

# NATURE OF LIGHT

According to 'MATTER (Re-examined)'

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*Abstract:* Light is sensed by rational beings. Only real entities can produce sensory perception. Matter alone provides substance needed for objective reality in space. Hence, light or its components are essentially made of matter. Universal medium (formed by matter), under suitable conditions, creates components of light from itself. For existence, it is essential for light's components to move at the highest possible linear speed, at which universal medium can move them and spin at frequency, proportional to their matter-contents. Flow of these components constitutes radiation of light or similar radiations. This essay very briefly describes mechanism of creation and development of light's components, as envisaged in alternative concept, presented in the book, 'MATTER (Re-examined)'. For details, kindly refer same [1].

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

## Introduction:

Light is an entity with physical attributes. It exists and moves in space. Only real objects can exist and move in space. To have objective reality and positive existence in space, light has to be a physical entity. Substance provides objective reality to all physical entities. Hence, light should have substance as its content. Matter alone provides substance with objective reality and positive existence to an entity. Therefore, light or its components have to be made of matter. As light can be simultaneously observed in more than one plane, it has to be constituted by three-dimensional matter. Light, being constituted by 3D matter, it has to have all associated physical attributes (mass, inertia, quantity, size, etc) of 3D matter, like any other 3D matter-body.

Light, being a physical object made of 3D matter, it has to have certain structure and definite process and mechanism of creation and sustenance. Nothing can be made out of nothing. 3D matter, for creation of light, has to be provided from pre-existing matter in space. There has to be an agency that provides matter for creation of components of light. Same agency, through natural process, should create and regulate various parameters of created light. This agency should exist outside components of light and as

light can be created and exist anywhere in space, the agency should fill entire space. An entity that fills entire space outside components of light is universal medium. Universal medium, which fills entire space, cannot provide matter from external source but from itself. Hence, universal medium should be made of matter. Under suitable conditions, universal medium should provide sufficient quantity of matter for creation of components of light from itself and provide a logical mechanism for their creation and sustenance.

Since universal medium fills entire space, outside corpuscles of light (or similar radiations), there can be only two types of real entities in nature – universal medium and corpuscles of light, made from and by universal medium. All other matter-bodies, larger than corpuscles of light, have to be constituted by corpuscles of light. Mechanism for their development has to be provided by universal medium. Corpuscles of light are smallest and only stable (basic) 3D matter-particles in nature. Under suitable conditions, corpuscles of light (of appropriate parameters) should be able to constitute larger composite 3D matter-bodies, under natural process, to form all other fundamental matter-particles and macro bodies. Same mechanism should account for diverse properties of macro bodies and various physical phenomena related to them.

Light is observed to have linear motion in space at constant speed. Matter is inert. It has no ability to move or act on its own. Therefore, light being a composite 3D matter-body, it has to have an external moving agency. Since light is independent of all other known agencies and moves anywhere in space, the moving agency of light has to exist in and fill entire space. Only universal medium is such an agency. To act on light and produce its motion, universal medium has to be a real entity. To be real, universal medium has to be made of matter.

Since an observer or source-body of light may move at any speed in any direction, constancy of light's speed cannot be related to them. Other 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 motion of the light should always be in relation to and through the universal medium. Universal medium should not only move light but it should also stabilise any variation and maintain its linear speed, at constant magnitude, irrespective of any influence that may tend to vary linear speed of light. Universal medium should provide mechanisms for all other properties of light as well.

Light is observed to have many similarities with electromagnetic waves. In fact, in most theories, light is currently considered as pure electromagnetic wave. Light is also understood to exhibit certain properties of corpuscles under certain conditions. In order to satisfy these diverse properties, particles of light should exhibit both these properties, simultaneously. These two characters, together, provide light (or similar radiations) with its dual nature.

### **Alternative concept:**

Alternative concept, presented in 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 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 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 ideal fluid. Distortions in universal medium constitute 'work' and stress due to work (distortions) is energy. Frequent local breakdowns of universal medium ensure availability of free quanta of matter and ample opportunities for them to migrate into latticework-structures of universal medium. This keeps quanta-chains of universal medium under compression, even without a definite container.

