NEW HORIZONS IN PHYSICS
OUT OF COSMIC ISOLATION BY UNDERSTANDING

October 17, 2018 – Guido KINET – guido.kinet@telenet.be

The riddle behind the magnetic field solved, a new physical constant " **#h**" the elementary quantum of action of empty space, the impossibility of the Planck square, the ether a three dimensional entity, the zero point field energy density, the matrix a medium composed of an integral number of finite equal parts, the quantum of space, the matrix and the Casimir effect, Larmor power a predictive gift, the Heisenberg uncertainty principle in murky water … ergs, quanta and the zero point energy…

Each of these landscape characteristics behind that new horizon was an enigma in itself and on closer inspection the outlines became increasingly clear, the answers were deeply hidden in the work of Max Planck, Thomas C. Hales, Hendrik Casimir, Joseph Larmor, Werner Heisenberg and Albert Einstein which were indispensable pawns in exploring that landscape behind the horizon and to enter a new world where behind every corner new questions challenged human ingenuity.

…. reaching out to anyone who is out there.

Some of the things mentioned above may be known by those who have already read previous related papers *(ref 6)*, but recalling it is important to unlock other sub-areas, such as searching for the origin of magnetism, the further deepening of the zero point field energy density (with startling results), the surprising equivalence of the number of quanta compared to the amount of ergs contained in a cm^3 of the matrix .... and tinker with the uncertainty principle of Heisenberg ….

Max PLANCK

"Science cannot solve the ultimate mystery of nature. And that is because, in the last analysis, we ourselves are a part of the mystery that we are trying to solve."

THE IMPOSSIBILITY OF THE PLANCK SQUARE

Planck length is the length scale at which the structure of space becomes dominated by quantum effects, and it is impossible to determine the difference between two locations less than one Planck length apart. In string theory, the Planck length is also in the order of magnitude of the oscillating strings that form elementary particles, and shorter length do not make physical sense … but there is a problem !!!!

The Planck length being the smallest possible length (lp = 1,616 199(97) × 10^{-35} m), ought to make the Planck area (lp^2) the smallest possible…. but the diagonal of the surface of the Planck area is longer than one Planck length and smaller than two Planck lengths. Since the Planck length is the smallest meaningful length, fractions of a Planck length don't have meaning, therefore the only logical option is that when the diagonal should be (out of necessity) exactly equal to the Planck length, is to conclude that the Planck area, is a circle.

But again there is something strange. As the Planck length is the smallest meaningful length, fractions of a Planck length don't have meaning. The **circumference** of our circle is not a multiple of that Planck length what makes that circle an impossibility, and the question arises if there is a minimum 'true size' to that circle.

The solution lies in answering the question "what mathematical figure has a circumference of three times the diagonal of our circle?" (instead of 3,14 times), the answer is a **HEXAGON**.

The smallest Planck area is NOT a square or a circles but is in fact a two dimensional hexagon, a quantum of space.

REPERCUSSIONS IN STRING THEORY

This has far fetching repercussions in string theory, because this means that a single closed string with a diagonal, obviously, smaller than the Planck length cannot exist, which makes the assumption that 6 out of the 10 spacetime dimensions in string theory wrapped up to a size of 10^{-35} m an impossibility. Furthermore in physics the definition of a closed string is a string that has no end-points, and therefore is topologically equivalent to a circle, but as proven a single string is unable to curl up and if that "closed string" refers to a single string with the assumption that one of the vibrational modes of a closed string can be identified as the graviton, there again is a problem.

Albert EINSTEIN

Einstein himself believed that theory of general relativity could not properly function without a medium … so the big question is where to look for that nebulous concept ?

THE ETHER A THREE DIMENSIONAL ENTITY

The first dimension in the quantum world are Planck length strings.

In string theory, the string, is the most fundamental basic ingredient ... a one dimensional fragment. *An elementary string can oscillate* in many different ways, similar to the strings of a music instrument, different oscillations of an elementary string correspond to different values for the physical properties of the string, such as its mass or spin.

The peculiar thing about elementary strings, is that when you try to put them in a certain pattern, there are only two possibilities, either simply put them one after another OR try to arrange them in different patterns.

