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Quantum geometrodynamics

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Abstract

In this paper we construct the whole of physics on the basis of three geometrical principles, namely, invariance of dimensionality, Lorentz invariant operators, and parity transformation. We call this scheme quantum geometrodynamics. We extract from the scheme the Nature's Blue Print (that is the basic ingredients from which all the furniture of the Universe are built); ipso facto we have constructed the theory of everything.

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1.0 Introduction

1.1 Background

Physics is concerned with the broad search for the basic knowledge about nature. This search encompasses four broad areas, namely, the structure of space and time, the structure of matter, the structure of energy and momentum, and the nature of the fundament interactions. Essentially from its early beginnings two methods of attack, namely, observation (experiment) and theory (mathematics) have been identified for this search. These two seemingly independent approaches actually reinforce each other; new experimental results demand refinements of an existing theory, and the refinements may require further experimental investigation. It has often been stated that progress in physics (nay, science) depends critically on symbiosis of experiment and theory. The views of physics which we wish to present here have sprung up from the fertile soils of experiment and geometry, and therein lies their strength.

1.2 Manifold

A fundamental concept of geometry is a "point". A point of an dimensional Manifold is described by its n co-ordinates (x_i), i = 1, 2, ..., n.

In physics, on the other hand, a fundamental concept is a "state". A Manifold point is a state of rest in physics; and for an n-dimensional Manifold it is described by the 2n quantities (x_i, $\bar{X}$), i = 1, 2, ..., n. Here x_i and $\bar{x}_i$ are connected by the parity operator P (recall Newton's third law).

In what follows we shall denote the n coordinates x_i of a point of an dimensional Manifold simply by (n) and the 2n coordinates of a state of rest by (n: $\tilde{n}$). We call this a dimensional description.

1.3 Motion

In geometry "motion" is described by a curve in a Manifold. A point on a curve in an n-dimensional Manifold is described by (x_i (t)), where t is a parameter.

In physics on the other hand we speak of a state of motion described conventionally for motion in an n-dimensional Manifold by (x_i (t), $\dot{x}_i(t)$). A state of motion in an $\bar{n}$ dimensional Manifold is thus described dimensionally by the 2n quantities (n, n).

It is clear from the foregoing that each of a state of rest and a state of motion is specified by a total of 2n linearly independent quantities. The number 2n is called the dimensionality of the physical process taking place in an dimensional Manifold. We achieve a higher level of abstraction if we note that the 2n quantities describing the state of a physical system are just the eigenvalues of certain 2n observables (dynamical variables).

Thus, Physics is concerned with the identification of the dynamical variables appropriate for a given physical system and the determination of the simultaneous eigenvalues of these observables.

2.0 Classical world models

There are a total of three universally accepted Classical World Models of the Universe, namely, Newtonian, Einsteinian, and Maxwellian World Models. These models describe the universe in terms of space, time, momentum and energy. All such models are called fundamental. In what follows we give in outline the basic structures of these models appropriate for a free particle in Hamiltonian variables.

2.1 Newtonian world

The Newtonian World Model was created in the 17C AD by Isaac Newton. Its basic structures are as follows:

2.1.1 Manifold

3-dimensional and Euclidean

2.1.2 State of motion

Determined by a total of eight dynamical variables $\{(q_i, p_i); (t, H)\}$, $i = 1, 2, 3$; a particular state of the system being determined by the simultaneous eigenvalues $\{(q_i', p_i'); (t', E')\}$ of these variables - here t' and E' are absolute quantities. The foregoing gives the conventional description of the state of motion of a Newtonian particle. The state of rest of the particle is defined by Newton's third law of motion.

2.1.3 Geometrical description

State of motion {(3,3);2}, and state of rest $\{3:\overline{3};2\}$.

2.2 Einsteinian world

2.2.1 Manifold

4-dimensional and pseudoeuclidean (Minkowski Manifold).

2.2.2 Conventional description

State of motion $\left(p^{\mu}, x^{\mu}\right)$, $\mu = 0, 1, 2, 3$. The state of rest is simply referred to as the rest frame, and is not the same as the parity generated absolute state of rest.

