LINEAR SPEED OF LIGHT

According to 'MATTER (Re-examined)'

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Abstract: Light is the flow of three-dimensional matter-corpuscles, each accompanied by a separate set of distortions in the universal medium. Together, they constitute the radiation of photons. For existence, it is essential for the matter-core of a photon to move at the highest possible linear speed, which the universal medium can achieve. This limit endows light with the constancy of its linear speed. The linear speed of light's consistency is related to, and thus depends on, the nature of the universal medium in the region of space where light is radiated. This essay very briefly describes the mechanism of light's motion and the stabilising mechanism of its linear speed, as envisaged in an alternative concept presented in the book 'MATTER (Re-examined)'. For details, kindly refer to [1].

Keywords: Universal medium, light, photon, corpuscles of light, speed of light.

Introduction:

Light is observed to have linear motion in space at a constant speed. Matter is inert. It has no ability to move or act on its own. As a result, light, as a composite 3D matter body, requires an external moving agency. Because light is independent of all other known agencies and can move anywhere in space, its moving agent must exist in and fill the entire space. Such an agency is the universal medium. To act on light and produce its motion, the universal medium has to be a real entity. Matter provides substance to all real entities. To be real, the universal medium has to be made of matter.

Since an observer or 'source-body of light' may move at any speed in any direction, the constancy of light's speed cannot be related to them. Another entity that is present everywhere in space (and acts on light to move it) is the universal medium. Therefore, universal medium should be the agency that moves light and the motion of light should always be in relation to and through universal medium. [We shall consider only the linear motion of light in this article.] The universal medium should not only move light, but it should also stabilise any variation and maintain its linear speed at a constant magnitude, irrespective of any influence that may tend to vary its linear speed. The universal medium should provide mechanisms for all other properties of light as well.

An alternative concept:

The alternative concept presented in the book 'MATTER (Re-examined)' is based on a single assumption that 'Substance is fundamental and matter alone provides substance to all real entities'. Matter, in its unstructured state, exists in the form of minute particles called quanta of matter. Unstructured matter in a quantum of matter tends to reduce its spatial dimensions to a minimum. Free quanta of matter tend to form quanta-chains in straight lines. Quanta-chains in perpendicular directions in a plane form two-dimensional latticework-structures, called 2D energy-fields. Each 2D energy-field extends infinitely in its plane in all directions.

2D energy-fields in all possible planes in space together form the universal medium. 2D energy-fields are able to co-exist at their intersections and thus fill entire space, outside 3D matter-particles. Due to its latticework-structures, universal medium has all properties of an ideal fluid. Distortions in the universal medium constitute 'work' and stress due to work (distortions) is the energy. Frequent local breakdowns of the universal medium ensure the availability of free quanta of matter and ample opportunities for them to migrate into the latticework-structures of the universal medium. This keeps quanta-chains of universal medium under compression, even without a definite container. They are continuously under stress to expand.

Local breakdown, in any part of the universal medium, releases quanta of matter from latticework-structures and forms a gap. The universal medium from all around (being under compression) moves towards the centre of the gap to re-establish continuity. Due to inward radial movement, the universal medium presses on any disturbance (3D matter-particle) present in the gap and compresses it. The presence of a disturbance in the latticework-structure of a 2D energy-field breaks its continuity. As far as the 2D energy-field is concerned, the space occupied by the disturbance remains a gap in it. 2D energy-fields from all around continue to thrust themselves into this space and keep the disturbance under compression. The application of pressure by the universal medium on a disturbance is gravitation. Latticework-structures of the universal medium impose certain restrictions on gravitational actions. Gravitation is unable to act on flat surfaces or straight perimeters of disturbances. The magnitude of gravitational action on a disturbance is proportional to the extent of the 2D energy field in the direction away from the disturbance and the magnitude of the convex curvature of its perimeter.

Gravitational action, by the universal medium, on a 3D disturbance is through direct contact between them. During this action, the latticework-structures of the surrounding 2D energy-fields are distorted. A distorted region in the universal medium around a 3D disturbance is its 'inertial-pocket'. All actions by the universal medium on a 3D disturbance are through its inertial-pocket. Gravitational action tends to reduce magnitude(s) of disturbance(s) in the universal medium, to minimum. This is achieved either by combining the disturbances present or by ejecting them from the 2D energy-fields of their existence. A side of a disturbance with a larger convex curvature experiences greater gravitational effort compared to a side of the same disturbance with a lesser convex curvature. Resultant of these efforts tends to push the disturbance in the direction of greater gravitational effort.