Put behind each other one gets an infinitely long line with only one dimension, "length", but in trying to arrange them in a pattern on a flat surface, you will find that the only way to achieve that is in the form of a hexagon, a regular two dimensional hexagonal grid or honeycomb grid. Any other way violates the principle that the Planck length is an indivisible given.

The "strings" that make up the hexagon are not firmly attached to each other, they have freedom of movement in the horizontal plane, bearing in mind that there is always a minimum distance of a Planck length to be maintained between the hexagonal grids.

The second dimension down in the quantum world is made up of hexagons with Planck length dimensions, matted together and molded into **a two dimensional fabric**, a **flexible field**

Thomas C. HALES

American mathematician, has provided a formal proof of the Kepler conjecture and of the classical honeycomb conjecture.

Important to mention is that the honeycomb conjecture states that a regular hexagonal grid or honeycomb is the best way to divide a surface into regions of equal area with the least total perimeter. The honeycomb conjecture was proven in 1999 by mathematician Thomas C. Hales. (Ref 1)

“n” layers of those two dimensional, honeycomb grids stacked horizontally on top of each other (random with respect to the hexagons) with at least one Planck-length separation between them, transforms into a 3D matrix, the quantum dimension from which emerge all the elementary particles.

The third dimension of the matrix is not the height to indicate the third dimension in space, but rather the stacking of n-layers of hexagons separated by at least one Planck length.

Arguing that the Planck length is in fact the smallest possible length, implies that it is impossible at that level to compress the quantum dimension still further, so it is fair to say that *the measure of the Planck length* is a *“force”* sustaining *the* 3D *canvas/matrix*, it is in fact a STRONG FORCE extending throughout the whole of space, this minimum measure prevents space to implode, it acts as force field. “*It is important to realize that forces can be particles too”*

The assumption that space exists in individual units rather than an area only stuffed with electromagnetic waves makes it quantifiable.

The Planck length determined the nature of the *smallest possible area*. By dimensioning this data, it was possible to describe the aether based on the shape of a *hexagon*, reason why it is considered as the individual basic unit that makes empty space quantifiable, written as : “Q”

Keeping the Planck length as a standard, space became a structured three-dimensional entity.

Therefore, **empty space, the most basic 3D environment,** can be summarized in one equation:

$$\mho_m = (l_{p(z)} \cdot Q_s)^n$$

- ✓ $\mho_m$: the **U**niversal **m**atrix",
- ✓ $l_{p(z)}$ the "z" coordinate (divided into units of Planck length), without any restriction of length, emphasizing the extent of the cosmos,
- ✓ Q_s : the impossibility of the Planck surface$\{l_{p(x)} \cdot l_{p(y)}\}$, a new notation for a hexagon with Planck dimensions, the quantum of space

Linking "n" number of space quanta in "n" horizontal planes (in the four quadrants), separated by at least a Planck length, to that "z" coordinate, is the definition of the Universal Matrix ($\mho_m$), …. "a flexible field composed of "n" hexagons (Q_s) stacked in a 3D grid, where each layer of that flexible field is separated by at least one Planck length, … EMPTY SPACE." *(Ref 6)*

$$\mathbf{\mho_m = (l_{p(z)} \cdot Q_s)^n}$$

THE MATRIX (ETHER) IS NOT TO BE REGARDED AS A CONTINUOUS INFINITELY INDIVISIBLE QUANTITY, BUT AS A DISCRETE QUANTITY COMPOSED OF AN INTEGRAL NUMBER OF FINITE EQUAL PARTS, THE QUANTUM OF SPACE, " Q_S ".

A 3D structure composed of infinitely small interconnected vibrating points shaped as hexagons. The $\mho_m$ is in a collective state of excitation with **vibrations in its matrix**.

The uniqueness of the flexible two-dimensional honeycomb field from which the three dimensional matrix is assembled, is that it is built out of one-dimensional entities with only "length".

This means that these two-dimensional fields have no thickness and that this is the reason that there is freedom of movement, among which vibrations.