2.2.3 Geometrical description

State of motion (4,4), and state of rest $(4:\overline{4})$. Here the time is non-negative.

Einstein's unification of space and time and of energy and momentum through relativity is certainly one of the greatest intellectual achievements in physics. This achievement, one of the triumphs of modem science, has had a profound effect in the development of electromagnetism, quantum field theory, and particle physics.

2.3 Maxwellian world

In the 19C AD James Clark Maxwell unified electricity and magnetism by showing that they are just two different manifestations of a single interaction called electromagnetism. The basic variables of Maxwell's theory were electric and magnetic fields. After Einstein's work, however, it became possible to describe electromagnetism in terms of fundamental (Einstein - type) variables:

2.3.1 Manifold

4-dimensional and pseudoeuclidean.

2.3.2 Conventional description

State of motion $\left(p^{\mu}, A^{\mu}\right)$

2.3.4 Geometrical description

State of motion (4,4); there is no state of rest for a massless classical particle.

2.4 Summary

The three Classical Models of Newton, Einstein, and Maxwell have something in common. According to these Models, geometrically a state of a free classical system is represented by a point in an 8-dimensional manifold: In the Newtonian World a point of the Manifold is determined by the intersection of three submanifolds, while in the Einstein and Maxwell Worlds a point of the Manifold is determined by the intersection of two submanifolds. In particular we note that the World (described by n) and Antiworld (described by $\overline{n}$) of the state of rest are parity symmetric.

From the foregoing we deduce the following important conclusion. The dimensionality of all free classical particle processes is eight, and the geometry is either Euclidean or pseudoeuclidean.

3.0 Microscopic world models

The geometrization scenario of classical physics was rendered impotent in quantum mechanics by the uncertainty principle of Heisenberg. The uncertainty principle forbids simultaneous determination of the eigenvalues of x^μ and p^μ. Consequently the concept of orbits of classical systems had to be abandoned. The

implication was that the state of motion of a free microsystem is not describable by a point in an 8-dimensional manifold. The work of W. Pauli and others, however, gave a fillip to the geometrization scenario. They showed that the electron possesses internal degrees of freedom (intrinsic angular momentum) called spin. In 1928 P.A.M. Dirac showed that the states of motion of an electron are determined by Einstein-type variables! We call this Dirac (fermion) World Model of the Universe.

3.1 Dirac world

3.1.1 Manifold

4-dimensional and pseudoeuclidean.

3.1.2 Conventional description

State of motion: (p^μ, γ^μ), , where *y* are the Dirac Matrices; and state of rest: ($\bar{e}$: e^+).

3.1.3 Geometrical description

State of motion (4, 4); and state of rest: (2: $\bar{2}$).

The Dirac theory, one of the triumphs of modern science, has had profound effect on the developments of atomic physics. It shows that QED can be treated by analogy with classical radiation theory. In the classical case radiation may be interpreted geometrically as a transition from the Minkowski Manifold (x^μ) to the (p^μ, A^μ) Manifold of the Maxwell World. In the quantum case, on the other hand, it is seen to imply a transition from the Dirac Manifold (γ^μ) to the (p^μ, A^μ) Manifold of the Maxwell World. The outstanding problem therefore is the determination of the geometrical structure of the Dirac Manifold whose "points", like the Minkowski Manifold of the Einstein World, determine the states of rest of the Dirac World.

From the foregoing, the Dirac Manifold (α^μ) is the quantum analogue of the classical Minkowski Manifold (x^μ). Unlike the Minkowski Manifold which is described dimensionally by (4: $\bar{4}$), however, the Dirac Manifold is described by (2: $\bar{2}$). The Dirac's theory applies to the charged leptons only whereas the geometrical theory is more general, because it applies to both charged and neutral fermions. Consequently the Dirac theory is incomplete! To fix it, we note that consistency with the state of motion of an electron requires that the dimensionality of fermion's state of rest must be eight. Thus, the structure (2: $\bar{2}$) applies separately to the charged and neutral fermion's states, so that the state of rest of a Dirac particle is described geometrically by (2: $\bar{2}$; 2: $\bar{2}$). In other words the physical state of rest of a fermion is a many particle state which is the union of a charged and a neutral sub-manifolds. Experiments have confirmed this conclusion: The charged electron - positron pair has the electron neutrino- electron antineutrino pair as its neutral partner; and the proton-antiproton pair has the neutron-antineutron pair as its neutral partner.

