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FUNDAMENTAL DIMENSIONS AND TIME

(According to "*Hypothesis on* MATTER")

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Abstract: Fundamental dimensions relate a matter body to another matter body or to a reference. Since we have no reference for matter content, we have no fundamental dimension to measure matter content of a body. In order to define a fundamental measurement for distance, rate of certain property of electromagnetic radiation is considered to be constant. For our convenience, the space about a point is partitioned into eight parts by three mutually perpendicular planes. Distances measured in each of these spatial planes indicate the relative location of a body. Use of dimensions, measured in three spatial planes makes the spatial system, three dimensional. Fundamental dimensions represent spatial measurements. Only one type of measurement - the distance or its derivatives - is used in all the three spatial planes. Unless we divide the space by more than three planes we cannot have higher-dimensional systems. It is also argued that while the time may be used to represent relation between events to describe their history, time being a functional entity, it does not qualify to be a fundamental dimension.

Keywords: Fundamental dimensions, Space, Matter body, Matter content, Time, Hypothesis on MATTER.

Introduction:

"Hypothesis on MATTER" describes an alternative concept. In it: the matter content of a body and the energy about the body are distinctly separate. Matter content is the total sum of three-dimensional matter in a body. Energy is the strain developed due to 'distortions' in the natural arrangements of basic matter quanta in and about a body. Matter content and energy content of a body cause and support each other for their existence and stability. They are not convertible into each other. Entire space is filled with '2D energy fields', two dimensional lattice structures by 1D quanta of matter. Parts of 2D energy fields within the body-dimensions contain sufficient distortions to sustain integrity and stability of a body in its current state. This part of 2D energy fields is the 'matter field' of the body. Distortions in the matter field are the 'work' existing in and about the body and it determines the state of the body. All apparent interactions, between matter particles, take place through the universal medium of 2D energy fields. This avoids the assumption of 'actions at a distance'. Each matter particle is acted upon separately by the universal medium and when simultaneous actions on more than one matter particle are considered together, they appear to be interaction between the matter particles.

2D energy fields fill the entire space. 2D energy fields, in various directions and planes, passing through a point, co-exist. It is an aether-like entity, but with definite structure and properties. Excess stress due to imbalances or excessive movements in 2D energy fields causes their break-down, locally. During the local break-down, quanta of matter in the lattice-work are liberated. Attempt by 2D energy fields to close the gap, formed due to local break down, gathers the liberated quanta of matter into a single 2D disturbance. This is a gravitational action. 2D disturbance is then compressed by gravitational action to create 3D matter-part of a photon. Matter body of a photon being a disturbance, it is ejected from any of the 2D energy fields, where the photon happens to be at any instant. This continuous ejection causes photon's constant motions. Distortions formed in the 2D energy fields, to maintain and move photon's matter body, are transferred at the highest allowable speed, without breaking down the 2D energy field. Distortions, in the 2D energy fields, formed about a photon are also a part of the photon. Spin motion of the photon's body in any plane appears like wave motion in the distortions and it is similar to an electromagnetic wave in many respects. A single pulse of distortion (electromagnetic) wave and the spinning-disc-shaped matter core together form a photon.

A photon is the basic 3D matter particle. Most fundamental property of a photon is its motion at constant linear velocity (for general description in this paragraph, we will not consider photon's spin motion at angular speed proportional to its matter content). In fact, a photon exists in stable state only because of its motions at constant velocities, with respect to 2D energy fields about it. A stable photon maintains its velocity at a critical constant value. It is a necessity of the 2D energy fields to maintain photon's velocity at its critical level. Any instability is overcome by 2D energy fields' continuous gravitational actions. In this article, motions are assigned to the photon for clearer understanding. A photon, being a matter particle, is incapable of any actions or movements on its own. Matter is inert. It is the inertial actions of the 2D energy fields about a photon, which move the photon's matter body. Distortions in the 2D energy fields about the photon (wave part of the photon) are the moving part, which carries the matter body of the photon. Speed of the photon is limited by the capability of the 2D energy field distortions to transfer themselves in the 2D energy fields (wave to radiate), while the 2D energy fields remain stationary in space. Limitation on the speed of distortion-wave limits the speeds of matter bodies, including photons, in space. All 3D matter in nature is in the form of photons. There are no basic 3D matter particles larger or smaller than photons. Photons, in various combinations, make up all other superior particles and bodies, we observe in nature.

All conclusions expressed in this article are taken from the "*Hypothesis on* MATTER" [1]. For details, kindly refer to the same.

