

# A New Look at the Melee of Quantum Particles and Fields

Kalyan Deb

India

**Abstract** A quantum field in space espousing one or more particles in the quantum domain springs into life by the cause-effect relationship between the quantum particle and the field only. While a field has no physical reality, the phenomenon generating the cause ever assumes a tangible physical form appearing as a particle. Elementary particles are created spontaneously out of the fictive state-of-nothingness and in turn go on producing composite particles in the quantum domain. At any location within the field an interaction between a particle and any other test particle will produce a resulting effect avowing the observed value of the property of the field at that point. Such an interaction takes place through the exchange of mediating particles carrying energy and momentum producing a change of state for both interacting particles including affecting their motion inside space. Moreover, interfacing of a particle with space beyond the quantum domain, in view of the amount of lethargy associated with it, causes spacetime curvature, in turn generating its motion under gravitation. We should consider the quantum particle as primary and the quantum field as the result of the presence of quantum particles within space. The entire universe has been created and perpetuated due to the above phenomena of interaction and interfacing, causing motion of particles and their change of state, as applicable, spontaneously at all times.

**Keywords** Quantum particle, Quantum field, State-of-nothingness, Lethargy

## 1. Introduction

Since the dawn of physical science through the metamorphosis at the advent of quantum physics the eternal tussle between the quantum particle and the field has run into a melee of each claiming to be fundamental being the forerunner while enduring together simultaneously in the quantum world. As the macro rises out of the micro domain, matter objects are found comprised of particles only whereas the field finds no equivalent being pertinent confined merely in the quantum realm.

In this article we take a close new look at the particle and the field in the quantum domain by imparting the physical sense as to which one and how it should be a forebear of the other without violating the causality principle. Thereafter we ponder over the truly spectacular phenomenon of spontaneous creation, out of all possibilities and probabilities, conscientiously adhering to the principle of causal symmetry, and then above all being guided and commanded by an inherent omnipresent consciousness, we move on to unravel the why's of nature beyond the what's and how's of pure science.

## 2. Why do Events Happen

Everything originates at the quantum domain which later on may transcend into the macro state, where applicable, in view of superposition and correspondence, and this is prevalent in every realm of nature, be that animate or inanimate, and strangely although perceptibly in our social arena also. *Events do happen* in nature taking into account the following order of sequence every time and at every place.

- Possibility
- Probability
- Causal symmetry
- Consciousness
- Spontaneity

An event may transpire only when there is a *possibility*, otherwise no amount of exogenous assistance or manipulation will prevail. If there lies more than one possibility, then *probability* aspect takes over, the route following a more probable path, however, keeping alive the less probable path(s). Next in line comes *causal symmetry*, the mandatory cause-effect relationship, identifiable in every single case and in every domain of nature, including non-physical venues, too. While causality remains inherently asymmetric, causal symmetry persists at all times. Then follows *consciousness* as anything that happens does happen consciously although the concept cum definition and application of consciousness need be generalized as well as be directly related to the happening, since *nothing happens in nature without an underlying perception of its consequence*, which is essentially once again consciousness itself being at the fore. Finally, when all the prior steps are set in, the event

\* Corresponding author:

debkalyan@yahoo.com (Kalyan Deb)

Received: Jul. 12, 2023; Accepted: Jul. 30, 2023; Published: Aug. 12, 2023

Published online at <http://journal.sapub.org/ijtmp>

happens *spontaneously* as nothing else can prevent it from happening or may alter its path. This may be found true, from every single quantum action through chemical and biological activity as well as large scale human or social ones. Every happening in nature takes place going along these five only essential and consecutive steps.

*This answers the 'why' of nature apart from the usual 'what and how' of pure science.* However, conditions pertaining to possibility and probability may be artificially created and stimulated through exogenous means thus apparently leading to causal symmetry, but until subtle consciousness is passably satisfied, spontaneous happening shall not take place.

### 3. Fundamental Principles of Physics

Physical laws are founded on five *fundamental principles* as follow [1].

- Principle of Constituents
- Principle of Causality
- Principle of Covariance
- Principle of Invariance
- Principle of Equiprobability

All known laws of physics governing natural phenomena are founded, in one or the other way, on these five fundamental principles without any violation. With simple yet profound logic governing these principles they suffice for every theoretical analysis as well as experimental finding.

Based on the concepts in previous paragraphs and before venturing into primitive notions, we should contemplate our *universe* as being a *continuum* descending from the *transcendental* to the *physical* form passing through a *transitional* form, conceived under an *axiomatic principle*, that allows a smooth transition and an uncompromising adherence to all fundamental principles leading to the primitive notions as enumerated below. Everything that we may conceive or may be created and perpetuated within our universe belongs to this continuum appearing in these three various forms [1] [2].

