HEAT

(According to 'MATTER (Re-examined)'

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Abstract: Presently, 'heat' is understood as a type of energy and 'heating' as a process of transfer of energy. Energy, being ability to do work, is a quality and hence a functional entity. Functional entities have neither objective reality nor positive existence in space. Therefore, energy has neither form, nor structure, nor real existence. However, in contemporary physics, energy (an imaginary entity) is treated almost like a real entity with form, structure, objective reality with ability to transfer and can change forms. It is currently used as cause of actions, where no other cause is obvious.

According to an alternative concept, presented in the book, 'MATTER (Re-examined)', energy is a functional entity that develops wherever and whenever work is done in association with a three-dimensional matter-body. Heating is a process of reducing three-dimensional matter-content level of a macro body. In any body, its 3D matter-content and work associated with its integrity and state are complimentary and support each other. 3D matter-content of a body is the quantity of matter it contains in the form of basic 3D matter-particles. Energy-content about a body is the strain developed, due to distortions (work-done), in universal medium about the body.

Keywords: Heat, 3D matter-content level, temperature, matter, energy, work done.

Introduction:

An alternative concept is proposed in book 'MATTER (Re-examined)'. In it: Entire space, outside most basic 3D matter-particles, is filled with an all-encompassing universal medium, structured by quanta of matter in two-dimensional latticework formations in all possible planes. Due to its structure, universal medium is inherently under compression. Compression experienced by any 3D matter-particle in the universal medium is gravitation. Magnitude of gravitation corresponds to extent of universal medium that exerts the pressure. Extent of universal medium between two 3D matter-particles is always less than extents of universal medium on their outer sides. Hence higher gravitational actions on outer sides against lesser gravitational actions from in between tend to move the 3D matter-particles towards each other. This tendency is understood as gravitational attraction or gravity. Gravitational attraction (gravity) is the resultant (relatively a minor by-product) of separate gravitational actions on two 3D matter-particles by universal medium.

Free quanta of matter, within a gap in its latticework structures are compressed, shaped and moved by universal medium to form photons. Photons (corpuscles of radiation) are the most basic 3D matter-particles. Each photon has a disc-shaped 3D matter-core that spins about one of its diameters at spin speed proportional to its 3D matter-content. 3D matter-core of photon is also moved at the highest possible linear speed by universal medium.

Gravitation can act only on (convex) curved surfaces of most basic 3D matter-particles. Therefore,

in order to invoke gravitational attraction between two photons, their 3D matter-cores have to be coplanar. Under suitable conditions two complimentary photons form a unit of primary 3D matter-particle (biton) by grouping in binary fashion to revolve about each other in common circular path, while spinning about a common axis passing through their 3D matter-cores and centre of their circular path. Bitons, in turn, form all other superior 3D matter-particles and macro bodies.

Magnitude of structural distortions in universal medium, in and about a body, is the total work done about the body. Intrinsic work about a body was done during creations of its constituents and formation of the body. This part of work maintains integrity of the body. Additional work invested about a body determines body's state of motion.

All conclusions expressed in this article are taken from the book 'MATTER (Re-examined)' [1]. For details, kindly refer to the same.

Photon:

Photons are the most basic 3D matter-particles. Critical constant linear and spin speeds of their 3D matter-cores are imperative for their stability and existence. Spin speed of photon's 3D matter-core is proportional to its 3D matter-content. 3D matter-core of a photon is moved at the highest possible linear speed by universal medium. Linear speed of photon is with respect to structural formations in universal medium. Structural formation of universal medium in any region depends on magnitude and direction of distortions in it. Therefore, if structural formations in universal medium are shrunk (compressed), a photon will appear to move slower to an observer outside the region of structural distortions. Similarly, if structural formations in universal medium are stretched (dilated), a photon will appear to move faster for an observer outside the region of structural distortions. Anyway, linear speed of photon remains critical constant with respect to universal medium.