Fundamental dimensions:

Matter and its interactions dominate our world. Matter provides the sense of reality to nature about us and to our existence. In order to understand matter bodies and their (apparent) interactions, as rational beings, we need to relate one matter body to others and relate a matter body in one state to the same body in a different state. This can only be done by comparison between different bodies or the same body in different states. For this reason, the dimensional measurements are formulated. To define a dimensional measurement, we need to have a reference. Nearer to an absolute measurement a reference is, better will be the accuracy of the dimensional measurement system defined.

Measurement starts with defining the quantity that is to be measured and it always involves a comparison of the quantity that is to be measured with some known reference quantity of the same kind. If the quantity that is to be measured is not accessible for direct comparison, it is usually converted into derived measurement. In general, one element is required to discriminate the quantity that is to be measured and sense its dimensions. A matter body may have only two types of basic dimensional measurements. One type of dimensional measurement is its matter (substance) content. Since we have no reference for this, we are unable to formulate a dimensional system for the direct measurement of the matter content of a body. Instead, we are compelled to represent the matter content of a body by using indirect means related to known or derived references.

Second type of dimensional measurement of matter bodies is regarding their sizes or locations in space. This is measured by the distance between different matter bodies or between different parts of the same body in space. Space is a functional entity, which has no real existence. Space is where we presuppose the matter bodies exist and (apparently) interact. Space provides a place of existence for real

(matter) entities. It has no other functions. Space can only fulfill the functions assigned to it. Since it is not a real entity with a form or structure, it can have no physical properties. It can neither bend nor expand nor contract. A functional entity cannot be quantified. When the space is considered to represent the 2D energy fields that fill it entirely, it becomes a real entity. A real entity is quantifiable. Relation between two points in space may be represented by the distance between them. Distance between two points in space is the length of the part of 2D energy field(s) in between the points in the plane(s) containing both the points. In this case, the distance is a measure of real entity. Distance may also be defined as a measure of separation between points on matter bodies or between points on a matter body. Dimensions of the space indicate the lengths (distances) of parts of 2D energy fields between matter particles/bodies. The statement that the space extends to infinity means that matter bodies can be found in space, however far and beyond.

In order to formulate a dimensional measurement for distance, we presume to have a reference. It is generally considered that the displacement of light in space keeps (almost) a constant speed. In order to make this property or any other physical properties of matter bodies (which exhibit constant rate as a reference) useful to define the distance, we have introduced a functional entity - time - to represent equal intervals of changes. With this, we can now determine the distance moved by a body in space or magnitude of physical changes in a body in a unit interval (of time). Distance traveled by a photon - corpuscle of light - in unit time, which is believed to be a constant, may be used to define or relate our measurements of distance in space. Any other reference, which will provide similar convenience, may also be used to define the distance.

Distance could be in any direction, and it is necessary to define a datum, for the distance measurements to be meaningful. There are many ways to do this. Most convenient and widely used method is to divide the space about a point into eight parts by using three, mutually perpendicular, spatial planes passing through the point and to use these planes or their co-ordinate axes as references. Distance in each of these planes is separately regarded as a (spatial) fundamental dimension. Thus, we have come to regard the space as a three-dimensional entity. In the three-dimensional system, distance is the only measurement but the measurement in each of the (spatial) plane is separated from others. As there are no other (spatial) planes envisaged in this dimensional system there are no higher (spatial) dimensions. As far as the three-dimensional system is concerned, there are no distances in higher-dimensional systems, to be measured. Higher-dimensional systems cannot be used to describe three-dimensional bodies or their interactions. Any such use, as is presently done in many theories, is not rational. By definition, a three-dimensional body can have only three spatial dimensions. It can be envisaged as a four-dimensional body only when we can partition the space by a fourth spatial plane in addition to the three spatial planes already considered. All cases of higher-dimensional systems are akin to this. To devise a higher-dimensional system, the space has to be partitioned by more than three planes, having definite mutual relationship. In all these planes, measured units will be of distance. A plane can show only the locations of points with respect to a reference in the same plane. Therefore, measurements of different nature (other than distance) cannot be used in any of the planes.