Variations in a 3D disturbance's shape, from a perfect circle in various planes, produce unevenness in gravitational compression on it from all around. In order to establish the 2D energy-fields' homogeneity, structural distortions tend to move from regions of high distortion-density to regions of low distortion-density. The 3D disturbance, held within the gap in a distorted region of 2D energy-field (inertial-pocket), is also carried along with the structural distortions in the direction of lower distortion-density. This phenomenon produces the inherent linear motion of every basic 3D matter-particle in space. In their stable state, the matter-core of the 3D disturbance and its inertial-pocket, together, form a photon.

Photon:

The 3Dmatter-core of a photon, being a disturbance in the universal medium, is ejected out of each of the 2D energy-fields of its existence. This is the mechanism of motion for the photons through the universal medium. As a photon moves forward, the latticework structures of 2D energy-fields in the front are

deformed to become part of the inertial-pocket, and the distortions in the latticework structures at the rear are relived to restore them to their original form in the universal medium.

Pressure (resistance) from the front, due to collision between the 3D matter-core of the photon and the quanta of matter in the latticework structures of 2D energy-fields, is balanced by the ejection effort from the rear. This balancing action maintains the linear speed of the photon at the highest possible level in the universal medium.

The most fundamental property of a photon is the motion of its 3D matter-core at constant linear velocity (for a general description of light's speed, in this article, we will not consider the spin motion of the photon's 3D matter-core at an angular speed proportional to its 3D matter content). In fact, a photon exists in a stable state only because of the motions of its 3D matter-core at constant velocities with respect to the universal medium. It is a necessity of the universal medium to maintain the linear velocity of a photon's 3D matter-core at this critical level. Hence, we can say that a stable photon maintains its linear velocity at a critical constant value. The universal medium's continuous gravitational actions on a photon's 3D matter-core overcome instability in its linear speed. [Here, motions are assigned to the photon's 3D matter-core for a clearer understanding. In reality, a photon's 3D matter-core, being a corpuscle of 3D matter, is incapable of any actions or movements on its own. It is the inertial actions of the universal medium about it that move the photon's 3D matter-core]. The inertial-pocket, in the universal medium (similar to the electromagnetic wave) about the photon's 3D matter-core is the photon's moving part that carries its 3D matter-core.

The difference between instantaneous convex curvatures at the front and rear parts of a photon's 3D matter-core determines the resultant gravitational action that moves the photon's 3D matter-core in its linear path. The inertial-pocket of the photon continuously moulds its (spinning) 3D matter-core, so that the magnitude of the convex curvature of the forward surface is always less than that of the rearward surface. Gravitational actions on the spinning 3D matter-core of a photon regulate its instantaneous shape so that the latticework structures in the universal medium are not damaged and, at the same time, external and internal pressures on the 3D matter-core of the photon remain in balance. Under this condition, a photon moves at a critical constant (maximum) linear speed through the universal medium (space).

Stabilizing mechanism:

We shall examine the principle of linear motion of the 3D matter-core of a photon while (for the present) ignoring its spin motion. Let us assume the 3D matter-core of a photon is a stretchable balloon filled with unattached but flexible marbles. Flexible marbles represent quanta of matter in their 3D status. A balloon represents gravitational pressure, holding constituent quanta of matter together and compressing them into 3D states, thus making a photon's 3D matter-core a 3D matter particle. Let us also assume that the 3D matter-core of a photon is disc-shaped with slightly bulging faces. [The following description is about the linear motion of a photon's 3D matter-core in a perpendicular direction to its disc plane. Linear speed is controlled by the difference in curvatures of the forward and rearward disc faces. When the direction of linear motion is not perpendicular to the disc plane, the difference in curvatures of the forward and rearward surfaces of the perimeter also comes into play].

The radial size of a photon's 3D matter-core is limited within critical limits by the latticework structures of the universal medium. Its periphery (being disc-shaped) has convex curvature. Gravitation continuously acts all around the periphery to compress the 3D matter-core. The stable radial size of a photon's 3D matter-core is a critical constant. Any variation is immediately stabilised by varying gravitational efforts at the periphery. In the meantime, variation in the radial size of a photon's 3D matter-core stabilises changes in its linear speed.

Figures 1, 2 and 3 show cross sections of the 3D matter-core of a hypothetical photon (that does not spin) in a plane passing through its spin axis and perpendicular to the line of the photon's linear motion. Figures are not to scale. Sizes and bulges are highly exaggerated. They are intended to show the principle of stabilisation of a photon's linear speed only. Grey figures show 3D matter-cores. Block arrows represent average magnitudes of gravitation in the form of various efforts acting on the 3D matter-cores. The red

outlines in figures 2 and 3 show the relative sizes and shapes of the 3D matter-core of the same photon, for comparison, when it is moving at its critical linear speed.