### 4. What are Primitive Notions

Primitive notions are those which are not defined by any other concepts except by themselves [2]. Study of physics and its vocabulary are primarily based on the following notions which are in every way basic and every other concept can be associated with one or more of these notions as follow.

- Space
- Time
- Motion
- Mass
- Energy
- Charge
- Geometry

#### • Interaction

These notions cannot be precisely defined using independent terms or acuties. Consequently, respective analytical expressions remain axiomatically interrelated.

### 5. State-of-Nothingness and Lethargy

*There must be a source of anything and everything that comes into being and that source must not depend on anything else and at the same time must be present at all times before and after anything comes into being.* This is the *state-of-nothingness* which is present at all times as the source of everything, obeying the principle of causality while itself being without any matter or even space [1].

On the other hand, the concept of *lethargy* ( $L_e = m/c^2$ ) as **also** ( $E = L_e * c^4$ ) with usual notations, in synergy with the concept of energy, accounts for the equivalent total of rest mass, kinetic energy and all other forms of energy or energy-equivalent of a particle or a group of particles, elementary or composite, as well as of any object in the macro domain even extending to an entire galaxy, coupled with electric and magnetic constants of space [1]. While being a physical quantity and having a unit of measurement, it is essentially transcendental in nature, residing in the state-of-nothingness and having no physical form, however, appearing in space associated with, starting from a single quantum particle through the entire macro domain, any system that may be conceived with an arbitrary boundary amounting to an enclave as a whole. As an aside, it is akin to considering *happiness* as transcendental while metamorphosing into a *happy child* as only physical.

*The concept of lethargy may be prudently applied in cases of particle-to-particle interaction and for interfacing of a particle or a system of particles with space.*

### 6. Space, Time and Motion

Motion implies moving from an initial to a final position over a spatial transverse, thereby needing the object in motion to withdraw completely from the initial position and go to the final position, thus anything undergoing motion must be *discrete and finite* only and by obeying the constituent principle it must be having a non-zero positive appearance down to the quantum domain [1] [2].

Space provides *separation* only allowing motion to take place inside it in the foregoing manner, and consequently it has to be a continuum having no constituents and it must also be *transitional* in between transcendental and physical.

Time arises out of the *slowness factor*, which is the reciprocal of speed and since every motion must be slow enough not to become instantaneous, time therefore appears on the arena during every motion as a *temporal transverse* with a non-zero positive value.

This imparts both space and time to acquire quantum values, conveniently termed as *Planck length* ( $l_p$ ) and *Planck time* ( $t_p$ ), thereby leading to *Quantum slowness*

( $1/c$ ) and in turn to the ultimate luminal speed ( $c$ ) in the universe that can *neither be attained nor violated* based on the above analysis and consideration and as cited below.

With usual notations, we may write ( $d_s^2 = c^2 t^2 - x^2 - y^2 - z^2$ ), the identity satisfying the value of space ( $d_s$ ) at its limiting ends ( $d_s = 0$ ) and ( $d_s = ct$ ), collapsing into non-existence, but acquiring a non-zero positive value over its domain ( $0 < d_s < ct$ ).

*Therefore, as long as motion persists with less than the luminal speed, both the spatial transverse and its allied temporal transverse will continue with unabated values being contained entirely inside space, which in turn will ever remain engulfed within the state-of-nothingness, where both space and time do not exist.*

Another interesting phenomenon that appears here is that the co-ordinates ( $x, y, z$ ) may acquire a value ranging from ( $x_1, y_1, z_1$ ) to ( $x_n, y_n, z_n$ ) while ( $n$ ) may be any arbitrary large positive integer, there may be an infinite number of co-ordinates all satisfying the universal ( $d_s$ ) and each having its own version along its own co-ordinate. *This strange yet analytically possible fact may be interpreted as multiverse till infinity.*

## 7. Particles and Fields

Motion inside space may only be performed by species which are discrete and finite, hence called *particles*, and going by primitive notions, having mass and carrying momentum and energy from an initial to a final position over a spatial transverse along with a mandatory temporal transverse. Since all objects are in motion at all times and are bound by the principle of constituents, it follows that there are particles only inside space which are in continuous motion forming the universe as a whole.

Now, the space encompassing particles allows a similar set of species emanating from one particle and going to another mediating over a spatial transverse termed as *field*, having distinct properties at each and every location within the field, based on observation cum measurement over a test particle at that position. Moreover, by prudent mathematical simulation, at any arbitrary position within, *particle like properties* may be observed due to interceding of two or more fields having properties of their own at every location.