Vibrations, ON a string of Planck length, propagate at:

$\nu = \sqrt{\tau}/\mu$

τ = tension = energy per unit length = $E/l = mc^2 / l = \mu c^2$

μ = mass per unit length = m/l

Consequently, we arrive at: $\nu = \sqrt{\mu c^2} / \mu = \sqrt{c^2} = c$ = speed of light

Vibrations on a quantum of space (Q_s) will, therefore, travel at the speed of light.

Note that Planck time is time required for light to travel one Planck length, which means that vibrations on a string that travel at one Planck length per Planck time, are only possible when speaking of waves with a wave length in the range of the **photon**.

It follows that $C = l_p / t_p$

The classical behavior of the electromagnetic field is described by Maxwell's equations, which predict that the speed *c* with which electromagnetic waves such as light, **photons** in other words, propagate through ***the vacuum*** is related to the electric constant ε_0 and the magnetic constant μ_0 by the equation:

$C = 1 / \sqrt{\varepsilon_0 \mu_0}$

THE ZERO POINT FIELD ENERGY DENSITY

THE ZERO-POINT FIELD ENERGY IS THE LOWEST ENERGY STATE OF THE MATRIX …. IT IS ITS GROUND STATE

Relative permittivity (the ability of a substance to store electrical energy in an electric field) of the vacuum

$\varepsilon = \varepsilon_0 \varepsilon_r$ where $\varepsilon_r = 1$ in vacuum which in itself means that there is no propagation of electric fields

$\varepsilon_0 = 1$ in Gaussian units

Permeability constant: a measure of the amount of resistance encountered when forming a magnetic field in a classical vacuum

$\mu_0 = 1$ in vacuum meaning there is no diamagnetic nor paramagnetic permeability

The equation of energy density in a vacuum is : $U = \varepsilon_0 / 2 . E^2 + ½ \mu_0 . B^2$

Given the above data :

$$\boxed{\mathbf{U = 1/2 . E^2 + ½ . B^2}}$$

E = electrical field that stores background energy that exists in space = vacuum energy = the zero-point energy of the string = ½ **hν**

B = magnetic field

Now we can write it down as :

$$\boxed{\mathbf{U = 1/2 (1/2\, h\nu)^2 + ½\, B^2}}$$

…. as long as the matrix represents a static electric field, in other words, if no particles pass through, there will be no magnetic field, we can equal the second part of the equation to zero which leaves us with :

$$\boxed{\mathbf{U = 1/2\ (h\nu/2)^2}}$$

A system in equilibrium $\Sigma \vec{F} = 0$

… so it is here that the electrical conductivity (σ) of **empty** space is zero, there is no conductivity, this is not quite the same as saying that in the **vacuum** of space there is no conductivity.

Empty space is an isotropic medium where the permittivity, ε, and permeability, μ, of the medium are uniform in all directions.

Taking it a step further

Empty space has been defined as an environment with a static electric field but no electrical conductivity $U = 1/2\ (h\nu/2)^2$. After a bit of juggling with that little equation it went from $1/2\ (h\nu/2)^2$ to :

$$\boxed{\mathbf{U} = h^2\nu^2 / 2^3 = h\ (h\nu^2) / 2^3 = \mathbf{(h\nu^2)\ h/2^3}}$$

… and then it becomes even more interesting.

$(h\nu^2)$ $h/2^3$ unveils some particular characteristics of that static electric field that are masked, and therefore makes it interesting enough to dig a little deeper into the data.

There is a dichotomy in the formulation of that static electric field of empty space, a first part between brackets $(h\nu^2)$ is a variable factor and a second part - **$h/2^3$** – which I would like to forward as the elementary quantum of action of empty space " **#h** " (the hashtag as a reference to the matrix and "h" the Planck constant) is an invariable quantity that can be calculated as :

(Wolfram Alpha computation)

$$\frac{\hbar \text{ (Planck constant)}}{2^3}$$

$$= 0.125\,\hbar \text{ (Planck constants)}$$

$$= 8.282588 \times 10^{-35}\ \mathrm{J\,s}\ \text{(joule seconds)}$$

$$= 5.169585 \times 10^{-16}\ \mathrm{eV\,s}\ \text{(electronvolt seconds)}$$

$$[\text{mass}]\,[\text{length}]^2\,[\text{time}]^{-1}$$

To go to the next step, it is necessary that we take a look into some of the work of :

Hendrik CASIMIR

Dutch physicist best known for his research on the two-fluid model of superconductors and the Casimir effect.