We may consider that the three-dimensional system as a combination of three identical single dimensional systems coexisting in the nature. Thus, we can also have one dimensional and two dimensional systems. We live and act in a three dimensional space system. We, being rational '3D beings', only the 3D matter is considered by us as 'real' matter. Due to our intelligence, we are able to visualize and understand (up to an extent) 2D and 1D space systems, but it is impossible to visualize or understand higher-dimensional systems, if any. As far as the '3D beings' are concerned, all higher-dimensional systems are imaginary. In 3D space system, length, breadth and depth (all are distances), each one in a coordinate plane represents the space. Magnitude of imaginary fourth (spatial) dimension, which is not yet defined or understood, is negligible compared to these three dimensions. Fifth (spatial) dimension, if any, will be negligible compared to the fourth dimension, etc. In order to sense reality, we do not need these higher dimensions and, as far as we are concerned, they do not exist in reality.

Similarly, in the two-dimensional space system, there are only two tangible dimensions - length and breadth. Third (spatial) dimension, depth, is negligible compared to these two dimensions; fourth (spatial) dimension is negligible compared to the third dimension, etc. In the single-dimensional space system, there is only one tangible dimension - length. Second dimension is negligible compared to the first dimension; third dimension is negligible compared to the second dimension, etc. Consequently, when we are dealing with a single-dimensional body in 3D space, it should be understood that such a body has its existence in

all other dimensional systems also. It exists in space. It is up to us how we partition the space and define dimensional systems. Since a single-dimensional body exists in space, it exists in all dimensional systems, the space is assigned to. By using any particular scale of measurement, its existence in all dimensional systems, other than the first dimensional system is negligible. Because, as far as the measurement system is concerned, no other dimensions exist. That is, only its length can be measured. If the same entity is scrutinized (by a '3D being' in 3D space system) in its most minuscule details, it should have its existence in all dimensional systems. In addition to its length, we must consider that a single-dimensional body has negligible width and negligible thickness. Similarly, in a two-dimensional space system, only the length and the breadth can be measured. Depth or thickness is so minute that it cannot be measured by using any method, presently used by us – the 3D beings. Dimensions, related to higher-dimensional systems do not exist in this particular measurement system. Yet, the body exists in space. Under these conditions, we may consider such negligible measurements as functional quantities rather than real quantities. Because, they are not tangible by using any real measurements used by us. A 2D body has negligible thickness in addition to its lengthy and breadth. A 3D body exists in all the planes and lines passing through it. Actions assigned to a 3D body are the resultant of all actions in various planes and lines passing through it.

We operate in 3D space system. We are unable to comprehend any space system higher than ours. It is difficult to visualize even a 2D space system. To be real, a fundamental dimension should be tangible and it should describe space or matter content. Since we have no fundamental dimension for the matter content, we are left with only three fundamental (spatial) dimensions. All three of them describe (distance of) 2D energy fields in space. They measure distance between matter bodies or between parts of matter bodies.

We use derived measurements from fundamental dimensions to represent the 'mass' of a body. In this case, the mass is assumed to represent the matter content of a body. Mass of a body is the mathematical relation between an external force, acting on it, and the body's acceleration. Acceleration is measured in terms of distance and time. However, the force is defined in terms of unit mass (circular logic?). We are compelled to do this, because we have no formulated measuring system for the matter content of a body. Matter content of a body cannot change unless matter is added to it or removed from it. Nevertheless, the mass of a body is liable to change, depending on the body's state (of motion). Mass of a body tends to increase with its speed. This discrepancy caused some confusion in our understanding of science. Mass describes neither distance nor matter content. Mass, being only a mathematical relation, it is not a fundamental dimension.

Matter occupies space. Fundamental dimensions are used to provide tangible representation of the space occupied by matter content of a body. We have no fundamental dimension defined for the matter content. Therefore, as long as only three coordinate reference planes divide the space, there can only be three fundamental dimensions.

Time:

Because of its functional property, time cannot be considered as a fundamental dimension. It comes into existence only when there is motion and because of the motion. It qualifies an action or a change of state. It does not describe space or matter content. As soon as the first 3D matter particle was created, due to its inherent nature of motion, a functional property of time also came into existence, for rational beings like us. Time has no tangible existence. Scale and measurement of the time is always related to some motion or change of state of matter. In other words, in order to assess time we measure properties of matter bodies. Hence, the time should be considered as a character of matter rather than its dimension. In some mathematical (analytical) solutions, time is also used with other fundamental dimensions to describe (history of) events in space. This has led to an erroneous belief that the time is a fundamental dimension. Thus, the time has come to be regarded by many as the fourth dimension of matter in space.

