5-Dimensional Universe

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In search for assumption to address in this essay on "Questioning the Foundations", I googled internet, and found following prevailing philosophies of Newtonian era;

> ***Cartesianism*[1] (***French philosopher R. Descartes): The self-evidence of consciousness (Descartes' "I think, therefore I am"), as well as the theory of innate ideas, forms the starting point for Cartesian epistemology. Cartesian physics considered everything extended to be corporeal, thus rejecting the idea of empty space.*
> ***Copernicanism*[2]***: the fundamental theoretical basis of modern astronomy.*

The result of the search indicates; philosophers wishing to communicate conclusions had to search for right words. Not being one among mainstream physicists, I share the problem of communications. Some words used in my essay may have a different linguistic meaning. Let us begin with identifying these words;

- **Reality**: That which exists intuitively to humans. Examples being space, matter, pain, happiness. .
- **Identity**: Identity is measured reality. Examples are Length, Mass… Identity may share the name with the Reality and represent only part of the namesake. In such case, the total existential quantity of identity is Reality. Pain and happiness are not identities.
- **Measurement**: Measurement involves use of an identity as Unit of Measure, and magnitude assessment by comparison of another identity from same reality.
- **Physical Number Set**: It is subset of Numbers that can be used to express magnitude of a reality.
- **Konservation**: Conservation excluding neutralization. It is characteristic of reality that is carried over to its identity and reflects in its measurement.
- **Anti-Konservation**: Anti-dote of Konservation, that allows for change in magnitude of identity. It is characteristic of reality that is carried over to its identity.
- **Host Reality**: Related to a concept, It has no characteristic unrelated to concept. The concept defines the reality and vise-versa. Examples are Knergy is host reality to Konservation and Space to Anti-Konservation.

In this essay is about re-alignment of concepts of measurement, space and energy leading to 5-D view of the universe.

SUMMARY

Human inquisitive search for order led to evolution of abstractions on nature. These abstractions followed two paths. One set of abstractions concerned the changes that man can bring about. The other set being the changes in nature he can not control. Text *Descartes' "I think, therefore I am"* [3]– found in literature indicate the evolution of physics (Ordered Human Knowledge) from the first set of abstractions. Cartesianism upheld a mystic consistent dualism of two finite substances, extended substance (matter) and the thinking substance (mind). René Descartes revolutionized human thinking, linking Euclidean geometry and algebra using the Cartesian coordinate system. In era of Newton, the focus shifted from *Cartesian epistemology*[4] – concerned with the nature and scope (limitations) of knowledge to algebraic precision of Newtonian physics. The contemporary view of universe (existence of matter in 3-D space) is gift of philosophers of Newtonian Era. Newton's conception of the Universe based upon Natural and rationally understandable laws changed our thinking about nature. 'Matter in 3-D space' world view is now integrated into human intuition. Post Newton rationalization relates to definition of space from fluid to a void.

The most powerful abstraction is found in mathematics – Georg Cantor's set theory. It extended natural numbers to transfinite numbers. With this a rational and logical world is built around

numbers as objects in themselves.

Proposition I; It is proposed that only a subset of Transfinite (cardinals and ordinals) numbers can be used in quantitative measurements. We call it Physical Number Set.

Proposition II; To bring clarity to difference between realities like matter Vs Charge a concept 'KONSERVATION - conservation excluding neutralization' is proposed. It is proposed in conjunction with its antidote ANTI-KONSERVATION.

Proposition III; Space is host reality for ANTI-KONSERVATION and KNERGY (Matter) is proposed as reality of KONSERVATION.

Knergy as a natural element has two dimensions - absolute magnitude and chronological - sequential order (Intuitive Time). The product is the Knergy that does not change in magnitude. This translates human intuition 'matter in 3-D space" to "Space contains Knergy" as law of nature.

Proposition IV; Composite Universe has five Dimensions.

- Three continuously variable dimensions of Space
- One discretely variable magnitude
- Chronological dimension mapping onto one of space dimensions

The resulting 5-D universe is compatible with observations leading to postulates of special and general relativity, astronomical observations as well as fundamental laws of physics.

SUBJECT

Science acts as organized, communicable repository of human knowledge. Science is also a method to refine human intuition. By updating our knowledge about the universe, we change interpretation of observations that form base for human Intuition. Measurement is communicable part of science. In the expression for identity, reality is present as the unit while comparative magnitude as a number. The set of numbers that can participate in a measurement is physical number set - a subset of mathematical numbers. Discussion below is to understand the usability of numbers in measuring reality and identify the subset for use to express magnitude of reality.