## 8. Creation of Particles

The state-of-nothingness being the solitary transcendental source, *two sensations of equal and opposite intensity*, may we christen them *ecstasy* and *apathy*, be spontaneously generated and appear mandatorily as two equal and opposite electric charges inside space since it can acclimate physical quantities only, following Euler's Identity ( $e^{i\pi} + 1 = 0$ ), and later on turning into the *particle and anti-particle pair* [1] [2].

Each *charge gets localized*, coupled with the permittivity and permeability of free space and taking into account a

linear dimension, setting in perpetual oscillatory transition between electric and magnetic energy like a resistance free LC circuit giving rise to an intrinsic angular frequency and spin angular momentum in union with an intrinsic linear dimension inside the localized space, which create the elementary particle and anti-particle pair having mass, as an extended version of space unlike a point.

Since the charges are in opposite phases, the particles with half-integer spin (asymmetric) named as Fermi-particles as *electron* and *positron* are only created in this manner, so they may occupy distinct spaces and endure as individual particles.

Each elementary particle so generated is with the quantum charge ( $e$ ), which is the minimum possible value to exist freely in space. Now there may be a possibility that the particle with the single charge gets split into more than one, in order to produce composite particles thereafter, albeit in a unique conscious manner, as described below.

Out of several possibilities it may be uniquely probable that the particle with unit charge ( $e$ ) may split into a pair of particles with charge ( $+2/3 e$ ) and ( $-1/3 e$ ) each named as a *quark* in such a way that the charge differential still remains unity only, whereas three such pairs, may then get together to create two new composite particles, each comprising of three such elementary particles, like forming the three sides of a triangle allowing stability sans redundancy. *This triangular configuration with two similar and one dissimilar charge also causes the asymptotically-free oscillatory nature of their mutual attraction-repulsion, since when the distance between two dissimilar charges of each pair decreases, the resulting increased strength of their attraction is overcome by the counter effect of the increasing repulsive action between the two similar charges in view of their diminished separation, and vice versa.* The two new stable composite particles so created are called *proton* and *neutron* with the summation of charges of the constituent quarks for each equaling to unity and nil value respectively, thereby satisfying two only possibilities.

### 8.1. Matter and Antimatter Population

Each particle out of the pair of above spontaneously generated positive-negative particles inside space, in turn may produce, also spontaneously, most likely an arbitrary assortment or an extremely unlikely exact population of fractionally charged positive and negative particles as *quarks* and *antiquarks*, obeying the principle of equal probability, similar to the tossing of a fair coin. While this may or may not be true even in the very long run, there is a fair possibility that over any particular interval, any one variety may appear in sufficient enough excess, causing an imbalance, to be immediately followed by the indispensable annihilation process, thereby creating a perpetual imbalance in favor of any one kind of particle only, resulting in an *enduring baryon asymmetry*.

The consequent process of turning into matter or antimatter is also a spontaneous process, with *equal probability* in order to create proton-neutron or their antiparticles. Most interestingly, there is a rational possibility that this may take place in any arbitrary zone inside the universe, with no

specific zone being preferred, and thus we may fairly assume that this may happen beyond our observable universe. This assumption therefore, bares open the possibility of the existence of another distant zone of the universe entirely composed of antimatter particles, which may one day be experimentally observed.

## 8.2. Creation of Photons and Gluons

Since all elementary particles are essentially charge carriers only, they remain mandatorily in constant motion in space in view of space having the unique properties of permittivity and permeability [1] [2], and so they will also interact with one another and in the only way possible, which is by exchanging mediating particles carrying energy and momentum from one particle to the other.

As each such elementary particle undergoes a motion, travelling from a higher energy state to a lower one, the differential amount of energy gets *dispersed as lethargy*, which in turn gives rise to the creation of another set of particles. This new particle, named as *photon*, being deprived of any electric charge must be neutral, and being uniquely created it must be a Bose-particle with integer spin (symmetric). Moreover, this particle will be created inside space but outside of the mother particle, and so it will undertake motion independent of the speed of the mother particle and will find its own way through space with a frequency in compliance with the usual notations ( $E = h\nu$ ).

Similarly, since all quarks in motion also disperse energy in the form of lethargy, another set of Bose-particles, named *gluon* will be created in the same way as photons, however, they must remain confined within the environment of the fractional charge carrier quark, having been generated therein, and cannot exist outside of it. These new set of particles will, therefore, mediate between and among the quark particles carrying energy and momentum thereby causing interaction among quarks.