Figure 1 shows the status of the cross section of a stable photon's 3D matter-core, moving rightward. Gravitational actions all around the disc-shaped 3D matter-core, shown by representative vertical block arrows, maintain its critical radial size. The magnitudes of gravitational efforts acting on disc-faces depend on the magnitudes of their convex curvatures. The rear face of the 3D matter-core bulges outward by a greater degree and thus provides greater convex curvature compared to the front face. The gravitational effort from the rear is greater, and hence, in the figure, it is marked as 'ejection' effort. The front face, having less convex curvature, receives less gravitational effort. This, being in the opposite direction of the linear motion of the photon, is marked as the 'resistance' effort. The resultant of ejection and resistance efforts act to move the 3D matter-core of the photon linearly. As long as the parameters of the 3D matter-core do not vary, in a homogeneous universal medium, the magnitudes of efforts from all sides remain constant and maintain the photon's linear speed at a constant magnitude, with respect to the surrounding universal medium.

Various efforts, mentioned above, do not act as we consider normal 'forces' in mechanics. It is the transfer of structural distortions in the universal medium that acts to move the 3D matter-core along with them. Movement is directly imparted to the 3D matter-core rather than by an external 'force' acting on it to move. Hence, the phenomena of acceleration, velocity, motion, etc. do not apply in the case of a photon's linear motion. A photon's 3D matter-core gets displaced in space with respect to the universal medium, which fills the entire space. In fact, the 3D matter-cores of photons do not move at all with respect to their surrounding structural distortions (inertial-pockets) in the universal medium. The transfer of structural distortions within the universal medium carries the photon's 3D matter-core with it, thereby affecting the photon's displacement in space. Structural distortions in the inertial-pocket surrounding the photon's 3D matter-core tend to re-distribute every instant, so that the universal medium re-gains its homogeneity. During the re-distribution of structural distortions, the inertial-pocket is transferred in the direction of the region of lesser distortion-density from the region of higher distortion-density, while the universal medium (as a whole) does not move. In reality, the redistribution of structural distortions around a photon's 3D matter-core is a continuous process so that at any instant, the 3D matter-core's size, shape, linear speed, and spin speed are maintained at critical values. Internal and external pressures at every point on the surface of the 3D matter-core remain in balance.

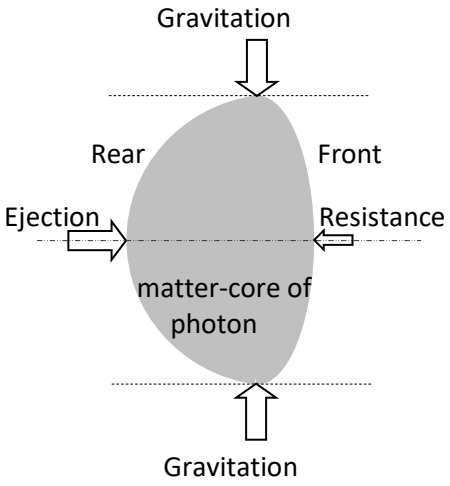

Figure 1

The inertial-pocket in the universal medium (surrounding the photon's 3D matter-core) is a creation of the 3D matter-core's shape. Therefore, wherever the 3D matter-core moves in the universal medium, similar structural distortions surround the photon's 3D matter-core. In other words, as long as a photon's 3D matter-core is in existence, the surrounding universal medium has similar structural distortions in the inertial-pocket, which carries the 3D matter-core at a constant linear speed, indefinitely. As the 3D matter-core of a photon moves along with surrounding structural distortions in a steady region of universal medium, we may relate the photon's motion to the steady universal medium. The magnitude of its linear speed depends on the parameters of the photon's 3D matter-core and the nature of the universal medium in any region of space. As long as these remain steady, the linear speed of light (or similar radiation of 3D matter) remains constant with respect to the absolute reference, provided by the universal medium.

To understand the mechanism of stabilisation of actions about a photon, let us consider the reduction in the 3D matter content of a stable photon, which was moving at a constant linear speed through a homogeneous region of universal medium. The envelope of a photon's 3D matter content is provided by the surrounding gravitational pressure. In a stable photon, the external pressure at any point on the surface

of its 3D matter-core is always balanced by the internal pressure of the photon's 3D matter-core. The pressure difference required to maintain balance between internal and external pressures depends on the curvature of the interface between them. A reduction in the 3D matter content in the 3D matter-core reduces its internal pressure during the time before gravitational efforts commence their actions on the 3D matter-core. Gravitational pressure all around the 3D matter-core asserts and reduces the radial size of the 3D matter-core, as shown in figure 2. Compare the radial size of the 3D matter-core shown in grey with its original radial size shown in red outline.