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

Gravitational action tends to reduce disturbance(s), in universal medium, to minimum. This is achieved either by combining disturbances present or by ejecting them from 2D energy-fields of their existence. Side of a disturbance, with larger convex curvature experiences greater gravitational effort compared to side of same disturbance with lesser convex curvature. Resultant of these efforts tends to move the disturbance in the direction of greater gravitational effort.

### **Creation of 3D matter:**

Stable disturbance, in a plane has a critical radial size, determined by gravitational capabilities of 2D energy-field of its existence. If number of quanta of matter in the disturbance is more than that is required to create critical radial size of stable disturbance, in any plane, gravitational compression compels its quanta of matter to grow into third spatial dimension. This is 'creation of 3D matter' (real 3D matter-particle). A 3D matter-particle exists, simultaneously, in more than one 2D energy-field and it is a disturbance in universal medium. Gravitational compression, in each plane, acts against natural tendency of quanta of matter, within the disturbance, to expand.

Magnitude of gravitational action depends on shape of a disturbance's perimeter. Variation in a 3D disturbance's shape, from a perfect circle in a plane, produces unevenness in gravitational compression on it. Major part of gravitational action on a 3D disturbance is limited to circular periphery of its matter-core. Its disc-faces receive only slight gravitational actions, appropriate to their very small curvatures and sufficient enough to sustain its inherent movements. 3D matter-core, being a disturbance in universal medium, is ejected out of each of 2D energy-fields of its existence. Gravitational actions from universal medium maintain its constant (highest possible) linear speed and spin speed proportional to its matter-content.

3D matter-core, created by gravitation, is stabilized and moved as required by mechanical interactions between it and distorted region in surrounding universal medium. In its stable state, 3D matter-core (created by gravitation) is disc-shaped, spins about one of its diameter and moves at constant linear speed with respect to steady universal medium. They have uniform radial size and thicknesses proportional to their matter-contents.

### **Photon:**

Matter-core of a 3D disturbance and associated distortions in surrounding universal medium, together, form a basic 3D matter-particle, called 'photon'. Photon is a corpuscle of light or similar radiations, whose spin speed (frequency) is proportional to its matter-content. All aspects of photon is regulated, stabilized and sustained by gravitation from universal medium.

Most fundamental properties of a photon are its linear motion at constant linear velocity and spin motion at angular speed proportional to its matter-content. In fact, a photon exists in stable state only because of its motions with respect to surrounding universal medium. It is a necessity of universal medium to maintain photon's movements at critical constant values. Moving photons are practically

isolated from universal medium, so that universal medium can maintain its serenity and stability. Variations in a photon's movements are stabilized by continuous gravitational actions from universal medium. [Here, movements are assigned directly to photon for clearer understanding. A photon, being a corpuscle of 3D matter, it is incapable of any actions or movements on its own. In reality, it is the inertial actions by universal medium about a photon, which move photon's matter-core].

Matter-core of a photon has segmented spherical (disc) shape that spins about one of its diameters. Quanta of matter, constituting matter-content of photon, are held together to form an integrated matter-particle, by all-around gravitational compression. Gravitation is effective only on convex curved surfaces of a 3D disturbance. Gravitational actions around circular periphery of photon's matter-core maintain matter-core's radial size at constant magnitude. Difference between instantaneous convex curvatures at front and rear surfaces of matter-core determines resultant gravitational action that moves photon in linear path and spins its matter-core.

Distortions in universal medium about matter-core of a photon are its 'inertial pocket' (distortion field). Inertial pocket of a photon contain enough distortions (work) in universal medium to sustain integrity, instantaneous shape and movements at constant speeds. Inertial pocket of a photon continuously moulds its (spinning) matter-core, so that magnitude of convex curvature of forward facing surface is always less than that of rearward facing surface. Gravitational actions on spinning matter-core of a photon regulate its instantaneous shape, so that latticework-structures of 2D energy fields are not damaged and at the same time external and internal pressures about matter-core remain in balance. Under this condition, a photon moves at a critical constant (maximum) linear speed through universal medium (space). Linear speed of photon is critical constant because that is the highest linear speed at which universal medium can move a 3D matter-particle, without causing its own breakdown.