## 8.3. Creation of Composite Particles

Elementary particles so created inside space, out of the state-of-nothingness, would further combine spontaneously to form composite particles, following the route of possibility-probability-causal symmetry and consciousness. Now in whichever way the particles tend to form composite particles, they must remain in constant motion while tending to remain together also. So, they resort to orbital motion instead of translatory motion to satisfy the condition, in a conscious manner only. The pioneering way would be to create Hydrogen atom, with one electron moving around a single proton, and this trend would continue to create more composite particles as molecules.

Therefore, our universe has been found to contain plentiful of Hydrogen atoms while all other atoms and molecules have come into existence through myriads of other natural phenomena following the similar route over billions of years.

***A simple experiment may be carried out by taking a large enclosed vessel and making it fully empty of all matter and keeping it free of radiation; then over a period of time traces of Hydrogen would be found inside the space grown spontaneously.***

## 9. Charge at Rest and in Motion

An electric charge and a magnet have similar fundamental characteristics that two like charges or poles repel each other while the unlike ones attract one another. When a charge is at rest, its influence is in the form of a sphere surrounding it, emanating radially outwards. When a charge is in motion, its influence traces out a cylinder, correspondingly radiating out in the form of great circles orthogonal to its line of motion, along diameters of the circles. This gives rise to the manifestation of the property of magnetism, and at any point on the circumference of any given circle, the influence starts from one end of the diameter going to the other end, thus causing *bi-polar magnetism*, which in its turn renders a magnetic monopole into an impossibility.

This simple concept lies at the heart all electric and magnetic phenomena, all their characteristics, their relative interaction, the respective fields and lines of action; even at the birth of electromagnetism due to varying strength of a charge in motion and varying speed of a moving magnet. On the other hand, both electric and magnetic fields have been prudently conceived purely for the convenient purpose of simulation only.

## 10. Interaction and Interfacing

All particles in motion inside space, move from a higher to a lower energy state, dispersing the differential energy as lethargy, which produces photons and in case of the environment of quarks produces gluons. These Bose-particles along with their own mass and carrying energy and momentum interact with other particles, as applicable, and by *giving out their entire mass-energy content as lethargy*, will add to the total lethargy of the particle it interacts with, thereby changing its state to a new one, commonly with a higher amount of kinetic energy.

This phenomenon is known as *interaction* and it is the common and the only cause of anything and everything that produces a change of state of both interacting particles including their motion prior to the phenomenon taking place. Rising from the quantum domain upwards, by virtue of superposition and correspondence, interaction plays its role in every sphere of nature, animate or inanimate it may be.

While the above kind of interaction, known as *electromagnetic interaction*, is the most common form of interaction, there are two other forms, known as *strong interaction* and *weak interaction* which come into play under specific circumstances only.

Quarks inside the nucleus of an atom interact with one other by strong interaction mediated by gluons in the same way as photons. The gluons are created by the energy dispersed by moving quarks and then gluons give out their lethargy onto other quarks causing the interaction thereby strongly binding the quarks inside the nucleus.

There is a possibility in some situations that one quark changes into another type of quark by releasing an amount of energy in the form of lethargy which at first produces an intermediate Bose-particle with an electric charge, as applicable, and finally the above intermediate particle will turn into a charged particle like electron and a neutral particle like neutrino. Similarly, an electron may also be captured by a quark along with a neutron emission from the nucleus. This is known as *weak interaction* only.

There are a number of variations depending on the types of particles which come into play e. g. W or Z particle, all such interaction happening with a unique consciousness that at all times *an exact equivalent amount of lethargy is dispersed* by the interacting particle to cater for the creation of the intermediary Bose-particle and/or another particle.

In addition, a particle or an assemblage of particles, by virtue of its total lethargy content may act upon the surrounding space encompassing it, in the form of *interfacing*, thereby causing no change of its own state except producing a change of its motion, that unique phenomenon being known as *gravitation*.

In the eye of General Relativity, space-time curvature created by a gravitating mass causes another nearby object in motion to follow the curvature thereby causing a change of its motion along the corresponding geodesic only. Now this can be sensibly interpreted in a way by re-writing the RHS of the conventional GR equation in the form of the ratio of the lethargy of the gravitating mass with the lethargy of Planck mass [3].

So, the right-hand side of the General Relativity equation, with usual notations, may be written as  $(8\pi G * (E/c^4))$  or in terms of lethargy as  $(8\pi G * L_e)$ , thus implying that spacetime curvature is caused by lethargy, and then by using notations of Planck length and Planck mass it may be written as  $(8\pi l_p * (L_e/L_{ep}))$ , thereby entailing that the ratio of the total amount of lethargy within the concerned volume of space and the lethargy equivalent of the Planck mass brings about the spacetime curvature as a linear multiplier of Planck length. So, we may infer that the phenomenon of gravitation does not manifest itself with a mass value below the Planck mass thereby *rendering the concept of quantum gravity as untenable* [3].