Figure 2 represents the actions of gravitational pressures on the 3D matter-core of a photon that has lost part of its 3D matter content. Gravitational action reduces the size of the 3D matter-core from all around until external and internal pressures are balanced at every point on its surface. The radial size and thickness of the 3D matter-core reduce due to the reduction in the quantity of 3D matter it contains. The internal pressure of the 3D matter-core is restored to its original value. However, a reduction in radial size necessitates an increase in the curvatures of disc faces. Increase in curvatures of forward and rearward faces off-set balances between external and internal pressures at respective faces. An increase in curvatures increases the magnitude of gravitational action at disc faces.

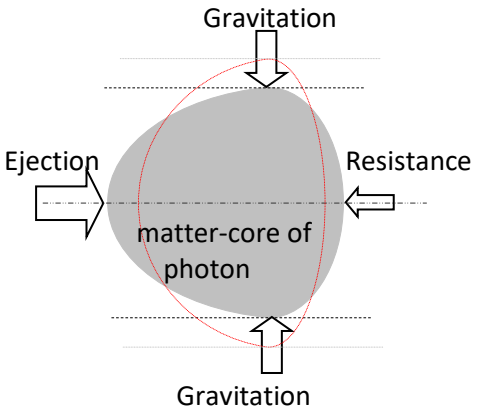

Figure 2

The rearward face, which has a higher curvature, experiences a greater increase in gravitational action. Internal pressure throughout the 3D matter-core is the same. As the curvature of the rear face is greater than that of the front face, it requires greater external pressure to balance internal pressure. (Similar to the 'Gibbs-Thomson effect' with respect to the relation between vapour pressure and surface curvature of a droplet.). A greater change in the curvature of the 3D matter-core's rear face increases the magnitude of gravitation by a greater margin compared to a lesser increase in the magnitude of gravitation due to a lesser increase in the curvature of its forward face. As a result, the increased gravitational actions on the rearward and forward faces of the 3D matter-core attempt to move the photon at greater linear speed. This increases resistance to the photon's linear motion.

However, gravitational actions from both the front (resistance) and rear (ejection) have increased. These two, together, compress the 3D matter content of the photon to increase its radial size, bringing it back to its original value. As the radial size of the 3D matter-core increases to its critical size, the 3D matter content of the photon re-shapes to bring down additional ejection and stabilise the photon's linear speed by reducing the curvatures of the disc faces. Loss of 3D matter-content would result only in a reduction in the 3D matter-core's thickness. By the time external and internal pressures are in balance, the relationship between ejection and resistance will have changed to provide the right magnitude of resultant action to move the photon at its critical linear speed.

Let us consider an increase in the 3D matter content of a stable photon, which is moving at a constant linear speed through a homogeneous region of universal medium. An increase in the 3D matter content enhances the 3D matter-core's radial size and thickness. Gravitational pressure all-around the 3D matter-core is off-set to increase its radial size, as shown in figure 3. Compare the radial size of the 3D matter-core, shown in grey, with its original radial size, shown in red outline.

Gravitational actions increase the size of the 3D matter-core until external and internal pressures are balanced at every point on its surface. The radial size of the 3D matter-core increases and reduces the curvatures of both rearward and forward disc faces. As the curvature of the rear face is greater compared to the front face, it requires greater external pressure to balance the internal pressure. (Similar to the 'Gibbs-Thomson effect' with respect to the relation between vapour pressure and surface curvature of a droplet.). A greater reduction in the curvature of its rear face reduces the magnitude of gravitation by a

greater margin compared to a lesser reduction in the magnitude of gravitation due to a lesser reduction in the curvature of its front face. The result of these actions tends to move the photon at a slower linear speed.

However, gravitational actions from the front (resistance) and rear (ejection) have decreased. Reduction in these two, together, lets gravitational action at the disc's periphery to compress the 3D matter content and thereby reduce the radial size of the 3D matter-core back to its critical radial size. As the radial size of the 3D matter-core reduces to its critical value, the 3D matter-core of the photon re-shapes to bring down the reduction in ejection and stabilise the photon's linear speed. A gain in the 3D matter-content would result only in an increase in the 3D matter-core's thickness. By the time external and internal pressures are in balance, the relationship between ejection and resistance will have changed to provide the right magnitude of resultant action to move the photon at its critical linear speed. Similar actions take place in every other plane as the 3D matter-core spins.