Electromagnetic waves are transfer of periodically varying distortions through universal medium. Spin motion of photon's matter-core creates cyclically varying distortions about it. Distortions in inertial-pocket of a photon, in any transverse (perpendicular to its spin axis and direction of its linear motion) plane have many similarities with EM waves. Hence, they may be considered as electromagnetic wave-part of photon. A single pulse of corresponding electromagnetic wave and spinning disc-shaped matter-core, together, form a photon. Rotating distortion-field about photon's matter-core, in transverse plane, appears as wave motion in space, which is same as electromagnetic wave. Matter-core provides matter-component and associated distortions in universal medium provide electromagnetic wave-component of a photon. This accounts for its dual nature – simultaneously being a 3D matter-body and an electromagnetic wave. Unfortunately, in current theories, these characters are looked upon and used separately for different purposes.

Stress produced due to distortions in inertial pocket is the energy-part of photon. Hence, this part of photon may be understood as a segment of electromagnetic wave of frequency corresponding to photon's spin speed.

Matter-core of a photon is a spinning disc of 3D matter. Because of disc-shaped matter-cores, gravitational attraction between two photons (or between photons in different 3D matter-bodies) occurs only when their disc-planes coincide. If disc-plane of a photon's matter-core is intercepted by matter-core of another photon, whose disc-plane is different, first photon experiences partial gravitational attraction towards second photon and second photon does not experience gravitational attraction towards the first photon. This phenomenon is the reason for very weak gravitational attraction between macro bodies, despite enormous strength of gravitation.

Axis of photon's spin is one of its diameters passing through center of matter-core. Direction of spin axis with respect to an external reference is 'polarity of photon'. End points of spin axis are photon's 'poles'. Spin motion of photon, about its spin axis, may be in either direction, clockwise or anti-clockwise, with respect to a reference. For convenience, we may classify photons according to their direction of spin with respect to an external reference into 'clockwise spinning photons' and 'anti-clockwise spinning photons'. Depending on chosen reference, class of a photon may change. Polarity of a photon is set

during formation or re-formation of its matter-core. External efforts may change it, during photon's unstable (by its matter-content) state. Photon's matter-core is most unstable at the instant of reflection from a reflecting-surface. By producing distortions in universal medium, at the point of incidence, polarity and direction of spin of a photon can be changed, during its reflection. Strong magnetic field applied at the place of reflection is found to change polarity of photon.

In its unstable state, spin axis of a photon may develop independent turning motion in any plane under action of external efforts. Spin motion of photon provides its matter-core with rigidity in space (gyroscopic inertia). An external effort on its axis is likely to precess its axis instead of turning it.

Due to combination of linear and spin motions, speeds of segments of photon's matter-core with respect to universal medium, differ. Difference in their relative speeds compels photon's matter-core to lose its matter-content (gradually) during long passages through space. This is one of the reasons for reduction in its frequency that leads towards phenomenon of 'red shift'. As and when a photon loses all its matter-content and its 3D matter-core becomes non-existent, its residual low-frequency inertial-pocket in universal medium to appear as low-frequency EM wave (background radiation) in space.

Matter-cores of all photons are of same radial size. There are no basic 3D matter-particles with radii larger or smaller than photons. Photons may have different quantities of matter-contents, indicated by their frequencies. Under suitable conditions, universal medium compels complimentary photons in various combinations, to form diverse fundamental particles. Further developments into superior 3D matter-particles and macro bodies and their sustenance are guided and accomplished by gravitation from universal medium.