Therefore, spacetime curvature will be in tandem with lethargy of the gravitating masses instead of the more versatile mass-energy tensor, showing the way how in reality *each and every gravitational phenomenon is caused and may be explained in view of the increase in the values of permittivity and permeability of free space from their quantum values, simply due to the presence of lethargy of the gravitating masses inside space*.

The act of interfacing as above can also explain the motion

of both *bound and unbound system of masses*. In case of any bound system, like the electron moving around the nucleus or the planet around the star, the continued loss due to dispersal of energy during motion is compensated for by an equivalent amount of lethargy emanating out from the state-of-nothingness in view of the spacetime curvature produced by the electron in motion. The same is applicable in case of the planet circulating the star.

For an unbound particle or a system, energy dispersal due to motion causes loss of lethargy in a continued manner till it eventually loses its identity as a particle and all its lethargy content goes into the state-of-nothingness.

A single travelling photon or a neutrino, but not any other Bose-particle or any charged Fermi-particle, while drifting through space ultimately loses its entire amount of lethargy and disappears from inside space going into the state-of-nothingness.

*Therefore, our universe must be regarded as an open system only and its entropy shall never go on rising unobtrusively forever.*

## 11. Quantum Characteristics

We usually look down at the quantum domain by its sheer smallness compared to our human scale while ignoring the fact that we are even smaller in size in relation to the cosmological scale. Everything inside a domain should be evaluated by the relative sizes within the domain only, therefore, size does not matter at all when we are going to view the characteristics therein. Now the quantum realm is usually ascribed with a number of *special features* that are not found outside of it, as delineated in the following.

Quantum physics, by virtue of its quantum characteristics, mandatorily needing a discrete and finite particle possessing a *non-zero positive appearance* inside space in the physical form capable of undertaking motion across a spatial transverse coupled with an indispensable temporal transverse, negates the possibility of the existence of a physical point and any single or two-dimensional entity, except by approximation and vindicating a wave to be non-physical reducing it to be a mathematical simulation only.

Quantum *superposition* is a simulation of the original quantum object in any other or more than one place or along more than one co-ordinate axis, instead of considering it as a phenomenon that the same object persists in more than one location simultaneously.

Quantum *entanglement* is the result of two or more species being ever allied to one another *through the state-of-nothingness* as long as they are entangled, so responding to mutual co-relation in spite of the separation or the mode and sequence of observation.

Quantum *wave-particle duality* cited as causing quantum interference is in the true sense *wave-particle unity* [3] since the real particle along with other virtual particles formed due to its motion in space, constitutes a plane wave travelling with the particle.



Quantum *tunneling* occurs when a quantum particle loses its identity by losing all its lethargy to the state-of-nothingness, at the entrance of a potential barrier, and then it appears at the other end of the barrier as a particle gaining lethargy from the same source.

Quantum *uncertainty principle* is due to the quantum particle having a mass value lower than Planck mass as a result of which its position and momentum values are guided by the *quantum action* or Planck constant in absence of any exogenous effect upon it.

Thermodynamics predates quantum physics, therefore presently we may consider both the First and the Second law of thermodynamics being founded on the fundamental principle that *for any quantum action taking place, the amount of energy before and after the action may be fully accounted for, and that the action ever propagates from a higher to a non-zero lower energy level only*. Every concept of thermodynamics is based on this underlying principle, including the concept of entropy, and the unattainability of hundred percent efficiency and of absolute zero of temperature.

Another *sui generis* possibility may emerge out of an interaction of the quantum object with the environment, thereby *increasing its energy content to de rigueur* extent, in turn causing simultaneous *spontaneous replication* of the object in view of mandatory consciousness, rendering it as *animate* or citing it as a living object and thus terming it as having life imparted into it.

Reality is the outcome of an action or a series of actions, albeit we may or may not be able to observe and measure. It is the result of a physical or even a metaphysical feat and so *anything that we may conceive is real*, even if transcendental in nature and being physical yet partially within the ambit of observation, experimentation and measurement, in view of an inherent and intrinsic attribute, possibly simulated via mathematics alone.

*Tests have been proposed to vilify the connotation of wave-particle duality albeit to validate that in reality there is only wave-particle unity* [3].

## 12. No Dark Matter and No Dark Energy

**Dark matter** has been construed in view of the observed anomaly in peripheral motion of galactic stars; whereas the galaxy may be viewed as a *bound system* generating extreme spacetime curvature thereby gaining *lethargy* out of the state-of-nothingness, compensating the seeming loss, thus rendering the need of dark matter as superfluous.