Motion of a body is necessarily accompanied by its displacement in space. In the 3D space system, magnitude of a displacement is measured with respect to the three co-ordinate planes. To comprehend the displacement of a body, it is necessary to compare the position of the body at any instant, with a reference. Since the same 3D matter body cannot exist simultaneously in two places, there should be an interval between the existence of the body in one place and its presence in another place, after its motion. The body can be in the second position, only after being at the first position. When changes in the bodies are considered, interval is between two states of a body. A body cannot be in two identical states simultaneously. One state has to precede and another state has to follow. Likewise, all actions have their

causes preceding them. Interval between two states of a body produces the rationality for the continuous existence of the body.

Cause and effect relation of all physical phenomena necessitates sequential operations. Hence, there is an interval (however small it may be) between two states or phenomena of matter bodies. This interval is required for the cause to produce the effect or for the first phenomenon to produce the second phenomenon, which depends on the result of first phenomenon. Unless the first phenomenon produces certain result, the second phenomenon cannot take place. These phenomena are real. There is nothing else between them. The interval in between the phenomena is only a functional entity. It has no real existence. Matter body in different states or at different locations (before and after the interval) has real existence. If the first phenomenon culminates in a particular result, the second phenomenon has to follow. Interval between them does not affect the nature of the first or the second phenomenon. On the contrary, it is the interval, which depends on the development of the second phenomenon after completion of first phenomenon. That is, unless the second phenomenon has developed (however late or far it may be) we do not recognize the interval. The interval comes into existence only when the second phenomenon has developed after the first phenomenon. Hence, the interval has absolutely no control over either of the phenomena or their results. The interval depends or it is controlled by the actions between two phenomena. If the interval is larger for the first phenomenon to produce a particular result to commence the second phenomenon, the first phenomenon can be considered to operate for longer interval (or if the second phenomenon takes place, a long time after the first phenomenon, the interval may be considered longer). Physical phenomena develop and control the interval between them. Physical phenomena are apparent actions of matter in all its related forms.

Time is used to represent the interval between the existence of a body at two locations (or in two states). Time is only a functional entity and hence it has no tangible existence, no direction and it is purely a scalar measurement. In order to have a reference for a body's motions (or states), the time is related to certain physical properties of reference-matter bodies which are assumed to take place at a constant rate. Whichever method we use to estimate the time, we are basically, comparing the motion of a photon in the 2D energy fields and the motion of another body in 3D space. Second, the unit of time is presently defined as *"duration of certain number of periods of the radiation corresponding to the transition between the two hyper fine energy levels in the ground state of caesium-133 atom"*. This refers to the frequency of photons radiated under defined conditions. In order to produce photons of this particular frequency, constituent photons of the atom have to discard quanta of matter at certain rate, into the 2D energy fields. This, in turn, depends on the speed variations of constituent photons of the atom. Frequency of the photons, radiated by cesium-133 atom under the defined conditions, depends directly on the movement and the variations in the speed of constituent photons of the atom.

Human beings (and up to an extent, many other living beings) have ability to think and deduce rationally. To develop this rationality, they are trained throughout their life to think in terms of cause and effect. Every effect has to have a preceding cause or an action follows a cause. This sequential rationalization creates a sense of past, present and future in all our thinking. This has created an apparent direction and an arrow of time for us. Our training is so thorough, that we refuse to consider anything else, which does not exhibit this sequential relation (e.g. instincts, precognition, etc) as reasonable or rational. In our rational thinking mind, the time appears to be very real, that we have no hesitation to call the time, a real entity and a fundamental dimension. We have even assigned physical properties to time so that it is able to dilate or contract irrespective of the fact that only those entities with real constituents and physical structure can dilate or contract.

Time is a convenience created for us and by us to understand (apparent) interactions between matter bodies or states of matter bodies, rationally. Functional dimension of time came into being when the first photon was created (if there was such an action) in nature. Time will continue to be in existence as long as there are photons that move and rational thinking beings, like us, are present in the nature. Time will cease to be in existence when there is a lack of any of the two. Since the time depends on the existence of photons and the existence of rational beings, either of them can control the time. Variation in the velocity of a photon in relation to the reference points in the 3D world or the thinking of rational beings can control or regulate the flow of time. Therefore, it is up to us, the rational beings, to assign meanings to the 'time'. Time will fulfill all functions assigned to it by rational beings. Hence, the time is not a real entity but it is only a functional entity.

