AURORA

According to ‘MATTER (Re-examined)’

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Abstract: Entire space, outside the most basic 3D matter-particles is filled with an all-encompassing universal medium, structured by quanta of matter. Each of basic 3D matter-particles is accompanied by separate set of structural distortions in universal medium, which sustains integrity and movements of its core-body. 3D matter-core and structural distortions in surrounding universal medium, together, constitute a photon. Light (radiation) is a flow of photons (corpuscles of three-dimensional matter). For existence of both, the photon and the universal medium, it is essential for the universal medium to move disc-shaped 3D matter-core of a photon at the highest possible linear speed and spin it (about one of its diameters) at frequency proportional to its 3D matter-content, within certain limits. Attempt to increase linear speed of a photon’s 3D matter-core, compels it to assimilate quanta of matter from surrounding universal medium and thereby increase disc-thickness and spin speed (frequency). In case of very high-frequency photons, increased thickness of 3D matter-core reduces torque on it and encourages it to discard quanta of matter from it. These two opposing phenomena, acting simultaneously, on very high-frequency photons radiated from sun and passing through the vicinity of earth (or any other moving macro body) ensure ample supply of free quanta of matter in the region. Universal medium gathers, shapes and compresses these free quanta of matter to form new photons to be radiated from the region. These radiations appear as aurora to us. This essay very briefly describes mechanism of creation of photons (corpuscles of light) of varying colour and complexity displayed during aurora borealis (northern lights) and aurora australis (southern lights), as envisaged in alternative concept, presented in the book, ‘MATTER (Re-examined)’. For details, kindly refer to same [1].

Keywords: Universal medium, radiation, light, photon, corpuscles of light, aurora borealis and aurora australis.

Universal medium:

In material world, all real entities are made of matter. Light is a real entity and hence made of matter. Light is observed to have linear motion in space at critical constant speed. Matter is inert. It has no ability to move or act, on its own. Therefore, a corpuscle of 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. Such an agency is the universal medium. 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.

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 (in vicinity to each other) 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) without gaps or voids. Due to its latticework-structures, universal medium has all properties of ideal fluid. Distortions in universal medium constitute 'work' and stress due to work (structural 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. They are continuously under stress to expand. Pressure, applied by this stress is gravitation.

Universal medium should not only move basic 3D matter-particles but it should also stabilise variations and maintain their linear and spin speeds, irrespective of external influences that may tend to vary their linear or spin speeds. Universal medium should provide mechanisms for all other properties of real objects, including light, as well.

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 of its structure. Excessive numbers of free quanta of matter (more than that can be absorbed into latticework structures of universal medium) in a region of space also produce similar effects. Due to inward radial movement of latticework structures in universal medium, it gather free quanta of matter in the gap to form a 'disturbance'.

Presence of a disturbance in latticework-structure of a 2D energy-field breaks its continuity. As far as universal medium is concerned; space, occupied by disturbance, remains a gap in its structure. 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 extent of 2D energy field, in the direction, away from disturbance and magnitude of convex curvature of its perimeter.

Corpuscles of radiation (photons) are created, moved and sustained by universal medium. Each photon has a disc-shaped (segmented spherical) 3D matter-core that spins about one of its diameters at spin speed proportional to its 3D matter-content and moves at the highest possible (hence constant) linear speed with respect to surrounding universal medium.

Mechanism of motion:

Universal medium is a self-stabilizing entity. Distortions in its latticework-structures (work) spread out in such a manner as to ensure homogeneous and isotropic nature of universal medium. Structural distortions (work) are transferred from higher distortion-density region to lower distortion-density

region, without moving the structure itself. Transfer of structural distortions (work) in universal medium carry 3D matter-particles in the region along with the structural distortions. Displacements of constituent 3D matter-particles in an object result in movement of the whole object. This is the mechanism of motion of objects.

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 corpuscles of light to move them) is the universal medium. Therefore, universal medium should be the agency that moves light and hence motion of light should always be in relation to and through the universal medium.

Universal medium, in and about a large body, has all the structural distortions (work) required to sustain integrity of all its constituent 3D matter-particles and to maintain body's linear motion in a straight line and spin motion at constant angular velocity. Therefore, structural distortions in the region of universal medium about a planet continue to transfer at constant speed along planet's path.