**Dark energy** has been conceived on account of the observed galactic expansion, however, galaxies being huge *bound systems* possessing humongous amount of *lethargy* generate enormous spacetime curvature causing own motion away from nearby galaxies, without the proviso of the presence of any fanatical dark energy within space.

*A computer simulation may be carried out to justify both above considerations.*

## 13. Event Horizon and Blackhole

The concocted notion of an *event horizon* has been commissioned from the perceived behavior of light rays not being able to emerge out of a conceived blackhole.

In fact, when a simple piece of stone is thrown out in the air and it comes down on the ground after ensuing a parabolic path, it demonstrates its own event horizon commensurate with its initial speed versus the gravitational pull of the earth. As the stone rises upwards, the lethargy associated with it on account of its mass and kinetic energy allows it to penetrate the imagined event horizons formed around the earth's surface at increasing altitudes corresponding to increasing speeds, till it rises to the level when the spacetime curvature commensurate with the remaining lethargy associated with it harmonizes with the spacetime curvature forming the event horizon around the earth at that altitude, preventing it from rising any further and then commencing its coming down following a path which complements the spacetime curvature caused due to its retained lethargy with the event horizon of the earth at every level.

A *blackhole* is a conceived piece of cosmological mass having an extremely high gravitational pull thereby having formed an event horizon around it such that a photon travelling out of the cosmological body finds the spacetime curvature caused by its speed matching with the curvature at the event horizon, and therefore, the light ray returns from that level same way the piece of stone thrown up comes down to the earth's surface.

A blackhole is also conceived to possess a *singularity* at its center, whereas in reality all the particles travelling towards its center completely lose their lethargy and their identities as particles, thereby going into the state-of-nothingness, and so eventually the blackhole will go into oblivion, all electric charges being mutually neutralized.

## 14. GR, Roy Chowdhury Equation and Mini Bang

General Relativity (GR) and Roy Chowdhury equation both deal with moving particles in space towards or away from a node, thereby suggesting conceivably somewhat similar like a bang earlier or later; while the scenario remains analogous when we replace particles with galaxies. Taking into consideration the spontaneous creation cum evolution from the micro to the present macro state, out of the state-of-nothingness, we may infer that instead of a fictive universal big bang, a localized *mini bang* only may have occurred at some point of time in the past and may happen again in some distant future, within our observable universe. Such a galactic crunch would produce cosmic microwave

background radiation also, analogous to what is being observed now, leading to its confirmation.

## 15. Quantum Entities and Universal Constants

Humans perceive and comprehend nature in terms of a set of transcendental and physical attributes prudently articulated as parameters, conveniently simulated by means of mathematics into symbols, formulae and equations, allowing mathematical operations to be performed, resulting into further derived concepts, which may become predictive.

At the heart of this rests a set of *quantum entities* with algebraic symbols and expressions which are interrelated in such a way that their precise values are dependent only upon the analytical relationships among themselves while their individual numerical values may be expressed depending upon the metrics and units of measurement often by experiments alone; true magnitudes of their values ever remaining unfeasible.

They cater to fundamental concepts and primitive notions, appearing as universal constants of nature. Several attempts have been made in order to verify if such constants have truly retained their numerical values over billions of years, however, such efforts turn out to be futile as these constants are never independent ones.

Starting with all seven fundamental or base units of measurement, and taking into consideration operating definitions thereof, every physical quantity can be asseverated directly or indirectly as a multiple of or as a combination of the values of these quantum entities. So we may consider that our entire physical universe from the micro state to the macroscopic scale is founded on and bound by such quantum entities only.

The quantum state of matter is characterized by quantum values of action, space, time, slowness factor and the quantum gravitational mass along with the gravitational constant, being inter-related same as primitive notions are bound by circular definitions only, and therefore their respective quantitative values cannot be independently derived by any precise analytical formulation except that their relative values are arrogated by the process of random natural selection through principles of symmetry, probability and possibility while their analytical relationship may be projected as follows:

- Quantum action ( $\hbar$ )
- Quantum slowness ( $1/c$ )
- Quantum space ( $l_p = \sqrt{\hbar G c}/c^2$ )
- Quantum time ( $t_p = \sqrt{\hbar G c}/c^3$ )
- Quantum gravitational mass ( $M_p = \sqrt{\hbar G c}/G$ )

Also stating the above entities in terms of permittivity ( $\epsilon$ ) and permeability ( $\mu$ ) of free space we may write as follows:

- Quantum action  $\hbar = (l_p M_p)/\sqrt{\epsilon\mu}$
- Gravitational constant  $G = (l_p/M_p)/(\epsilon\mu)$

- Quantum slowness  $1/c = \sqrt{\epsilon\mu}$

The above quantum entities are inter-related in terms of the respective values of ( $\hbar, G, c$ ) and then taking into account the value of ( $\alpha = 1/144$ ), we may bring the value of the elementary charge ( $e$ ) also under the same ambit and thereby find that the values of all such quantum entities are well appropriated accordingly.