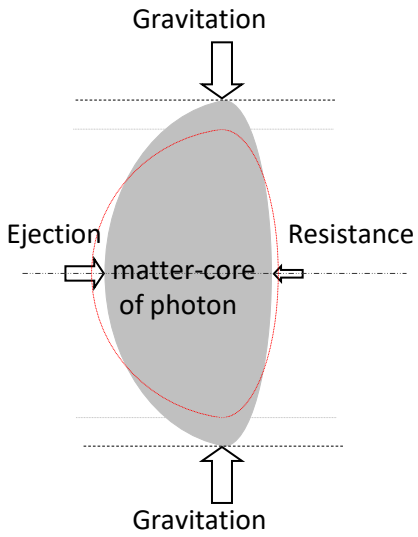

Figure 3

Stability of photon's linear speed:

The universal medium cannot move 3D matter bodies at linear speeds higher than the linear speed of a photon (light). Hence, the linear speed of light is the ultimate linear speed of any 3D matter body in space. As the linear speed of 3D matter bodies approaches the linear speed of light, they break down into inferior constituents. At the linear speed of light, only photons can survive.

Due to the inertial properties of the universal medium, the efficiency of external effort acting on 3D matter bodies reduces as their linear speed increases. When the linear speed of a 3D matter body approaches the linear speed of light, the efficiency of external effort on it (in the direction of its motion) reduces to zero. External efforts are unable to act on 3D matter bodies, moving at the linear speed of light in the same direction. [This phenomenon is often interpreted as infinite relativistic mass]. Therefore, no external effort can act on a photon in the direction of its motion and change (increase) its linear speed. However, the linear speeds of photons are susceptible to changes (reduction) under the action of external efforts in directions other than the direction of their linear motion.

3D matter is inert. Transfer of structural distortions in universal medium (inertial-pockets) carries basic 3D matter particles (3D matter-cores of photons) and affects displacements of photons in space. Transfer of structural distortions (inertial-pocket) in universal medium, surrounding the 3D matter-core of a photon, causes a photon's linear (and spin) motion(s). Since it is the structural distortions that carry the 3D matter-core, it is imperative that both the 3D matter-core and the inertial-pocket move in synchronism with each other. A misalignment between them affects the stability of the photon.

Photon's inertial-pocket, being structural distortions in the universal medium, has only one steady linear speed in space. This is the linear speed of the electromagnetic waves. Depending on the structural parameters of the universal medium in a region, the speed of transmission of free structural distortions (which are not linked to superior 3D matter particles) is limited to the highest linear speed possible without damaging the structure of the universal medium. As long as a photon's 3D matter-core moves in synchronism with the surrounding structural distortions, the universal medium causes no resistance to the motion of the photon's 3D matter-core or its stability. The tendency of relative displacement between a photon's inertial-pocket and 3D matter-core creates instability in the photon's motion. The forward displacement of a photon's 3D matter-core with respect to its inertial-pocket (by which the 3D matter-core tends to push at the front of the inertial-pocket) may be considered an increase in the photon's linear speed. Rearward displacement of a photon's 3D matter-core with respect to its inertial-pocket (by which

the 3D matter-core tends to push at the rear of the inertial-pocket) may be considered a reduction in the photon's linear speed.

An increase in ejection effort from the rear, without a corresponding increase in resistance from the front, tends to increase a photon's linear speed. Photon's 3D matter-core is pushed forward (by the structural distortions at the rear) onto the latticework structures in the structurally distorted region of the universal medium at the front. This can happen when a photon is moving in a region of universal medium with a gradient in distortion-density in a direction towards lower distortion-density. In this case, the universal medium at the rear of the photon's 3D matter-core has a higher distortion-density compared to its forward part. Correspondingly, ejection effort remains greater than that which can be balanced by lower resistance, and the photon has a tendency to increase its linear speed.

An increase in a photon's linear speed moves its 3D matter-core forward, with respect to its inertial-pocket to cause additional forward compression. The 3D matter-core may be assumed to rub or collide bodily into the forward part of the latticework structure of the inertial-pocket. This may cause excessive external pressure (resistance) from the front of the photon's 3D matter-core and result in a few quanta of matter (from the latticework structure) piercing into the 3D matter-core of the photon to be converted into 3D status and assimilated into the 3D matter-core. Increased ejection, during this process, effectively compresses the photon's 3D matter-core to increase its radial size. A change in the radial size of the photon's 3D matter-core initiates the stabilisation process of the photon's linear speed (by using the curvatures of its forward and rearward faces), as described above.

Additional quanta of matter assimilated into a photon's 3D matter-core increase its 3D matter content. The increased 3D matter content (rest mass) of the photon's 3D matter-core requires higher ejection from the rear to move it at the same linear speed as it was moving earlier. Since ejection effort from the rear is already higher, an increased bulk of the photon's 3D matter-core would compensate for higher ejection from the rear and restore its linear speed to the critical constant value. As the linear speed of the 3D matter-core reduces to its critical value, excessive pressure between it and the inertial-pocket is relieved. Thus, an attempt to increase the linear speed of a photon results in the photon gaining additional 3D matter content (with a corresponding increase in its energy content) from the surrounding universal medium instead of increasing its linear speed. An increase in 3D matter content is indicated by an increase in the photon's spin speed, frequency, or colour. Any attempt to increase the linear speed of a photon (light) results in increasing its frequency (colour of light) rather than its linear speed.