The mathematical numbers are symbols that distinguish similar objects by labeling them. When the objects are repeatedly picked in same order, the labels attain additional meaning – the sequence of picking (the quantity picked). The label represents a set of picked objects. This gives us Counting numbers or Integers. In set theory, Ordinals (1^{st}, 2^{nd}, 3^{rd} . . .) are labels used for counting. Georg Cantor defined the cardinal and ordinal numbers and their arithmetic. There is a Empty/Null Set with no members. This set as an object is important in mathematics. When this is considered as valid for counting, the cardinality of an ordered set that include all ordinals up to N, is N+1. The inclusion of zero (Empty/Null Set) as a viable mathematical object enables indefinite extension of mathematical numbers (nominal number) using recursive logic.

Georg Cantor's set theory extends the mathematical numbers to include Transfinite numbers. Aleph-null, $\aleph_0$, is the first transfinite cardinal number of cardinality (ω-omega), of natural number set. The finite ordinals and cardinals are the natural numbers: 0, 1, 2, ….Whereas there is only one count-ably infinite cardinal, namely $\aleph_0$ itself, there are uncount-ably many countable infinite ordinals. The set of numbers representing a reality is

$$0,1,2,3,.....,n,..;\aleph_0,\aleph_1,\aleph_2,\aleph_3,.....\aleph_n,.....$$

The magnitude representing number is limited to one countable infinite cardinal number. In a set of identities representing the reality we have uncountable, positions for 'count-ably infinite'. Examples of ordinal ranges are;

0, 1, 2, 3, ...

ω, ω+1, ω+2, ω+3, ...

2ω, 2ω+1, 2ω+2, 2ω+3, ...

$\omega^2, \omega^2+1, \omega^2+2, \omega^2+3, \ldots\ldots\ldots$

$\omega^2+\omega, \omega^2+\omega+1, \omega^2+\omega+2, \omega^2+\omega+3, \ldots$

$\omega^{\omega}+\omega, \omega^{\omega}+\omega+1, \omega^{\omega}+\omega+2, \omega^{\omega}+\omega+3, \ldots\ldots\ldots \varepsilon_0$

An identity that does not exist can not be measured. Number Zero, The empty set can not be used in measurement. Its existence is limited to the realm of mathematics. The two sets below represent the same identity;

- Set Theory Set {ω+1, ω+2, ω+3, ω+4, ω+5, ω+6} of cardinality 6
- Physical Number Set {ω, ω, ω, ω, ω, ω} of cardinality 6

Among numbers representing a physical identity the following holds true;

$$\omega + n = \omega = n + \omega$$

$$\omega - n = \omega = -n + \omega \ldots\ldots(1)$$

Where; ω is number infinite and n counting number. Equation (1) can be read as;

When a reality can be measured to be infinite, it can be created (+n units) or consumed (-n units).

Unit of Measure

Substituting (1) in ordinal range, Physical Number set can be expressed as a set of uncountably infinite set of ordinal numbers;

{1ω^r, 2lω^r, 3lω^r, 4lω^r, 5lω^r, 6lω^r, ... }

The ordinal representing the identity is $nl\omega^r$. Here l (Lowercase L) is the level (1 to ω) of number range and r the infinite order (0 to ω). The infinite order and level of identity appears as a projection of reality on observer. In identifying the reality suitable for Unit of measure, lω^r is absorbed into unit of measure. An infinite order and level can be attributed to reality, and an identity measured by countable set of ordinals.

$$reality \equiv \{1,2,3,4 \ldots\ldots set.of.countin.numbers\}(l \in (set.counting.numbers))\omega^{set.of.counting.number}$$

The number 'Rulwr' selects the identity as a unit. The number used along with selectable unit of measurement to represent an identity in units of measure,

$\Re \in$ set of real numbers.

After accounting for translation of units as well as 'infinite order' of identity, we have *Physical Number Set as* set of real number:

$$n \in \Re \ldots\ldots\ldots\ldots set\_of\_real\_numbers$$

Realities can be distinguished from each other, by their infinite order. Examples: Reality of point (0 infinite order), line (1 infinite order), area (2 infinite order) and volume (3 infinite order) refer to projections of reality of space on observer. Some other realities with are; time (1 infinite order), energy (-1 infinite order), Knergy (0 infinite order) and speed (0 infinite order).

Observation & Measurement

Environment for Observation are set up, such that Cause and effect logic begins at the object and ends with a signal to human brain. Basic Observation[5] with binary result identifies the object. The result indicates the presence of object in magnitude greater than or equal to unit of observation.