The foregoing enables us to elevate the dimensionality scenario to a theorem applicable to classical free particles and fermions: The dimensionality of all free particle processes is eight, and the geometry is either Euclidean or pseudoeuclidean. The dimensionality theorem becomes a law of nature if it can be extended to non-fermion nuclear states.

3.2 Nuclear world

From the Dirac theory and the dimensionality theorem we deduce that fermions are 2-dimensional objects that reside in 2-dimensional "space". To determine the concrete nature of this "space", we need to enumerate the fundamental dynamical variables whose simultaneous eigenvalues determine fermion states.

As we have seen, the geometrization scenario applies to fermion systems as well. Thus, the states of the atom are describable in terms of the fundamental variables of Newton and Einstein. Because the atom is a bound system, we work entirely in spherical coordinates. We deduce from the Dirac solution that Newtonian type variables are best suited for the geometrical description of the fermion states. Consequently the fermion states are determined by the set of variables { $\vec{\lambda}$, (*t*, *H*)}, where $\vec{\lambda}$ is the Newtonian vector (orbital angular momentum). As is well known, $\vec{\lambda}$ is symmetric under parity transformation so that the particle and antiparticle states are determined by the same variables.

The absolute state of rest of the atom is determined by the vanishing of $\vec{\lambda}$ and so fermions there reside in (*t*, *H*) cosmic "plane". The uncertainty principle, however, forbids simultaneous determination of t and H, showing that the concept of phase space does not apply to the atom. We deduce from $\Delta t'\Delta E' = h$ the existence of discrete energy levels in the fermion states, with $\Delta t'$ the transition time between levels. There are a total of eight energy levels, four energy levels in each of the charged and neutral submanifolds of the absolute state of rest. For a classical system a state is determined by a point of an 8-dimensional manifold, while for a fermion system a state is determined by a set of eight discrete energy eigenvalues there being an infinite number of each type of these states. The conclusion to be drawn from the foregoing is that in the limit $\vec{p} \to 0$ the Newtonian World goes over into the Dirac World.

$$\left(3:\overline{3},2\right) \xrightarrow{\bar{p}\to 0} \left(2:\overline{2},2:\overline{2}\right) \tag{3.1}$$

A pertinent question that arises is this: what world replaces the Einsteinian World in the limit $p \to 0$? As before it is instructive to introduce an angular momentum operator ($\overline{\alpha}$) defined in terms of the Einsteinian variables x^{μ} and p^{μ}:

$$\overline{\alpha} = \hat{x}p^o - x^o\hat{p}. \tag{3.2}$$

Note that $\overline{\alpha}$ is asymmetric under the parity transformation. The vector operator $\overline{\alpha}$ has some interesting properties 1′. When $\vec{p} = 0$ the Einsteinian World – Antiworld state is determined by a total of eight eigenvalues, one energy and three space eigenvalues in each of its World and Antiworld, and so the dimensionality of the associated absolute state of rest is 8 as well. Asymmetry under parity admits a single asymmetrical geometrical structure $\left(1:\overline{3},3:\overline{1}\right)$. Thus, in the limit 0 the Einsteinian World goes over into a new world:

$$\left(4:\overline{4}\right) \xrightarrow{\bar{p}\to 0} \left(1:\overline{3},3:\overline{1}\right) \tag{3.3}$$

By direct analogy to Newtonian and Dirac Worlds we conclude that the Einsteinian absolute state of rest is inhabited by bosons (of spins zero and one). Appropriate appeal to experimental results shows that the associated fundamental particles are photons (γ), w^-, w^+, z^o. There exists therefore a boson world described as follows [2].

3.2.1 Boson world

3.2.1.1 Manifold

4-dimensional and pseudoeuclidean.