A reduction in ejection effort from the rear, without a corresponding reduction in resistance from the front, tends to reduce the photon's linear speed. This can happen when a photon is moving in a region of universal medium with a gradient in distortion-density in a direction towards the higher distortion-density region. In this case, the universal medium at the rear of its 3D matter-core has a lower distortion-density compared to its forward part. Correspondingly, ejection effort remains less than that which can be balanced by higher resistance, and the photon has a tendency to reduce its linear speed.

The compression on the photon's 3D matter-core reduces. Photon's 3D matter-core is (apparently) pulled rearward by a reduction in distortion-density at the rear. Since magnitudes of change are related to the curvatures of the disc faces of the 3D matter-core, the magnitude of change in ejection effort at the rear disc face is much greater than the magnitude of change in resistance at the forward disc face. As a photon's inertial-pocket is not a 3D matter particle, it is not (apparently) attracted to any other 3D matter body. Due to a greater reduction in ejection effort compared to a reduction in resistance, the photon's 3D matter-core tends to shift rearward relative to its inertial-pocket. Photon's 3D matter-core tends to slow down.

Rearward displacement of the photon's 3D matter-core with respect to its inertial-pocket relieves compression of the 3D matter-core. The 3D matter-core expands in volume to fill the inertial-pocket. All constituent quanta of matter in the 3D matter-core take part in this expansion. During this process, a few (randomly orientated but rightly placed) quanta of matter expand rapidly and escape from the 3D matter-core of the photon to join the latticework structures of 2D energy-fields. The 3D matter-content of the photon reduces, while the 3D matter-core's volume increases. The radial size and thickness of the 3D

matter-core increase. Increased radial size initiates the stabilising process of the photon's parameters and linear speed in relation to the curvatures of the 3D matter-core's disc faces, as described above.

Quanta of matter lost from the photon's 3D matter content. Reduced 3D matter content (rest mass) of the photon's 3D matter-core requires lower ejection from the rear to move it at the same linear speed as it was moving earlier. Since ejection from the rear is already lower, a reduced bulk of the photon's 3D matter-core would compensate for the reduced ejection effort from the rear and restore its linear speed to a critical constant value. As the linear speed of the photon increases to its critical value, the reduced internal pressure of the 3D matter-core is restored. Thus, an attempt to reduce the linear speed of a photon results in the photon losing 3D matter content (with a corresponding reduction in its energy content) into the surrounding universal medium instead of reducing its linear speed. A reduction in the 3D matter content is indicated by a reduction in the photon's spin speed, frequency, and colour. Any attempt to reduce the linear speed of a photon (light) results in reducing the photon's frequency (colour of light) rather than its linear speed.

In this way, the universal medium maintains the critical linear speed of photons (light or similar radiation) automatically by changing their 3D matter contents (frequency and rest mass), irrespective of any attempts to vary their linear speed.

The frequency of light can be varied only by changes in the 3D matter contents of constituent photons. One way to vary the frequency of light is by attempting to vary its linear speed. Corpuscles of light are related only to the surrounding universal medium. They are created from and by the universal medium. From the moment of their creation, they are independent 3D matter bodies. They have no other 'source bodies'. Hence, the assumption that parameters of light (like its linear speed or frequencies) are affected by source bodies or receptors (macro bodies in the region of the creation of photons or those that receive light radiation) is not very correct. Hence, 'Doppler effects' or similar phenomena, which affect wave motions like sound, electromagnetic waves, etc., do not affect the radiation of light.

Linear speed of light:

The linear motion of a photon is with respect to the universal medium, which is static in space. The number of latticework squares of 2D energy-fields traversed by a photon in (absolute) unit time is a constant. If any part of the universal medium in a region of space is structurally distorted, the number of latticework squares of 2D energy-fields in a unit distance, in any direction, in the structurally distorted universal medium is greater than the number of latticework squares in the (absolute) unit distance in the undistorted universal medium. [Structurally distorted region around the 3D matter-core of a photon is the photon's inertial-field. Similarly, structurally distorted region in the universal medium in and around a macrobody is its matter-field.] Hence, the distance moved by a photon in a structurally distorted region of the universal medium (in a denser matter-field) compared to an undistorted region in unit time is less. The absolute linear speed of light in any region of space depends on the distortion-density of latticework structures in that region (matter-field). This is variable from region to region in space. The matter-fields near very big macro bodies are denser in structural distortions than the matter-fields near smaller macro bodies.