Identification can also be construed from measurements;

- Positive observation is identified with object's measure of unit or more.
- Negative observation is identified with absence below unit of measure (Zero).

In this case, units used in observation and measurement are same. The units used in observation and measurement have differing primary purpose. Same unit may not be suitable or even available for both.

Physical Number Set

In case reality's magnitude is continuously variable in its identity, the unit of observation differs by at least one infinite order from unit of measure. Infinite order 1, defines two units one each for set (infinite order 0) and (infinite order 1). If unit of observation belongs to lower order set, the identity belongs to set of +ive order realities. If it is reverse, it belongs to set of –ive order realities. If both belong to same set as unit of measure it is reality with zero infinite order. Thus we have complete number range to represent magnitude of physical reality in identity as below; (Read: '$l\omega^r$' as L omega arr)

$\{l\omega^r, 2l\omega^r, 3l\omega^r, 4l\omega^r, 5l\omega^r, 6l\omega^r, \ldots\ldots\ldots.\}$ $r<0$

$\{1,2,3,4,5,6 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\}$ $r=0$

$\{l\omega^r, 2l\omega^r, 3l\omega^r, 4l\omega^r, 5l\omega^r, 6l\omega^r, \ldots\ldots\ldots\ldots\ldots\}$ $r>=1$

KNERGY

The word energy derives from Greek (energeia), appears for the first time in the work of Aristotle in the 4th century BCE. The concept of energy emerged out of the idea of living force. In 1802 lectures to the Royal Society, Thomas Young was the first to use the term "energy" as capacity to do work. "The product of the mass of a body into the square of its velocity may properly be termed its energy". Albert Einstein proposed mass–energy equivalence in 1905. This brings into question – energy and mass being same reality. There exists divergence on whether mass & energy are inter-convertible or inertia & gravity characteristics are directly attributable to energy. General relativity provides insight into inertia and gravity as result of space geometry, a result of presence of matter. This attribution of mass characteristic to space makes the energy-mass conversion view persist.

Energy has been variously defined over time, beginning with perception of briskness of earthling, capacity to do work to the reality identified with conservation.

Konservation

Energy is primarily a host to the conservation concept. Conservation defines energy and vice versa. The conservation concept has wide applicability and encompasses neutralization. However, all directed experiments to observe complimentary (-ive) energy has produced no result. It places energy squarely at par with matter. Matter too is without a complimentary matter (-ive matter) for neutralization. The statement "can neither be created nor destroyed (or neutralized)" is a valid for Matter & Energy alike.

To distinguish this conservation without neutralization, we give it new name Konservation. In addition we consider that it defines a new reality 'Knergy'.

Knergy: The three elements of Energy, Matter and Time are combined into the reality of Knergy- host reality of Konservation (Conservation without neutralization). Infinite can't be a measure of Knergy. If this is feasible, then creation and consumption is possible of Knergy.

Natural Quantization

Unit, identifies magnitude of reality to unity and can be defined as difference between two identities. We have a natural unit (minimum) for measuring Knergy. Knergy exists as integer multiple of this unit. If not, we can construe a unit, from difference with identity measuring to

infinity. The natural unit not only defines the minimum magnitude of Knergy, but also minimum difference between two Knergy identities. Existence of natural unit is attributed to Konservation. The measure of Identity

= N natural units (Counting Number/Infinite order 0/Natural Units)
= R units of Observation (Real Number/Order <> 0/Defined Units)
= R units of Measurement (Rational Number/Order = 0/Defined Units)

This natural quantization on Matter (Knergy) contents can be related to Plank's constant in uncertainty principle, photo electric effect, and laws governing formation and properties of mass particles.

Dimensions of Knergy

An object itself can be considered as identity of a composite reality. A reality may or may not be observable. An object may consist of multiple identities of which some are observable. Realities corresponding to identities composing the object are said to be parent realities of composite reality. Dimension is an observable parent of a reality. The object is said to have as many dimensions as number of such realities composing the object.

By definition, we have attached a Chronological dimension to Knergy. All identities of Knergy have infinite magnitude in chronological dimension. This is independent of quantity. By definition of Knergy (Host reality of Konservation), it has two parents;

- A chronological Dimension
- A magnitude Dimension

Chronological Dimension (Time)

Knergy exist unbound in Chronological dimension. In Chronological dimension it exists over the infinite interval.

Chronological Dimension = ω Chronological Units

Observing realities

ω Chronological dimension indicates that reality is not observable. For measurability, it is required that the magnitude remains firm during observation. With infinite magnitude, the measure is indefinite in units of measure as per (1) above. With this measure the reality can be created or consumed during observation, changing its magnitude. It is measurable through its identity 'Time'.