In stable state, photons move in linear paths. During reflections and refractions, their matter-cores and inertial pockets become unstable and universal medium stabilizes them by natural processes. However, when high-frequency photons form binary systems to form superior 3D matter-particles, their matter-cores remain stable, while their inertial-pockets are unstable due to curved paths. In this state, interactions between distortions in their inertial-pocket give rise various types of 'natural forces'. Different types of 'natural forces' originate from universal medium's gravitational efforts. Hence, basically, there is only one type of effort.

Current concept of a photon is quite different from what is explained above. Photon is usually considered as a quantum of energy or electromagnetic wave or particle (?) with zero rest mass. Mass of a matter-body depends not only on its matter-content (rest mass) but also on its linear speed. Hence, a photon moving at the speed of light should have infinite mass. In order to overcome this illogical result, it has become necessary to arbitrarily assume a photon as a mass-less entity. Its mass should always remain zero irrespective of its linear speed.

Momentum of a matter-body is related to its mass. Momentum is essential for a matter-body to do work. Yet, photons are found to do work on collision. In order to overcome these contradictions, even though they possess no rest mass, in mathematical equations, photon is also considered (simply) to possess certain momentum (in some cases, enough momentum to knock out orbital electrons from atoms!). A photon is assumed to have no matter-content but carries only (undefined) energy, which can do work. Contemporary theories also assume that matter is vested only in subatomic particles and larger matter-bodies, which have rest mass. How or from where this matter came into being is not explained. Hence, search for mysterious particles, which may endow property of mass to matter-bodies continues.

Photon, in this concept, is a basic 3D matter-particle that has definite matter-content, indicated by its rest mass. It also has associated work (energy) which was instrumental to its creation and sustains its matter-core or which can do external work, on photon's disintegration. This part of associated energy is considered as mathematical equivalent of electromagnetic wave of same frequency as spin speed of photon's matter-core.

Distortions (equated to electromagnetic wave), associated with a photon, exist within surrounding universal medium but coupled with matter-core of each photon. Matter-core of photon is made of 'real' 3D matter. Matter-core of a photon and its associated inertial-pocket (distortions in surrounding universal medium) are developed and maintained by mutual actions.

Photon is the smallest 3D matter-particle that can exist independently and in reality. It is a physical (materialistic) entity that has objective reality in space. It is a corpuscle of light or any other similar radiation. All other 3D matter-particles and macro bodies are made of combinations of photons.

### **Light:**

Light (or similar radiations) is constituted by numerous 3D matter-corpuscles moved by associated (electromagnetic wave-like) distortions in universal medium. Therefore, light exhibits all characteristic properties of photons. Number of photons per unit time indicates amplitude of light. Frequency of photons in a ray of light shows its intensity and color. Direction of spin of photons in a ray of light indicates its polarity.

Distortions, formed in universal medium, to maintain and move a photon's matter-core, are transferred at (highest) constant linear (and angular) speeds, which universal medium can provide, without causing its own break-down. Matter-core of photon is carried by moving distortions in universal medium. Magnitudes of speed of transfer of distortions depend on nature of universal medium in any region of space.

Continuous flow of corpuscles of light (photons) is a ray of light. It consists of 3D matter-particles as matter-cores of photons and associated distortion-fields. As it is the matter-content that is transferred in a light ray, the process may be called radiation of matter. All similar radiations, by means of displacement of photons in space, are radiations of matter. Depending on quantity of 3D matter in constituent photons of a radiation, radiation of matter may be classified into; Heat ray, infra-red rays, visible light, ultra-violet rays, x-ray or cosmic radiations. Quantity of 3D matter, a photon contains, is indicated by its spin speed (frequency). Frequency of a photon is directly proportional to its matter-content.

### **Conclusion:**

A beam of light is continuous flow of photons (3D matter corpuscles accompanied by their inertial-pockets in universal medium. Distortions in a moving inertial-pocket carry 3D matter-cores of photons at constant linear speed. Linear speed of light is constant because that is the highest linear speed universal medium can move 3D matter. Corpuscles of light, like any other 3D matter-body, obey all laws of physics, including laws of gravitation.

### **Reference:**

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

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