Photon:

Gravitational action, by universal medium, on a disturbance is through direct contact between them. During this action, latticework-structures of surrounding universal medium are distorted. Distorted region in universal medium around and about a 3D disturbance is its 'inertial-pocket'. All actions by universal medium on 3D disturbance are through the inertial-pocket. 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 push the disturbance in the direction of greater gravitational effort.

Variation in 3D disturbance's shape, from a perfect circle in various planes, produces unevenness in gravitational compression on it, from all around. In order to establish 2D energy-field's homogeneity, distortions tend to move from region of high distortion-density to region of low distortion-density. 3D disturbance, held within the gap in distorted region of 2D energy-field (inertial-pocket) is also carried along with distortions towards the direction of lower distortion-density. Transfer of structural-distortions in the universal medium produces inherent linear and rotary motions of every basic 3D matter-particle in space. Moving structural-distortions in universal medium, surrounding 3D matter-core of a photon, has many similarities with EM waves in each plane. 3D matter-core and the structural distortions in surrounding universal medium, together, form a photon. 3D matter-core provides photon's particle-nature and structural-distortions in surrounding universal medium provide its wave-nature.

3D matter-core of a photon, being a disturbance in universal medium, is ejected out of each of 2D energy-fields of its existence. This is the mechanism of motion of photons through universal medium. As photon moves forward, latticework-structures of 2D energy-fields in front are parted to create passage and latticework-structures at rear joins back to restore continuity of universal medium. Pressure (resistance) from front, due to collision between 3D matter-core of photon and quanta of matter in the latticework-structures of 2D energy-fields, is balanced by ejection efforts on it from the rear. This balancing action maintains linear speed of photon at the highest possible (hence constant) level with respect to surrounding universal medium. Similar actions on rearward and forward faces of segments of 3D matter-core maintain rotary speed of 3D matter-core proportional to its 3D matter-content.

Most fundamental property of a photon is linear motion of its 3D matter-core at critical constant velocity and spin motion of the same at angular speed proportional to its 3D matter-content. In fact, a photon exists in stable state only because of these motions at constant velocities, with respect to surrounding universal medium. It is a necessity of universal medium to maintain linear velocity and rotary speed of photon's 3D matter-core at this critical level. Hence, we can say that stable photon maintains its linear velocity and rotary speed at critical constant values.

Universal medium's continuous gravitational actions, on photon's 3D matter-core, overcome instability in its linear and angular speeds. [Here, motions are assigned to photon's 3D matter-core for

clearer explanation. In reality, 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 universal medium about it, which move photon's 3D matter-core]. Inertial-pocket, in universal medium (similar to electromagnetic wave in each plane) about photon's 3D matter-core, is photon's moving-part that carries its 3D matter-core.

Difference between instantaneous convex curvatures at front and rear parts of photon's 3D matter-core determines resultant gravitational action that moves photon's 3D matter-core in its linear path and rotates it about one of its diameters. Inertial-pocket of photon continuously moulds its (spinning) 3D matter-core, so that magnitude of convex curvature of forward surface is always less than that of rearward surface. Gravitational actions on spinning 3D matter-core of a photon regulate its instantaneous shape, so that latticework-structures in universal medium are not damaged and at the same time external and internal pressures about 3D matter-core of photon remain in balance. Under this condition, a photon moves at a critical constant (maximum) linear speed through universal medium (space) and spins at angular speed proportional to its 3D matter-content. 3D matter-cores of all photons have identical radial size. Thickness of their segments depends on amount of 3D matter-contents.

Magnitude of resultant moving effort on each of the segments of 3D matter-core of a photon has two components. The component in the direction of its linear motion provides linear impetus for linear motion of the 3D matter-core and transverse component provides for torque for rotation of 3D matter-core. Relative magnitudes of linear effort and torque depend on instantaneous curvatures of forward and rearward faces of segments of 3D matter-core. As thickness of the segments increase with increase in 3D matter-content, linear effort reduces and torque increases. Reverse happens when 3D matter-content and thickness of segments reduces. As a result, instantaneous displacement of any point on the 3D matter-core of a photon is at a critical constant rate with respect to universal medium.