Time = t ω Chronological Units = t time-units.

Since, with finite magnitude, its magnitude remains stable during observation. The chronological dimension is observed in the units in which it measures to be finite – time units, observable units – the measure of chronological dimension is a real number to account for unit change (chronological units).

In mathematical terminology, ω belongs to set of cardinal numbers, while t belongs to set of ordinals. The reality of chronological dimension is sum of its identities (time) or sequence of instants. The measured value called time by observer is instance interval 'T' between start and end of observation. The infinite order of time is 1. In Pico-Physics Time is identity of 'Samay' the chronological realty. The reality whose measure is open to extend to infinity has minimum infinite order of 1. If it has finite existence it's infinite order is 0.

Units of observation: Infinite order 1, defines two units, one for each set - 'infinite order 0' and 'infinite order 1'. If unit of observation belongs to lower order set, the identity belongs to set of +ive order realities. If it is reverse, it belongs to set of –ive order realities. If both belong to same set as unit of measure it belongs to set of zero order realities.

Infinite order of reality defines relation-ship between observation and measurement units as 1, o or -1 depending on Measurement unit >=< Observation unit.

Magnitude Dimension (Energy)

By definition, Knergy has zero infinite order; its measurement & observation unit belongs to same infinite order. It is everlasting. This gives Knergy identity a chronological dimension (time) with infinite order 1. To this chronological dimension, another dimension (infinite order -1 shall be added to result in zero order Knergy. Let us call the identity that contributes to its magnitude as Energy.

If E is the identity of reality energy constituting Knergy, and 'T' the instant interval, we have for unit Knergy object (N = 1);

$$E \times T = 1 \quad \ldots . \quad (2)$$

E is continuously variable (measures to a real number) and hence can be measured to a transfinite number in suitable units. The linguistic definition of Knergy assigns infinite order 0 to Knergy. Chronological dimension as infinite, the other dimension is Energy. The equation (2) defines the relationship between natural units of Knergy, Energy and Time. In observer's unit of measure for energy and time, the natural unit for Knergy translates to Plank's constant.

The natural Knergy unit is identified with plank's constant.

The identity of unit Knergy is synonym with photon, corpuscular light (Photon) particles.

The unit Knergy object relates to contemporary corpuscular light (Photon) particles. The energy of photon varies inversely with time (directly with Frequency).

As antidote to Konservation, we define Anti-Konservation.

SPACE

Space occupies an important place in human intuition. In the 17th century, Gottfried Leibniz, and Isaac Newton, set out two opposing theories of what space is. Leibniz held that "space is that which results from places taken together". Leibniz echoed *René Descartes* (1596-1650) view of space as extension of matter in length, breadth, and depth. Leibniz argued that space could not exist independently of objects. Newton took space to exist independently of matter arguing with help of the bucket argument[6].

Newton's light corpuscles and "Space independent of matter" co-existed with Descartes' Space - a plenum occupied by "ether[7]", which, imperceptible to the senses, is capable of transmitting forces on material bodies immersed in it. Descartes assumed that the "ether" particles are in constant motion, but, as there is no empty space for them to move to, he inferred that they move to places vacated by other ether particles. Physical properties of Space have been discounted as experiments to find "Ether" failed.

Contemporary space is a residual concept of Cartesian Space on removal of matter (Ether). It is an infinite 3-Dimension continuum which can be measured and fixed (it is neither created nor destroyed).

This is clearly reflected in concept of inertial frame of reference. The nature of space is now embedded in 3-D inertial frame of reference.

The Proposition – Anti-Konservation

The context of phrase 'cannot move for space in Cartesianism' is that we experience objects that move relative to each other. We do not observe any motion for identity[9] space. It is proposed to remove constrain of no-change and use ANTI-KONSEVATION as defining

characteristic of space.

Permissible Action	Conservation Charge	Konservation Energy	3-D Reference Frame Space	Anti-Konservation Space
Can be created or destroyed	No	No	No	Yes
Can be neutralized	Yes	No	No	Yes??
Can move/Transfer	Yes	Yes	No	Yes
Can be measured	Yes	Yes	Yes(Indirect)	Yes(Indirect)

Contemporary concept of space gives it a strict conserved character – It can Neither be created nor destroyed, nor neutralized, nor move, nor measured. We can have different level of conservation for an identity based on one or more assigned characteristics.