3.2.1.2 Conventional description

State of motion: $\left(A_b^{\mu},\ \gamma_b^{\mu}\right)$, where $A_b^{\mu}, \gamma_b^{\mu}$ are the bosonic 4-operator, and state of rest: (γ :w^-;w^+ :z^0)

3.3.1.3 Geometrical description

State of motion: (4, 4) and state of rest $\left(1:\overline{3},3:\overline{1}\right)$.

If we assume invariance of dimensionality to be a law of nature one can construct a third nuclear state described geometrically by $\left(2 \oplus 3:\overline{3}\right)\left(or\ \left(3:\overline{3}\oplus\overline{2}\right)\right)$, called fermion – boson World. As can easily be seen, the fermion-boson World is characterized by an asymmetrical geometrical structure. It’s associated dynamical variables is a set of eight matrices, four 6x6 matrices and four 2 × 2 matrices, which cannot be reduced to a set of eight 4 × 4 matrices. This irreducibility implies that the fermion-boson state has no discernable geometry. Such a state is unstable [3]. Because fermions come in two different charged states only a neutral W particle can reside in this World. Thus, the inhabitants of the fermion-boson World are the nucleons, W^o and $\overline{W}^o$.

We have thus seen that the absolute states of rest of the atom are described geometrically by the primitive structures $\left(2:\overline{2},2:\overline{2}\right)$ for fermions, $\left(1:\overline{3},3:\overline{1}\right)$ for bosons, and $\left(2 \oplus 3:\overline{3}\right)or\ \left(3:\overline{3}\oplus\overline{2}\right)$ for fermion-bosons. These distinct basic geometrical structures may be regarded as Nature’s Design similar to architect’s (or engineers) design for a project. To determine the concrete states of the atom we merely “install” the fermions and bosons (fundamental particles) as appropriate, which serve as Nature’s “building blocks”, in the structure. The fundamental particles are themselves characterized by a total of five fundamental parameters, namely, c, e, e_g, h, h' ($h' = 10^9h$), where e_g is the gravitational charge [4] and h' is the strong interaction constant [3], which serve as Nature’s “building materials”. The geometrical design, “building blocks”, and “building materials’ constitute Nature’s Blue Print for the Universe.

3.3 Absolute states of rest

In this sub-section we enumerate the absolute states of rest of the atom.

3.3.1 Nuclear states

Nucleon state: $\left(P:\overline{P},\ n:\overline{n}\right)$ (3.4)

Boson state: $\left(\gamma : w^{-}, w^{+} : z^{0}\right)$ (3.5)

Fermion—boson state: There are two distinct states.

Charged state: $\left(P \oplus W^{0} : \overline{W}^{0}\right)$, *and* $\left(W^{0} : \overline{W}^{0} \oplus \overline{P}\right)$, (3.6)

Neutral state: $\left(n \oplus W^{0} : \overline{W}^{0}\right)$, *and* $\left(W^{0} : \overline{W}^{0} \oplus \overline{n}\right)$, (3.7)

3.3.2 Lepton states

There are three charged nuclear states, namely, states (3.4), (3.5), and (3.6) which give a total of +3*e* and -3*e* electric charge in the sub-world and anti sub-world of the nuclear manifold respectively. The atom,

which is the union of the Dirac World of the leptons and the nuclear World, must be electrically neutral. It follows that there must necessarily exist three lepton states; and with due reference to experimental results, these states are:

$$\left(e^{-} : e^{+}, \nu_{e} : \overline{\nu}_{e}\right); \left(\mu^{-} : \mu^{+}, \nu_{\mu} : \overline{\nu}_{\mu}\right); \left(\tau^{-} : \tau^{+}; \nu_{\tau} : \overline{\nu}_{\tau}\right). \quad (3.8)$$

These lepton states are stable, hence neutrino oscillations cannot occur.

All the particles enumerated in (3.4), (3.5), (3.6), (3.7) and (3.8) have been discovered. It is to be noted, however, that both the mass of the neutrino and the place of the neutrino in the formal theoretical framework had hitherto not been established. The primitive geometrical structure $\left(2 : \overline{2}, 2 : \overline{2}\right)$ and the associated states (3.8) have resolved these problems [5, 6]. The dimensionality invariance scenario has further been used to deduce the periodic table of the chemical and antichemical elements [7]. The formal periodic table shows that there is no asymmetry between matter and antimatter.