Axis of rotation of 3D matter-core of a photon is always perpendicular to direction of its linear motion. Due to superimposition of linear and spin motions of 3D matter-core of photon, its forward rotating segment has higher instantaneous rate of displacements compared to that of rearward rotating segment. Hence, to maintain average critical linear speed of 3D matter-core, forward rotating segment moves at slightly higher speed and rearward rotating segment moves at slightly slower speed from optimum speed. Because of this speed difference, forward rotating segment continuously assimilates quanta of matter and rearward rotating segment continuously discards quanta of matter at slightly higher rate. This phenomenon causes photons gradually lose their 3D matter-contents. Gradual reduction of 3D matter-content causes frequency reduction (leading to phenomenon of red-shift) until its death, when whole of its 3D matter-content is lost. At this point, when a photon is at its lowest frequency and it ceases to exist as a corpuscle of 3D matter, associated inertial pocket (wave-part of photon) is left in universal medium to appear as CMB Radiation.

Effects of external factors on linear speed of photon:

Depending on its instantaneous orientation, gravitational (apparent) attraction between photon's 3D matter-core and another 3D matter-body tends to either accelerate or decelerate photon's 3D matter-core. Attempt to increase relative speed compels photon's 3D matter-core to assimilate quanta of matter from latticework structures of universal medium and attempt to reduce this relative speed compels photon's 3D matter-core to release quanta of matter free from it into surrounding universal medium. This mechanism sustains photon's critical constant speeds irrespective of any external influences. For brief details on stabilization mechanism of linear speed of light, kindly refer to short article 'Linear speed of light' at http://vixra.org/pdf/1103.0026v2.pdf. (Apparent) gravitational attraction is the only external force that can act on a photon.

Another factor that affects impetus on 3D matter-core of a photon is the gradient of structural distortion-density in surrounding universal medium. As a photon approaches higher distortion-density-region in universal medium, resistance to its forward surface is comparatively higher than driving effort from the rear surface. Higher distortion-density in front of 3D matter-core produces higher resistance to its motion and thereby increases interaction between 3D matter-core and the universal medium. Effect on photon's 3D matter-core is equivalent to that of an attempt to accelerate it, which helps it to acquire

quanta of matter from surrounding universal medium (inertial pocket) to augment its 3D matter-content and spin speed (frequency). This increases absorption of number of quanta of matter from universal medium by 3D matter-cores of photons.

Similarly, as 3D matter-core of a photon moves away from a higher distortion-density region in universal medium, resistance to its forward surface is comparatively lesser than driving effort from rear surface. Higher distortion-density in universal medium, behind 3D matter-core, produces higher impetus to accelerate its motion and thereby increases interaction between 3D matter-core and the universal medium. Effect on photon's 3D matter-core is equivalent that of an attempt to accelerate it, which helps it to acquire quanta of matter from surrounding universal medium (inertial pocket) to augment its 3D matter-content and spin speed (frequency).

In either case, whenever a photon moves through universal medium of varying distortion-density, its 3D matter-core assimilates quanta of matter from surrounding universal medium, which increases its 3D matter-content and frequency. Therefore, a photon passing through variable distortion-density region in universal medium gains 3D matter and increases its frequency.

Aurora:

Angular speed of photon's 3D matter-core, in terms of number of rotation and unit of time, is its frequency. Photon's frequency is proportional to its 3D matter-content. Due to absence of segments, spherical 3D matter-core of an imaginary photon cannot have driving effort on it. As 3D matter-content of a photon's 3D matter-core increases, curvatures of faces of its segments and hence their angular departure from the direction of linear motion of photon increase. As a result, direction of driving effort on the 3D matter-core deflects from the direction of the line of its motion, OA, as shown in figure 1.

In figure 1, O represents 3D matter-core of a photon, moving in the direction OA. As 3D matter-content of the photon increases and enlargements of its segments shift line of action of driving effort towards direction along OB. Effective driving effort on the 3D matter-core along its direction of linear motion reduces to OC. This is as good as an external action to decelerate the photon.