### 15.1. Casimir Interaction

The strength of Casimir interaction ( $F_c$ ) between two uncharged parallel conducting plates each having area ( $A$ ) separated by a distance ( $d$ ) may be formulated as ( $F_c = \pi^2 \hbar c A / 240 d^4$ ), and then taking into account the strength of Coulomb's interaction ( $F_e$ ) between two electrons separated by the same distance as ( $F_e = e^2 / 4\pi\epsilon d^2$ ) and also the Fine structure constant ( $\alpha = e^2 / 4\pi\epsilon \hbar c$ ), all with usual notations, we may arrive at the expression ( $F_c/A = (\pi^2/240\alpha) * F_e/d^2$ ) and by putting in the corresponding numerical values, where applicable, we may finally derive the new relation ( $F_c/A = 5.63 * F_e/d^2$ ).

Now irrespective of the nature of original derivation of the formula for ( $F_c$ ) as above, which agrees with the experimental value, and therefore may be taken as true, we arrive at the above relationship, which states that the value of the stress due to Casimir interaction is a constant positive multiple of the value of the stress due to Coulomb's interaction caused by two electrons separated by a distance ( $d$ ) and over a square area of side ( $d$ ) only. Since Coulomb's interaction is caused by mediating photons radiating out from the electrons in all possible directions; and when the distance between the plates is exceedingly small, we may consider that the photons are concentrated over the above small square area only resulting in the corresponding stress value; and therefore we may infer that *Casimir interaction is truly a manifestation of Coulomb's interaction* only as and when the two parallel plates are in extreme proximity of each other.

Furthermore, taking into account the Fine structure constant as the ratio between two energies e.g. the energy that is needed to overcome the Coulomb's repulsion between two electrons separated by a distance ( $d$ ), and the energy of a single photon of reduced (or angular) wavelength ( $d$ ), which is applicable for an extremely small value of ( $d$ ) only as in this case, and trivializing the remaining numerical factor in the above expression, we once again come to the forgoing conclusion that Casimir interaction is a manifestation of Coulomb's interaction caused by mediating photons between two electrons which are placed extremely closely apart.

This observation, on the other hand, may vindicate the hypothesis that the photons radiating out of each one electron will enter into the state-of-nothingness by transferring all their lethargy to the other interacting electron thus creating a decrease in energy potential across the intervening space between the two electrons, thereby causing the attractive nature of the Casimir interaction in the first place, while the same interaction between the electrons would become repulsive in nature as long as the plates are kept at a larger

distance of one another.

### 15.2. Fine Structure Constant

Starting with the analytical relations ( $\alpha = e^2/4\pi\epsilon\hbar c$ ) and ( $M_p = \sqrt{\hbar c/G}$ ) with usual notations, the Fine structure constant may be viewed as the ratio of the strength of Coulomb's interaction between two elementary charges and the strength of Gravitational attraction between two masses each equal to Planck mass over the same distance ( $r$ ) as ( $\alpha = (e^2/4\pi\epsilon r^2)/(M_p^2 G/r^2)$ ).

Considering that only an *integer multiple* of the elementary charge will satisfy the relationship exactly, and then taking a cue from its experimental value, we may arrive at the theoretically pertinent value ( $\alpha = 1/144$ ), which may be regarded as the value observed at an infinite distance away or in the limit of zero momentum transfer, while the experimental value, measured higher, should be due to higher energy levels only.

Similarly, by expressing the above constant also as the ratio ( $\alpha = e^2/q_p^2$ ) we may deduce that the Planck charge ( $q_p$ ) is equal to 12 times the value of the elementary charge. Now in order to accommodate and account for 12 elementary charges together freely available in nature while requiring them to be mandatorily in motion, we may conceive them first to be in a fictive alignment along the 3 independent mutually orthogonal spatial axes, thereby 4 being in one axis appearing as 2 pairs along each axis, out of them in one pair two charges to be in mutually opposing axial rotation and in another pair in mutually opposing orbital motion; thereby accounting for 12 charges.

This configuration is conceived only to ascertain a physically tenable scenario in relation to the above theoretically appropriate value of ( $\alpha$ ) and in consideration thereof.