We may say that a photon – radiation of matter – always maintains its velocity at a constant critical value with respect to the 2D energy fields in a region. Actually, it is the 2D energy fields, which are forcing a photon to move at the allowable maximum possible velocity with respect to itself. Just because this velocity is the maximum that the 2D energy fields can produce, it happens to be a critical constant under steady conditions. If conditions of the 2D energy fields in a region of space vary, the criticality of the maximum velocity also will vary. For a different state of the 2D energy fields in another region of space, the magnitude of the constant velocity of a photon (the light) is different for an observer outside the region. This is because of the comparison between the units of distance, defined in both the regions. Since the definition of distance is related to time, velocity of light in any region of space is a critical constant. However, due to the difference in the definition of distances in different regions of space, comparing the velocity of light in one region of space with respect to an observer in another region of space create discrepancies.

Based on the constancy of the velocity of light in a region of space, we can set our standard of time. Interval required for the photon to move through a definite quantity (space occupied by the functional thickness of 2D energy fields) of quanta of matter is set as a standard unit of time. While doing so, we did not consider any of our aspects as the observers or the state of our surroundings. Instead, it is assumed that the observer and his surroundings are static (and in universally constant state) with respect to the 2D energy fields. The 2D energy fields are fluid in nature. Due to distortions in them, their density may vary from place to place and the motion of a photon is related to these variable densities of 2D energy fields. Therefore, to assess the absolute velocity of a photon - radiation - the state of observer and his surroundings with respect to the 2D energy fields also should be taken into consideration. An estimate of the velocity of radiation (light) without considering these factors is only of apparent or relative value. Each observer under different states of motion has his own estimate of relative time with respect to other regions. To estimate the absolute time: motion of the photon, motion of the observer, movements of the (distortions in the) surrounding 2D energy fields and the state of surrounding 2D energy fields are to be taken in to consideration.

Motion of a photon is usually considered with respect to the observer. Depending on the motion of observer and the state of the 2D energy fields, the velocity of radiation (observed from outside the region) appears to be faster or slower than the estimated relative velocity but never faster than the absolute velocity of radiation. Since the velocity is a relation between the displacement and time, we can take either the displacement or the time to be a constant and let the other vary. In some cases (like transmission of light through a refractive medium - matter field), we take the time as constant and let the displacement vary. Thus, we find that the light travels slower in a denser refractive medium. However, in some other cases (like when comparing very large velocities or passages of light near a massive body), we take the displacement as a constant and let the time as variable. Thus, we see that the time moves faster or slower for the observers in motion or near massive bodies. It appears that the general rule followed at present is that; if the observer is outside the region in the medium, velocity of radiation is considered variable within the medium and the (rate of) time is considered a constant. If the observer is inside the region in the medium, the velocity of radiation is considered a constant in the medium and the (rate of) time is considered variable. This is not a scientific thinking.

In every day life, we consider the (rate of) time a constant so that the light appears to be traveling slower in a denser medium and faster in a rarer medium. Whatever is the case, velocity of light with respect to the 2D energy fields never varies. If the 2D energy fields in a region can be made very dense, the velocity of light in it will appear to be very slow to an outside observer, may be even few kilometers per second and thereby creating illusion that the time almost stands still. For another observer, witnessing the action from inside this dense 2D energy fields, time will flow at a different rate.

Time is included with the fundamental dimensions to define the character of certain events, in some theoretical approaches. This is only for the ease of analytical solutions of mathematical equations. This does not mean that time has become or is regarded as a fundamental dimension, as many people happen to think. When different states of a static body are considered, it becomes necessary to show the interval between two states of the body. This interval is compared with standard interval defined for the time scale. This part may be represented in the solutions to indicate changes in the state of the body. This will not make the time a fundamental measurement. It still remains a functional entity indicating the interval as defined originally.

Conclusion:

We have no system of direct measurement of matter content of a body. Distance is the only measurement defined for direct measurement. Distance is used to indicate the location of a body in space, in relation to a reference. Space is divided into three spatial planes to facilitate distance measurement. Distance, measured in each of these spatial planes is regarded as a fundamental dimension. Time is defined and estimated in relation to the variation of some or the other property of matter bodies. Therefore, the time itself is not real but it is only a functional quantity to indicate a relation. It describes a function or a relation. Hence, it is not correct to assign a direction or other physical properties to time. It is used simply as an instrument to compare duration of an action to the duration of a standard action. Since the time does not describe space and it is not tangible, time is not a fundamental dimension. During measurement of time, we are actually estimating a regular motion or some other similar physical activity of a reference matter body and assigning certain meaning to such motions in terms of time. As long as we use only three mutually perpendicular spatial planes to partition the space, we have only three fundamental dimensions.

References:

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