Anti-Konservation allows for creation, generation, neutralization, movement and measurement. Matter is extended substance that extends into space. It moves in space. The proposition Matter is conserved originates from observed motion of matter in space. Conservation of matter was further extended to chemical reactions under normal laboratory conditions. Newtonian physics took conservation further and used it to provide existential reality similar to matter for abstract (Capacity to do work) concept. It named it as Energy. Along with inertia it used energy as new key word describing the universe of human observation.

Conservation was extended successfully to define potential energy or internal energy. The success in return affected the concept itself, to include neutralization. This neutralization makes conservation applicable to many different areas with scintillating results. Conservation is a combination of "neither be destroyed nor created" as well as neutralization concepts (Can be neutralized by opposite). It does allow motion.

Cartesianism concepts of Matter and Space have developed in their own right with increased knowledge of nature.

Space Density

Real Space (R-Space) is proposed as Host Reality for Anti-Konservation. Geometric space (G-Space) is proposed as Host Reality for Contemporary 3-D inertial frame. The ratio of R-Space to G-Space is space density. It can be seen as ratio of measure of space by two observers observing each other. When observer A, observes B as an object, the inertial frame of observer 'A' is G-space and that of 'B' is R-space. In mutual observation, space ratio is identical.

The Rational (For Space Is Anti-Konserved)

The rational for anti-conservation lies in many cosmological observations. These are currently understood based on The Big Bang and the Expansion of the Universe. Thermodynamic explanations of Big-Bang are questionable. This understanding is under constant challenge. Some recent observation call for accelerating universe that the universe appears to be expanding at an increasing rate. The observation leading The Baum–Frampton[8] postulating an oscillating universe.

In these models, we place ourselves at center of the universe with universe oscillating with respect to center – similar to sun at center of universe in **Copernicanism.** The expansion rate dependency on distance in big-bang theory is troublesome considering laws of inertia. It calls for de-bunching effect to be observable. It shall be visible in large scale structure of the

universe.. De-bunching will make matter density measurement guide us to center of universe. However, matter is uniformly distributed in space and unable to guide us to center of universe.

These observations along with observations on Gravitation - Force & Red Shift, CBR – Cosmic Background Radiations, Uniform Density of matter in universe, Center of Universe related paradoxes and De Broglie wavelength shift, point to a universe, where contemporary (Holistic) understanding of Space as a conserved identity is unable to sustain the observed facts. Conservation of space is leading us on a path of constant hypothesizing.

Anti-Konservation allows for matter density for visible large scale structure of the universe to be independent of observed red shift. It explains cosmic background radiation

Anti-Konservation provide us an opportunity to attribute the observations to the process of Energy consuming the occupied space, which is generated at a constant rate (Hubble's constant) in free space. Due to low value of Hubble's constant, on smaller scale (inter galaxy), space do not appear to change.

It also creates a clear distinction between space and matter and don't require attribution of physical properties to space. Anti-Konservation concepts provide a new direction to be at peace with the astronomical observations.

VIEW OF UNIVERSE

Newtonian Era (3-D Fluid)

Descartes view of universe seems to be an extension of human observation of fish (swimming) in Sea and birds (flying) in sky to existence of matter in space. Arrived to develop contrast between mind and matter. This identifies space as some kind of light fluid, unable to resist motion of matter. This notion of light fluid has been discussed and discounted in contemporary physics.

Contemporary (3-D infinite continuum)

Big Bang Theory can be considered to include the Contemporary view of universe as a 3-D infinite continuum that does not change and houses matter. General theory of relativity deals with geometry of space and behavior of matter in space.

Proposition (5-D Universe)

The proposition to incorporate anti-Konservation as property of space, gives us 5-D view of universe. The five dimensions include 3 dimensions of space (3-D infinite continuum), and 2 dimensions of Knergy (Energy and time of 2-D Matter). Knergy is mapped onto space with time dimension overlapping one space dimension (in the drift direction). This view is simply stated in three words of Unary law in Pico physics[9] 'Space Contains Knergy'.

The 5-D view provides 3 degrees of freedom to an object. Two are unmapped continuously variable spatial dimensions. The third space dimension is mapped to Time (Chronological dimension). (Time maps onto the dimension along the object motion, giving it a constant speed.) Freedom to assign a number too fifth dimension is conditional upon;

5^{th} dimension Magnitude X chronological difference
= Integer Number X UOM (for Knergy).

Thus value of 5th dimension is related to dimension in drift direction, as well as value, with magnitude represented by counting number in natural units. Thus the freedom for 3^{rd} & 4^{th} Value assignment to, continuously variable 3^{rd} space dimension is constrained by mapping of 2-D Knergy onto 3-D space - 'Space contains Knergy'.

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