The matrix and the Casimir effect

A vacuum is full of fluctuating electromagnetic waves that can never be completely eliminated. The typical example of the Casimir effect is of two uncharged conductive plates in empty space, placed a few nanometers apart. In a classical description, the lack of an external field means that there is no field between the plates, and no force would be measured between them.

When this field between the plates, is instead looked upon using the quantum electrodynamic vacuum, it is seen that these plates are making geometrical restrictions on the waves in it, so relative to that, what is between the plates is a local drop in the energy density compared to the vacuum.

Energy density between the plates depends on the way plates interact. When they are pulled apart a little, there is not only the increase of the volume between them but also the increase of energy density in that volume, and so when plates are pulled apart just a little it is actually like creating energy, and by pulling the plates apart work must have be done and that means unconditional that a force was applied …. *(Ref 3 & 5)*

Looking at the matrix ($\mho_m$) similarity arises with the uncharged conductive plates and the “n” layers of the flexible field ($\mathbf{l_{p(z)}\,.Q_s}$) of that matrix that are constantly vibrating.

The excitation of the field changes the expectation value of that field, energy is transferred from one quantum to the next and causes a disturbance that gives rise to an electromagnetic **wave packet** which are in essence travelling waves. (*A wave packet*) When two or more complementary traveling waves interact, they form a standing wave, whereby a particle in essence is the translation of vibrating **space quanta** into one of the elementary particles, each with their own **unique** vibrational signature.

A standing wave pattern is not actually a wave; rather it is the pattern resulting from the presence of two or more waves of the same frequency with different directions of travel within the same medium. Compare it with an "envelope ", of non-expanding configurations of localized wave actions, that travels as a unit with its own unique frequency.

Each particle in essence is the translation of vibrating **space quanta**, each with their own **unique vibrational signature.** Empty space is a system in equilibrium regarding its energy distribution and each particle is an indivisible part of that equilibrium.

"Empty space" does not contain particles of matter, as soon as these particles appear, the name "vacuum space" becomes the new terminology.

An established fact is that when those elementary particles move through the matrix, they lose kinetic energy, and here that first part of the equation $(h\nu^2)\ h/2^3$ - $\mathbf{h\nu^2}$ – comes into play.

Inserting for instance a value of one Hertz (*here only as an example, most particles/waves of course have much higher frequencies*) into $\mathbf{h\nu^2}$ as a value for the frequency (ν) of a particle, will lead us to …

(Wolfram Alpha computation)

$(h$ (Planck constant)$) \times 1\ \text{Hz}^2$ (hertz squared)

$6.62607 \times 10^{-34}\ \text{kg m}^2/\text{s}^3$ (kilogram meters squared per second cubed)

$6.62607 \times 10^{-34}\ \text{W}$ (watts)

$[\text{mass}]\,[\text{length}]^2\,[\text{time}]^{-3}$, ….. ***Larmor Power,***

So - $\mathbf{h\nu^2}$ - is indicative for the loss of energy of an accelerating particle but also calculates for **the amount of energy needed by that same particle to regulate its energy level avoiding disintegration**.

Sir Joseph LARMOR

... an unassuming, diffident man who did not readily form close friendships and whose numerous acts of generosity were performed without publicity

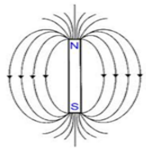
Going the extra mile, Larmor power a predictive gift ?

"Larmor radiation (Ref 2) is produced by an accelerating particle. The Larmor power is the rate at which an accelerated charge loses energy. The power of the radiation depends only on the magnitude of the charge and the acceleration of the particle, both of these increasing leads to a quadratic increase

It is said that Larmor's power does not incorporate the constraints of quantum mechanics, reason why it should be applied with great caution to microscopic systems such as atoms. For example, Larmor's equation predicts that the electron in a hydrogen atom will quickly radiate away all of its kinetic energy and fall into the nucleus … !!!