It is pretty clear from the primitive structure $\left(1 : \overline{3}, 3 : \overline{1}\right)$ and the state (3.5) that the Ws are space-like particles and γ and z^{0} are monopoles. These same particles also featured in the so called electroweak theory. The electroweak theory assumes that the *z*°, instead of the $W^{0}S$, mediates neutral current events, and hypothesizes the existence of an auxiliary object known as the Higgs particle! The *z*° is the so called Higgs particle because it plays the same role prescribed for the Higgs [4]. The incompleteness of the electroweak theory has had terrible consequences.

The states (3.6) and (3.7) are unstable because, as has been noted, it is impossible to reduce the geometrical structure $\left(2 \oplus 3 : \overline{3}\right)\left(\left(3 : \overline{3} \oplus \overline{2}\right)\right)$ to either the fermion or boson structure. These states cannot survive - they are annihilated via strong nuclear interaction which involves the *W*°*S* and *p* or *n*. Baryon Baryon resonances and mesons are the byproducts of strong nuclear interactions [3]. Baryon resonances predicted by our theory were discovered in 2007 [8]. The unavoidable conclusion to be drawn from our analyses is that dimensionality invariance is a law of Nature.

As is well known, the photon is the quantum of electromagnetism. We now know that the *z*° is the quantum of gravitation [4] and the charged *W* particles mediate weak and the neutral Ws strong nuclear interactions. The boson absolute state of rest (3.5) is thus seen to be a synthesis of all four interactions into a single cosmic force in the sense that all four forces have a common origin. As P^{μ} increases (implying increase in entropy) this cosmic force breaks up into the familiar universal forces of gravitation, electromagnetism, weak and strong nuclear forces. We have here a completely different picture of the universe from that postulated by the so called Big Bang scenario!

4.0 Quantum dynamics

4.1.1 4-Operators and field equations

Newton's theory of classical mechanics is a universal mathematical scheme for the determination of the states of a classical dynamical system — it is a prescription for the determination of the simultaneous eigenvalues of the eight linearly independent dynamical variables that characterize each of these systems. There does not exist a similar universal mathematical scheme for the states of dynamical systems describable in terms of Einstein — type variables, which we shall call 4-operators. Our aim here is to present such a scheme.

4-operators are of three distinct types, namely, 4-coordiante $\left(X^{\mu}\right)$, 4-momentum $\left(P^{\mu}\right)$, and 4-spin $\left(\gamma^{\mu}\right)$. An example of 4-spin 4-operators is the set of Dirac matrices. We shall work entirely in a space-time background (coordinate representation), consequently we deal with only two distinct types of 4-operators, 4-momentum and 4-spin. These 4-operators reside in Dirac-Nduka quantum space.

4-operators are subject to the same algebraic axioms as Hubert space operators except that only 4-operators of the same type can be added together. 4-operators, however, have the additional property in that Lorentz invariant scalar operators can be constructed from them. A pair of 4-operators P^{μ}, γ^{μ} that satisfy,

$$P_{\mu}P^{\mu} = m^2, \gamma_{\mu}\gamma^{\mu} = 4 \qquad (4.1)$$

are called fermion 4-operators, and those that satisfy,

$$P_{\mu}P^{\mu} = 0, \gamma_{\mu}\gamma^{\mu} = 0 \qquad (4.2)$$

are called boson 4-operators[2]. Fermions are called time-like and bosons null particles on account of (4.1) and (4.2) respectively.

As we have seen, electromagnetic (Maxwell) systems are endowed with a pair of 4-operators $\left(P^{\mu}, A^{\mu}\right)$, and fermion (Dirac) systems with 4-operators $\left(P^{\mu}, \gamma^{\mu}\right)$. We add here that gravitation systems are endowed with 4-operators $\left(P^{\mu}, A_g^{\mu}\right)$, where $A_g^{\mu} = (\psi, 0)$ and $\left(A^{\mu}, \gamma^{l\mu}\right)\left(\left(A_g^{\mu}, \gamma^{ll\mu}\right)\right)$, are 4-operator for charged (neutral) weakly interacting atomic systems. Strongly interacting nuclear systems are not described by such a pair, as has been noted [3].