Therefore, the absolute linear speed of light appears slower near larger macro bodies when compared with respect to the distance measurement used in another region of space. Since distance and time measurements are related, they vary with each other for any region of space. Hence, the absolute linear speed of light in one region of space with reference to the universal medium in the same region of space and the absolute linear speed of light in another region of space with reference to the universal medium in that region of space are identical. Discrepancies develop only when the absolute linear speed of light in one region of space is related to the universal medium in another region of space.

Due to circular logic, we use time to define time; a unit of time within the matter-field of a macrobody also depends on the distortion-density of the universal medium in that region of space. Thus, the 'absolute unit of time' in any region of universal medium may be different from the 'absolute unit of time' as determined in a structurally undistorted region of universal medium. Although a unit of time and linear

speed of light are constant and equal in every region of universal medium, discrepancy develops when a unit of time or linear speed of light, determined in one region of universal medium, is related to a unit of time or linear speed of light, determined in another region of universal medium. This has given rise to many speculations about the nature of time and its variations. Linear speed of light in outer space or near another macro body (whose 3D matter content is not equal to the 3D matter content of earth) should not be compared with linear speed of light on the surface of earth, using units of distance and time determined on or near the surface of earth.

An observer is a large macrobody compared to a photon. A static observer and his surroundings are within the matter-field of a macrobody, where the observer is situated. The observer is static only when considered in a relative reference frame with respect to the macrobody, which may be in any state of motion. The observer moves with the matter-field in the region of his existence. The critical linear speed of light (the motion of photons) is with respect to the structural distortions in the surrounding universal medium and depends only on the distortion-density of the matter-field of the region. Therefore, a photon always appears to move at the same linear speed within the same region of space, irrespective of the direction of the macrobody's (matter-field's) motion. The linear speed of a photon, with respect to the matter-field of the region, is a critical constant. This is essential for the integrity and stability of the photon.

The entire space is filled with the universal medium. There is no empty space. Air or other 3D matter particles in a part of space may be removed to create a vacuum. This may remove the refractive media from the region, but it does not create empty space. Therefore, by comparing the linear speed of light in a vacuum and in air (or other media), we cannot determine light's absolute linear speed. A photon is radiated at its absolute linear speed in regions of space, far away from any other macrobodies, where the surrounding universal medium is free of any structural distortions other than those that are required to maintain the stability of the photon in consideration. In all other regions of space, the linear speed of a photon is determined with respect to structural distortions in the universal medium in that region. For a constant magnitude of structural distortions in the universal medium, the linear speed of a photon and the unit of time in it are constants.

If an observer (laboratory) develops motion with respect to the surrounding matter-field, it will be reflected in the linear speed of light the observer is observing. If the observer is so small that he can be accommodated on a photon, he will be moving at the same (critical constant) linear speed as other photons in the matter-field, in the direction of its own motion. Other photons moving within the region will also be moving at their critical constant linear speeds. Under this condition, the observer sees other photons in relation to himself. Each of the other photons will appear to move at linear speeds relative to the observer's motion. A photon moving in the opposite direction will appear to the observer as moving at double the critical linear speed, and a photon moving in the same direction will appear to have no linear motion at all. Photons moving in various other directions will all appear to move at their relative linear speeds. Photons (light) radiating in any region have relative motion with respect to other photons in the same region. But, with respect to the surrounding matter-field, all photons are moving at their critical constant linear speed. Since a static observer is a large macro body moving with and being a part of the surrounding matter-field, he observes all photons in the region as moving at a critical constant linear speed irrespective of their directions of motion. This phenomenon has led to the assumption of the 'universal constancy' of light's linear speed.

This is the reason why all attempts to measure the relative linear speed of light beams moving in various directions failed to register any difference in their linear speeds from the constant critical value. All experiments (like the Michelson & Morley experiments) were conducted within the matter-field of the earth and on light beams moving within the same matter-field by observers who were steady within the matter-field of the earth. Irrespective of changes in the directions of radiation, all light beams (in various directions) registered the same linear speed.

If an observer places himself outside the region of the matter-field where light beams are radiated, he can notice that the linear speed of light is different from the critical linear speed of light in his surroundings. This is how the linear speed of light is found to be slower in denser refractive media. We have no hesitation

in accepting this fact. All refractive media usually have a denser matter-field compared to the atmosphere near the surface of the earth. The observer, being outside the region of matter-field where light is being radiated and measuring the linear speed of light by using 'distance measurements' for his own region of space, correctly finds that light has slowed down.