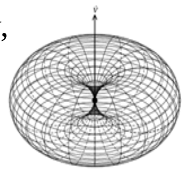
A small detour to refute this reasoning

Magnetic field under investigation



"what makes up a magnetic field"? The only reason we know it exists is due to the way it interacts with normal matter. A particle moving in an electric field completely changes the nature of empty space, not only by its presence but also through the mysterious emergence of a “magnetic field”, and the question remains, what is it that magnetic field and what is its origin?

Magnetic fields are invisible fields that exert a vector force, characterized by both strength and direction, and are produced by changing electric fields (or magnetic objects).



Magnetic fields are mathematically and physically equivalent to a vorticity, meaning they have a tendency to rotate. This is what makes it difficult to determine the origin of magnetic fields, since it means that magnetic fields have helicity, which is a kind of “topological charge.”

When that (elementary) particle by its presence changes “empty space” into a “vacuum space”, a second part ½ B^2 is added to the definition of the energy density of empty space, calculating for the magnetic field, balancing the equation to obey the law of conservation of energy :

$$\boxed{\mathbf{U = (h\nu^2)\, h/2^3 \ + ½\, B^2}}$$

(see the reshuffling of U= ½ $(h\nu/2)^2$ to $(h\nu^2)\, h/2^3$ on page 5)

A bold move …

A "pure" static electric field, can be converted to an EM field, with both E and M components present, by simply moving a particle with regard to the frame in which only the “pure” electric field appears (the matrix). That is, a pure static electric field will show the familiar magnetic field associated with a current, in any frame of reference where a charge moves.

That moving / accelerating (elemental) particle emits energy, in fact it loses kinetic energy, and to maintain the law of conservation of energy, a second part has to be added to that initial equation of empty space - "magnetic energy" (½ B2) - transforming that empty space equation into the equation of a vacuum.

Seemingly there are two kinds of energy in play : *Kinetic energy* and the energy stored in the magnetic field, *magnetic potential energy*, and that … is where the shoe pinches.

Kinetic energy radiated by the particle is *emitted in the form of photons*, so in fact there is NO potential energy present, there is only the energy of that (those) photon(s), and that is sheer Kinetic energy.

The Planck–Einstein relation connects the particular photon energy *E* with its associated wave frequency ν in the equation **E = h c / λ**

Since the frequency *ν*, wavelength *λ*, and speed of light *c* are related by **ν = c / λ** it follows that :

$$\mathbf{E = h\nu}$$

So we can rewrite the equation for the energy density in vacuum as follows :

$$\boxed{\mathbf{U = (h\nu^2)\ \#h + h\nu}}$$

That equation really tells us that **- $h\nu^2$ -** is indicative (a measure) for the loss of energy of an accelerating particle, **- hν- the amount of energy necessary** to maintain the energy level of the particle, and of course the elementary quantum of action of empty space **$h/2^3$** or " **#h** " binding those two elements together in a way that also the electric equilibrium of the matrix is safeguarded.

Again inserting a value of one Hertz for the value of the frequency "ν" to show the equivalence in energy loss and energy gain of an moving particle in vacuum.

- **$h\nu^2$** is indicative for the *rate at which an accelerated charge* ***loses energy***

  (Wolfram Alpha computation)

  (h (Planck constant)) × 1 Hz^2 (hertz squared)

  6.62607×10^{-34} kg m^2/s^3 (kilogram meters squared per second cubed)

- **hν** *the* ***energy absorption*** *to uphold the energy level of the particle*

  (Wolfram Alpha computation)

  (h (Planck constant)) × 1 Hz (hertz)

  6.62607×10^{-34} kg m^2/s^2 (kilogram meters squared per second squared)

The "magnetic field" is in fact an energetic loop, driven by the particle itself ... The moving particle loses energy ($h\nu^2$) and needs to be replenished energetically ($h\nu$) to prevent annulation so there is a constant flow of energy entering and leaving that particle, which takes the shape of a vortex, constantly creating a positive and a negative side which is responsible for the externalization of magnetic properties of particles moving in an electric field.