Let the system be endowed with a pair of 4-operators. Then, consistent with the invariant operator theorem [9], the system possesses an invariant (or Killing) operator $F\left(q^{\mu}, p^{\mu}, \lambda^{\mu}\right)$ and field equation.

$$F\left(q^{\mu}, p^{\mu}, \lambda^{\mu}\right)\left|\alpha'\right\rangle = 0 \qquad (4.3)$$

where $\left|\alpha'\right\rangle$ is a tensor product ket - that is a simultaneous eigenket for the eight dynamical variables that characterize the system. Equation (4.3) determines the system, free or interacting, completely and with absolute precision. Equation (4.3) coincides with the Schrodinger equation in the non-relativistic quantum domain. Thus, the well known theories of Newton (gravitation), Maxwell, Dirac, Schrodinger, and the unphysical theory of Klein - Gordon are special cases of (4.3). Equation (4.3) is therefore a unified field theory of the physical fields which are endowed with 4-operators.

4.2 The dimensionality theorem

We have constructed the whole of physics in terms of just three fundamental principles, namely, invariant operator theorem, dimensionality invariance, and parity transformation. We have not had to involve ourselves with such exotic and unphysical terms as virtual particles, vacuum polarization, renormalization, asymptotic freedom, TCP, etc. that decorated the old quantum field theory (QFT). The cheering news is that the infinities that plagued the old QFT, and the problems of the Standard Model have completely disappeared. We summarize this new physics in a fundamental theorem (dimensionality theorem):

***Theorem* 4.1**

The dimensionality of all relativistic physical processes (free or interacting) is eight. The system is stable if the geometry is pseudoeuclidean, and unstable otherwise.

We note here that physical interaction in the relativistic theory is interpreted mathematically as a sum of 4-operators. It is therefore incorrect to say that physical interaction involves exchange of particles as is claimed in the old QFT! In the classical theory interaction does not change the dimensionality either, but it is not mathematically equivalent to the sum of 3-operators. Therein lies a clear distinction between classical and relativistic systems.

4.3 QGD, Newton, and Einstein theories

It has often been claimed that Newton's theory is an accurate approximation of Einstein's theory in the limit of small velocities. It is true that the Lorentz transformation coincides with the Galilean transformation, and Einstein's mass-energy relation agrees with Newton's familiar expression for kinetic energy in the limit of low velocities. These elements are, however, peripherals of these theories. QGD asserts that these two theories do not even agree in the absolute World of rest. They are two independent pictures of the Universe.

The Newtonian picture asserts that the states of a classical non-relativistic system are determined by the simultaneous eigenvalues of the set of dynamical variables $\{(q_i, p_i), (t, H)\}$ and gives a prescription (Newton's Laws) for the determination of the states. Einstein created an independent picture by which the states of a relativistic system are determined by the simultaneous eigenvalues of a pair of 4-operators, but did not prescribe a scheme for the determination of these states. This defect in Einstein's work has now been rectified by the QGD.

4.4 QGD and the Quark Model

Experimental physicists have established that there exist two distinct groups of fundamental particles in Nature conventionally called fermions and bosons. Fermions are of two types, namely, leptons and nucleons, which have the same basic structure, but differ only because of their mass and coupling constants. Similarly the two types of bosons, mesons and the so called intermediate vector bosons, have the same basic structure but differ in their masses and coupling constants.

According to the quark model the **heavier** nucleons are composite while the **lighter** leptons are fundamental. The opposite is the case for bosons where the **heavier** intermediate vector bosons are fundamental while the lighter mesons are composite. Would it be reasonable to state that our world's heaviest man (e.g. a Japanese **Sumo** wrester) is **composite** while the World's smallest man that has the same basic structure (e.g. a Pygmy) is fundamental?

