e$), the energy-to-mass ratio remains unchanged according to the physics principle of the conservation of mass-energy.

$$\left|\Delta\tau v\right| \to \left|e^{-}\right|$$

8. Conclusions

As already surmised by Max Born-Pascual Jordan [7] [8] [9] [10], it is indubitable that the position of an electron cannot be determined until after the measured displayed event.

On the basis of the theoretical assumptions presented, it is possible to establish a consistent interpretation of the Heisenberg uncertainty principle (the electron lives in its energy orbital level (just) only in the energy form) and this is the reason why there is no conflict between the negative charge of the electron and the positive charge of the nucleus, because it is the nucleus itself that generates the space-time variations that gives rise to the "energy orbital level".

In summary, the thesis of this study is that the electroweak force is an interpretation conditioned by a notion of an atomic model limited by representations of three-dimensional space.

Clearly, the extension to the hyper-dimensional integrated model introduces greater degrees of complexity, but it opens new horizons both because it unifies quantum mechanics to classical theories and introduces consistency variables to

Young's Double-Slit experiment and consequently to the Complementarity and Superposition Principles.

This study, in reference to [2] Chapter "6.1. *Extending the Standard Model in Hyper-Dimensional Mechanics; Precursive time the Hidden Variable*", was carried out to verify the soundness of time curvature and precursive time theory applied to the mass of an atomic nucleus. As far as it has been worked out, it appears that this theoretical research applied to the masses of nuclear quantities satisfies significant consistency assumptions.

Regarding the dynamics related to the different dislocations of the energy orbital levels ($s^1 \div s^7$) it is reasonable to assume that there are mechanics related to the nucleus that is not yet understood.

The theory found no conflict with known phenomenologies.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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