Similarly, using our standard of distance measurements, the linear speed of light is higher in outer space, away from the earth's (and other large macro bodies') matter-field. This fact is not recognised due to our adamant belief in the assumed constancy of the linear speed of light. Instead, we prefer to mystically dilate the functional entity of 'time'. The general (unscientific) rule, followed at present, is that in denser media, light slows down, and in rarer media, time dilates.

Photon, being a 3D matter-body, obeys all natural physical laws, including laws of motion and gravitation, under all conditions. With respect to an observer (who is steady on the surface of a large macro body), the relative linear speed of a small free body, moving under constant inertia in the same region is constant irrespective of its direction of motion. This common rule applies to the linear motion of photons (corpuscles of light) as well. Relative linear speeds of smaller matter bodies moving near the earth's surface depend on the magnitude of effort ('force') acting on (or energy stored in association with) them. In the relative reference frame, we do not consider linear motion transferred to smaller macrobodies by the earth's motion.

In the case of photons, the external effort propelling them and their linear speed relative to the earth's surface depend on the distortion-density of the earth's matter-field. Assuming that the distortion-density of the earth's matter-field is constant throughout the earth's surface and in its surroundings, the linear speed of the radiation of light near the earth is a critical constant, irrespective of the direction of the radiation. The change in magnitude of structural distortions in the matter-field in the region of radiation (like within a refractive medium or near a large macrobody of different size) varies the value of light's critical constant linear speed when compared with the unit of distance in another region of space. The linear speed of light is not a universal constant. Light has its highest (constant) linear speed in free space, far away from 3D matter bodies. As light approaches a very large macrobody, its critical linear speed (and the unit of time) reduces due to the higher distortion-density of the matter-field in that region. The more enormous a macrobody is, the lower is the critical constant linear speed of light in that region of that macrobody with respect to the standard of distance determined for free space. If the unit of time for that region of space is also varied correspondingly, there will be no change in the critical linear speed of light in that region.

However, as far as a photon is concerned, it always moves at a critical constant linear speed with respect to the universal medium around it. The number of latticework squares in 2D energy-fields, traversed during an equal interval of time, is the same, irrespective of the distortion-density of the matter-field in the region of radiation. The matter-field, with a higher distortion-density, has a greater number of latticework squares of 2D energy-fields per unit distance as compared to the matter-field, with a lower distortion-density. Consequently, light appears to move slower to an observer outside that region of space. To an observer within the same region of space, the linear speed of light does not change; it remains the same at the critical constant value.

Should the observer develop linear motion within the matter-field, where light is being radiated, his linear speed is algebraically added to the critical linear speed of light to obtain its relative linear speed. Since the critical linear speed of light is too high, compared to the highest linear speed an observer can attain, and the straight-line distance available within the matter-field of constant distortion-density is too small compared to the distance traversed by light in unit time, it is impossible to determine this experimentally. [A fish floating in a water current observes any other matter-body moving with respect to the water current as moving at its true relative linear speed with respect to the current, irrespective of the direction of its motion. If this relative linear speed of 3D matter bodies is of constant value with respect to the water current, all objects within the current and linearly moving with respect to the current appear to move at constant linear speed, irrespective of the directions of their motion. The relative linear speed of fish and other moving objects within the current comes into prominence only when the fish is able to move with a

speed comparable to the speed of moving objects with respect to the current.]. However, by choosing a rotational frame of reference, this fact is confirmed by the phenomenon of the 'sagnac effect' [1]. Since the dual nature of light is not well recognised, the results of experiments similar to Sagnac's experiments are not satisfactorily explained.

Conclusion:

A beam of light is a continuous flow of photons made of 3D matter-corpuscles (the 3D matter-part of light) accompanied by their inertial-pockets (the energy-part of light), in the universal medium. Structural distortions in a moving inertial-pocket carry the 3D matter-core of a photon at a constant linear speed. The linear speed of light is constant because that is the highest linear speed at which the universal medium can move any 3D matter body. The relative linear speed of light is a critical constant in any region of space. The magnitude of this constant value depends on the nature of structural distortions in the universal medium in the region where light radiates. The linear speed of light (with respect to a static observer on earth), measured on or near the surface of the earth, is constant irrespective of the direction of radiation. Corpuscles of light, like any other 3D matter body, obey all laws of motion and gravitation. Light has a relative linear speed with respect to a moving observer within the region of space of the radiation. The critical linear speed of light is not a universal constant. It depends on the distortion-density of the universal medium in the region of space (where the radiation takes place) and the units of distance and time in that region of space.

References:

[1] Nainan K. Varghese, *MATTER (Re-examined)*, http://www.matterdoc.info

[2] Wikipedia, *Surface tension,* http://en.wikipedia.org/wiki/Surface_tension

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