## 16. On the Gravitational Wave Scenario

Gravitational wave is a quasi-misnomer being not a wave albeit having truly a gravitational origin. Whenever a cosmological entity of enormously high mass value along with the kinetic and other forms of energy associated with it, thereby epitomizing a source of gigantic amount of *lethargy*, interfaces with space, it causes extreme spacetime curvature, like every other source of gravitation, however, being of a colossal scale the effect is spread over a very large distance and for a very long time, dying out eventually at a distant location in space away from the source. Consequently, the entire manifold coming under its purview will have the values of electric and magnetic constants higher than the corresponding quantum values in free space, starting from a significantly high differential fading over the vast spatial transverse.

In case of an accelerating source, a prudent mathematical simulation, as evident with GR, interprets the above scenario in the form of a gravitational wave propagating with the luminal speed and applicable frequency, carrying away energy and momentum, physically affecting all that lies in its

path. However, space being a transitional entity, in between transcendental and physical, having no constituents while being a continuum, cannot be squeezed or be altered in volume or shape in any manner physically. In reality, the permittivity and permeability values fluctuate from corresponding quantum values, thus affecting the luminal speed, altering and thereby causing interference of laser beams cutting across; thereupon being observed, measured and interpreted as a gravitational wave passing through the given region of space.

## 17. No to Theory of Everything

With our present-day enormous accumulation of knowledge about nature and our abundant acquaintance with its amazingly diverse laws and principles encompassing virtually every phenomenon that we may come across, we are quite logically tempted to believe in the existence and the eventual finding of one coherent, comprehensive and singular virtuously theoretical only podium by naming it as the *theory of everything*.

On the other hand, it is pure logic that cautions and counsels us and tells us that there *cannot be and must not be* a theory conceptualizing all-in-one mode, by virtue of the most basic nature of mother nature proffering equal opportunity to every possibility without any preference and for by definition theory being the philosophy behind every phenomenon. As a result, we should, instead of striving to get at the theory of everything, but based on the essential lucidity prevalent in nature, adhere to the mode of communal progression of events that leads to the colossal number of diverse phenomena, which are not linked by any single interpretation or mathematical simulation or unique formulation.

May we therefore candidly concede, for every theory that explicates a phenomenon, *a given condition or state leads to another with seemingly limitless possibilities*.

## 18. Conclusions

The *state-of-nothingness* being the autonomous origin, encompassing all *space* and allowing all matter *particles* to be spontaneously generated within, and all *interactions* being mediated by particles only and in addition with the portent of *interfacing* of particles and space; the *carte du jour* is all-embracing for the universe in its bid to endure unabated. However, emanating from the classical point of view and followed up by purely analytical considerations, the elysian concept cum covenant of *fields* has become awfully dexterous. Thus the space intervening the particles has been conveniently and prudently simulated in terms of an arena having attributes, called properties, at any arbitrary location within, thereby calling for a reverse scenario, starting with the fields, purely on an axiomatic basis, and granting life to the particles as a result of mutual interbreeding alone.



Moreover, endeavors have been made to twitch with the one-dimensional *string* only or discrete spacetime iotas causing *foam*; flaunting superficial advantages in terms of mathematical analysis gaining substantial progress, whereas the singular vital feat in the universe, that is *motion*, prohibits lower than a three-dimensional relic to undergo kinesis and that discrete artefacts mandatorily exhibit intervening voids thus exposing space which it wished to swap in the first place.

We, as integral part of our universe are composed of *particles* only, created and perpetuated out of the state-of-nothingness, and wholly contained by it, within a spatial manifold being a continuum having no constituents, as a transitional entity in between transcendental and physical ones; being perpetually in spontaneous motion resulting in interaction and interfacing with other particles and space, thus creating the *fields* around, enduring in absolute harmony *without a melee*, aphoristically as an open system with no plausibility of having a beginning or an end while being eternally recycled following localized *mini-bangs* periodically over time, thereby initiating

consecutive destruction and reconstruction by religiously obeying identical principles and laws of nature founded on apodeictic simple logic simulated via mathematics.

---

## REFERENCES

- [1] Deb, K., On Fundamentals of Physical Science with Quantum State and Gravitation available at <http://article.sapub.org/10.5923.j.ijtmp.20150505.02.html>.
- [2] Deb, K., On Primitive Notions as Foundation of Physics available at <http://article.sapub.org/10.5923.j.ijtmp.20160604.03.html>.
- [3] Deb, K., A New look at Quantum domain and the Dual-slit adventure available at <http://article.sapub.org/10.5923.j.ijtmp.20201001.02.html>.
- [4] Hobson, A., There are no particles, there are only fields available at <http://dx.doi.org/10.1119/1.4789885>.