Further, contrary to the claim of the quarkists, the discovery of quarks to date has been inferential (that is discovering a particle by construction): The J/ψ particle is **assumed** to contain a **c** quark, the upsilon particle is **assumed** to contain a b quark, etc. We note, however, that no experiment whatsoever can establish that nucleons and mesons are composite.

On the formal theoretical plane, QGD asserts that all of physics is describable in terms of a total of 20 dynamical variables and 5 fundamental constants. A complete description of any particular physical process involves only 8 of these variables. Which dynamical variables characterize the quark world, and what geometry applies to the quark manifold?

According to Gell-Mann and Zweig, the creators of the quark idea, quarks had to be mathematical, a convenient rubric for organizing baryons and mesons. Quarks in fact play a role in particle physics similar to that of dummy variables in the calculus, and complex operators in quantum mechanics - they are not real and do not exist.

4.5 QGD and Large Scale behaviour of the universe

The dynamical variables that account for the large scale behaviour of the universe, according to QGD, are, $\vec{\lambda}, \vec{\alpha}, S$ (Entropy), and G (Geometry). A number of important consequences derive from this assertion.

Firstly, the thermodynamic constraint $\Delta S > 0$, implies that the entropy of the universe was a minimum at the beginning of the universe. Consequently the "big bang" scenario could not have been the origin of the universe because for it $\Delta S < 0$. QGD has thus confirmed Eddington's conjecture that primordial matter began at rest, and was then nudged out of equilibrium by cosmic processes - Eddington's cosmic processes are just strong nuclear interactions.

Secondly, if we admit, as is conventionally assumed, homogeneity and isotropy of the universe, we must have

$$d\vec{\lambda}/dt = 0, \quad d\vec{\alpha}/ds = \gamma\vec{p}, \quad d\vec{p}/dt = 0 \qquad (4.4)$$

It follows from (4.4) that the momentum and angular momentum of the universe are conserved. The universe is therefore either static or undergoes uniform translational and rotational motions. Accelerating universe implies a repudiation of the homogeneity and isotropy scenario. No experiment, however, is known to be in conflict with this scenario. Thus, the reported acceleration of the universe and the associated dark energy must be rejected.

Climate is defined as conditions of temperature, dryness, wind, light, etc. As far as we know, the dynamical variables which are responsible for climate change have not been identified. QGD asserts that climate change is driven by changes in $\vec{\alpha}, S$, and geometry (G). The change is said to be natural if it is driven by fermion-boson asymmetry and particle-antiparticle annihilation, and induced if it is driven by changes in $G(\Delta G)$. Abnormal climate change results from a combination of the two: fermion-boson asymmetry and ΔG drive changes in entropy (ΔS); ΔS drives $\Delta\vec{\alpha}$; and ΔS and $\Delta\vec{\alpha}$ combine to drive climate change — which may result in natural disasters (hurricanes, cyclones, typhoon, tornadoes, earthquakes, and global warming) [10].

References

[1] A. Nduka, Geometncal foundations for the invariant (absolute) operator theories of the fundamental processes, JNAMP, 11(2007).

[2[A. Nduka, Theories of the fundamental processes, (a Research Monograph), paper II, KK Integrated Systems Ltd., Owerri, Nigeria.

[3] A. Nduka, Theories of the fundamental processes, (a Research Monograph), paper Ill, KK Integrated Systems Ltd., Owerri, Nigeria.

[4] A. Nduka, Theories of the fundamental processes, (a Research Monograph), paper V, KK Integrated Systems Ltd., Owerri, Nigeria.

[5] A. Nduka, Neutrino Mass, JNAMP, 10(2006) 1-4.

[6] Physics World, September 2005, page 13.

[7] A. Nduka, Theories of the fundamental processes, (a Research Monograph), Paper V, KK Integrated Systems Ltd., Owerri, Nigeria.

[8] Physics News, February 2007, page 7.

[9] A. Nduka, Theories of the fundamental processes, (a Research Monograph), paper I, KK Integrated Systems Ltd., Owerri, Nigeria.

[10] A. Nduka, Quantum Geometrodynamics and Climate Change. October 2007 Mars Conference (to be published).