It is also this reasoning that explains why the electron in a hydrogen atom will not fall into the nucleus. *Larmor Power, in a quantum mechanical setting.*

Where does the magnetism of a permanent magnet come from? Inside a substance are also a lot of moving charges around the core of every atom. Orbiting electrons and the electrons themselves turn out to rotate around their axis, losing constantly kinetic energy and at the same time continuously being replenished with photonic energy. Such a circular current of a circular electron a "dipole" can be regarded as a miniature magnet. Iron (and some alloys with iron) appears to be a material with extremely strong internal dipoles.

In normal circumstances, the planes in which the electrons move are randomly oriented, so that all these miniature magnets indicate random directions, one will notice no magnetic effect on a large scale. But when all these microscopic magnets point in the same direction you get a large amount of small magnets that all work together, creating a permanent magnet.

This is obviously only a first approach in unlocking the phenomenon of magnetism, but it will open a few new doors for further research ... and undeniably it will, in my opinion, have a strong impact on existing and new theories ….

Werner HEISENBERG

What we observe is not nature itself, but nature exposed to our method of questioning.

Zero point energy and the Heisenberg uncertainty principle

The ideal harmonic oscillator is a hypothetical mass on a perfect spring moving back and forth. The Heisenberg uncertainty principle dictates that such an ideal harmonic oscillator, one small enough to be subject to quantum laws, can never come entirely to rest, because that would be a state of exactly zero energy, which is forbidden. In this case the average minimum energy is one-half h times the frequency, ½ hν.

Strings are able to vibrate as harmonic oscillators, and different vibrational states of (the same) strings and in string theory, strings vibrating at different frequencies constitute the multiple fundamental particles found in the current Standard Model of particle physics

The Heisenberg uncertainty principle states that it is impossible to know simultaneously the exact position and momentum of a particle. That is, the more exactly the position is determined, the less known the momentum, and vice versa. This uncertainty arises because the act of measuring affects the object being measured. *(Ref 4)*

I have the idea that …

If we associate electromagnetic wave behavior with an elementary particle, it can easily be assumed that this oscillating electromagnetic wave (or electromagnetic waves) that

gives shape to the elementary particle, can be considered as a time apparatus, a clock with a specific **frequency (ν_x)**, and by that it is also possible to assign a **wavelength (λ_0)** to that elementary particle. (**$\lambda_0 = c / \nu$**)
If the frequency (ν_x) than generates its "**proper time**", the elementary particle with a wavelength (λ_0) generates its "**proper space**" (a non-expanding configuration)…. space and time as elementary properties of elementary particles !!!!

Now let's take this to the Heisenberg's uncertainty principle, but first just a reminder

- *$P = E / c = h / \lambda$ (momentum = Energy / c = Planck's constant / wavelength)*
- *$\lambda = c / \nu$*
- *$h\nu^2$: accounts for Larmor Power*

First approach to the uncertainty principle :

Expressed in the form of $\Delta x \, \Delta p \geq \hbar/2$, it says that one cannot know with absolute certainty, both the position and momentum of an electron, I have the idea that ….

- ….. the uncertainty in position expressed by Δx should be undone by entering the frequency of this particle in - **$h\nu^2$** -which gives an idea of the amount of energy needed to maintain its integrity, and when replenishing its energy content by picking up that (those) so needed photon(s) it labels his trajectory and thus gives away its exact location.

- …. the uncertainty in momentum expressed by Δp should be undone by introducing the next logical approach : $P = h / \lambda_0$ (where $\lambda = c / \nu$)

Second approach to the uncertainty principle :

$\Delta E \, \Delta t \geq \hbar/2$, this equation gives us the uncertainty in energy transferred to an electron (or other {elementary} particle) over a period of time Δt. That is, the smaller the time interval, the greater the uncertainty in energy is. I have the idea that …

- … the uncertainty in energy transfer expressed by ΔE should be undone by entering the frequency of this particle in - **$h\nu^2$** -, which gives an idea of the amount of energy needed to maintain its integrity, which means that we know the exact amount of energy transfer