In case of a very high frequency-photon, due to geometry of its 3D matter-core, magnitude of

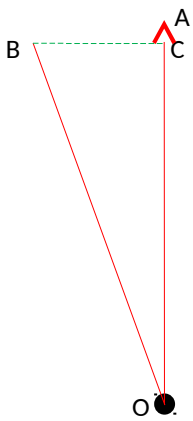

Figure 1

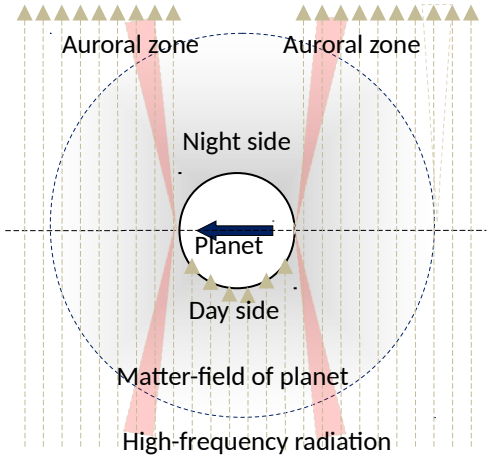

Figure 2

forward driving effort reduces as its 3D matter-content increases. As thicknesses of is segments increase, spin motion of 3D matter-core of a photon increases and its linear speed tends to reduce. Consequently, linear speed of high frequency-photon that absorbs quanta of matter from surrounding universal medium tends to reduce. Attempt to reduce linear speed invokes actions similar to attempt to decelerate the photon and the photon gradually loses 3D matter in the form of free quanta of matter, discarded into surrounding universal medium. Therefore, attempt to increase frequency of a very high frequency-photon beyond certain limit (about 10^{22} Hz) would cause its 3D matter-core to gradually discard quanta of matter.

Tendency of reduction in linear speed of a photon reduces internal pressure of its 3D matter core that leads to dispersal of quanta of matter from photon's 3D matter-core into surrounding universal medium. Number of quanta of matter, discarded from 3D matter-core of a photon depends on its total 3D matter-content. Very high-frequency photons discard greater number of quanta of matter at higher rates into surrounding universal medium.

Gradually, when the photon reaches a steady stable state with in a region of universal medium with gradient in distortion-density, number of quanta of matter assimilated into photon's 3D matter-core and quanta of matter discarded by the 3D matter-core will equalize. In the region, where number of discarded free quanta of matter exceeds number of quanta of matter that can be readily absorbed into latticework structures of universal medium, they form disturbances. If discarded quanta of matter in the disturbances are in sufficient quantity, they may be used by the universal medium to form new photons and radiate them from the region. Universal medium will gather, compress and mould free quanta of matter in these disturbances into 3D matter-cores of new photons to be radiated in all directions. These photons, radiated from suitable regions, appear to dwellers of the planet as auroras.

A typical auroral display on earth consists of photons created from free quanta of matter available in universal medium in polar region of earth (or any other macro body of considerable size) on its night side. Although similar phenomenon takes place on the day side of earth, sun light overcomes auroral displays on that side. Variations in the 3D matter-contents of newly created photons by universal medium from free quanta of matter produce effects of different magnitudes and colours of radiation.

Most auroras occur in auroral zone (a narrow band above surface of planets as shown by reddish conical region in figure 2) all around polar region of a planet. They are clearly visible on the night side of planet between 10 degrees to 20 degrees elevation from planet's poles. Photons, created out of these regions do not reach observational points on the planet. It is not necessary for the planet to have an atmosphere or a magnetic field to produce auroral displays.

Conclusion:

Auroras, about any large macro body, are caused by radiation of corpuscles of light (photons) radiated from the region of universal medium, where matter-field of the body has gradient in structural distortion-density. High-frequency photons, passing through this region absorb quanta of matter from structures of universal medium and discard them free into universal medium. Further, universal medium forms new photons from these free quanta of matter. Radiation of new photons from these regions appear as auroras to observer on the surface of the macro body.

References:

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

[2] Nainan K. Varghese, **Nature of light**

[3] Nainan K. Varghese, **Linear speed of light**

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