- ... the uncertainty in time expressed by Δt should be undone when $t = \nu_x$

ERGS, QUANTA AND THE ZERO POINT ENERGY

The magnitude of the ZPE is truly large. It is usually quoted in terms of energy per unit of volume, which is referred to as energy density. Renown physicist have pointed out that the amount of ZPE in one cubic centimeter of the vacuum is greater than the energy density in an atomic nucleus where the energy density is of the order of 10^{44} ergs per cubic centimeter. (The **erg** is a unit of energy and work equal to 10^{-7} joules")

Quantum Mechanics predicts the energy density of the Zero Point Energy to be in the order of 10^{98} ergs per cubic centimeter. *(Ref 5)*

" …. The matrix is not to be regarded as a continuous infinitely indivisible quantity, but as a discrete quantity composed of an integral number of finite equal parts, the quantum of space, "Q_s "…."

The question is whether there is any similarity between the number of quanta of space and the value of the zero point energy at Planck level.

To answer that question there is a need of unity in dimensions. Zero Point Energy is expressed in ergs per cm^3 and it is therefore important to calculate the amount of quanta of space per cm^3.

Surface of a hexagon	$(3\sqrt{3} * z^2) / 2$

$(3\sqrt{3} * l_p^2) / 2 = 2.598\ l_p^2$ = surface of one quantum of space (Q_s)

Number of Planck lengths in one cm =	one cm / $l_p = 6.187 \times 10^{32}$
Number of quanta (Q_s) in one cm^2 =	$1\ cm^2 / 2.598\ l_p^2 = 1.474 \times 10^{65}\ Q_s$
Number of quanta (Q_s) in one cm^3 =	$(1.474 \times 10^{65}) \times (6.187 \times 10^{32})$
	$= 9.119638 \times 10^{97}$ quanta (Q_s)

Number of quanta (Q_s) in one cm^3 of space when each layer in the matrix is separated by one Planck length = $9.119638 \times 10^{97} / 2$

Brings the total of quanta of space present in one cm^3 to **: $4.559819 \times 10^{97}\ Q_s / cm^3$**

The value of the Zero Point Energy at Planck level = **10^{98} ergs per cm^3**

There is ≈ equivalence between the number of quanta of space and the number of ergs in the Zero Point Energy, almost one to one. (4.559819×10^{97} " quanta of space" in one cm^3 to 10^{98} ergs per cm^3 Zero Point Energy) what makes it once again plausible that the matrix as previously argued is not without foundation.

To immediately draw the conclusion that 1 cubic centimeter has an extremely high mass weight is particularly naïve.

10^{98} ergs per cm^3 ***Zero Point Energy is the*** amount of ***energy stored*** in space per cm^3.

" … Each particle in essence is the translation of vibrating space quanta, each with their own unique vibrational signature … "

Only very small portions of the available energy in the matrix will be converted into (elementary) particles (see the Casimir effect pages six and seven above, and page 12 second paragraph) …. and only then do mass and weight become manageable terms.

AFTERWORD

First of all, there will be some among the readers who are reluctant towards the concept of string theory, but one can substitute the word "string" as presented here with that other term "Plank length", and yes there will also be some readers who do not accept the Planck length as the smallest length or at least show some doubt, but here again I start from the assumption that there must be a smallest length anyway and for that reason those arguments do not change fundamentally the reasonings made.

Secondly, in the assumptions that I make concerning the uncertainty principle of Heisenberg I start with the phrase " *… I have the idea that …* " showing my great respect for his intellect and achievements … because who am I to criticize his scientific work.

PHYSICAL CONSTANTS

Physical constants used in this paper can be looked up in the reference work below:

CODATA Recommended Values of the Fundamental Physical Constants: 2014

https://zenodo.org/record/22826

Physical constants not mentioned in the reference work :

erg : a unit of energy and work equal to 10^{-7} joules

1 J = 10.000.000 erg

Physical constants not mentioned in the reference work and which are the outcome of arguments in the above work :

$\mathbf{Q_s}$: quantum of space = 1erg Zero Point Energy = 10^{-7} J

 # h = h / 2^3 = 0,125 h = 8,8282588 x 10^{-35} Js

Ʊm : universal matrix (see page 4)

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1. https://en.wikipedia.org/wiki/Honeycomb_conjecture
2. https://brilliant.org/wiki/larmor-power/ retrieved 17.47, Sep 2, 2018
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