Should 3D matter-core of a photon move faster than its critical linear speed, parts of 3D matter-core tends to rub stronger into structure of universal medium and thereby assimilate quanta of matter from universal medium into itself. 3D matter-content of its 3D matter-core will increase and make it necessary for the 3D matter-core to spin faster. Therefore, attempt to increase linear speed of a photon (by external actions) increases its frequency rather than its linear speed. Similarly, should 3D matter-core of a photon move slower than its critical linear speed, parts of 3D matter-core tends to move away from rubbing surface of structure of universal medium and thereby reduce its internal pressure. This encourages quanta of matter in 3D matter-core of photon to escape free into universal medium. 3D matter-content of its 3D matter-core reduces and makes it necessary for the 3D matter-core to spin slower. Therefore, attempt to reduce linear speed of a photon (by external actions) reduces its frequency rather than its linear speed. In either case, linear speed of photon remains critically constant, with respect to universal medium.

Biton:

A biton is a binary unit made up of two complimentary photons, moving in common curved path at their critical linear speeds (speed of light). High centrifugal action on the photons is neutralized by equally high gravitational attraction between them. A biton reaches stable state, when constituent photons are also spinning about a common axis, passing through centre of their circular path. Spin speed (frequency) of a photon is proportional to its 3D matter-content. Each photon completes one spin during the time it takes to complete one revolution in its curved path. Hence, radial size of a biton depends on 3D matter-contents its constituent photons. Photons of a biton continuously strive to maintain their 3D matter-contents equal at all times.

Stable (radial) size of the biton is determined by the balance between centrifugal actions on constituent photons and gravitational attraction between them. Due to this mechanism [1], every biton has an inherent tendency to stabilize itself. In its stable state, 3D matter-contents of constituent photons of a biton are equal, both photons are spinning in synchronism, photons are moving in the common circular path, at any instant they are diametrically opposite in their common

circular path, median perimeter of the biton is equal to one wavelength of the photons and 3D matter-cores of both photons are coplanar. Lesser 3D matter-contents of photons make them spin slower and make radial size of biton larger. Higher 3D matter-contents of photons make them spin faster and make radial size of biton smaller. Variation in any of these requirements brings biton's self-stabilizing mechanism into action. All superior 3D matter-particles and macro bodies are made up of bitons, in various combinations. Changes in 3D matter-contents of constituent photons in bitons of a macro body give rise to phenomena of its heating/cooling.

External pressure on a biton:

Instability of a biton may be caused by changes in any one of its balancing actions. External pressure on a biton and changes in 3D matter-contents of its constituent photons affect biton's stability. External pressure on a biton append with the gravitational attraction between the photons. Increased external pressure on a biton tends to provide additional push on constituent photons towards each other and reduce biton's radial size. Reduction in external pressure on a biton tends to let centrifugal action to move constituent photons away from each other and increase biton's radial size. Changes in 3D matter-contents of constituent photons vary magnitudes of gravitational attraction between them and affect centrifugal actions on them. Increase in gravitational attraction or reduction in centrifugal actions on photons tend to reduce biton's radial size. Similarly, reduction in gravitational attraction or increase in centrifugal actions on photons tend to enlarge biton's radial size.

We shall examine actions on a single biton during variations in external pressure on it. In a macro body, each of its affected constituent bitons behaves identically and together they cause changes in the body as a whole.

Constituent photons of bitons tend to move towards each other under increased external pressure and thereby reduce radial size of their mean circular path. This is not stable state for the biton, because both photons require more than one complete revolution in circular path to complete one spin about their common axis. This requires a change in transfer of structural distortions in universal medium (which are instrumental to movements of photons' 3D matter-cores) about circular path of photons in the biton. Structural changes are always resisted by self-stabilizing property of universal medium. Resistance by universal medium tends reduce linear speeds of photons in their common circular path.

Tendency to reduce size of circular path by increased external pressure is opposed by increased resistance to linear motion of constituent photons. Attempt to reduce linear speed of a photon results in loss of 3D matter-content from its 3D matter-core. As a result, frequencies of photons (being proportional to their 3D matter-contents), reduce. Due to reduced frequency of constituent photons, the biton requires much larger circular path for its photons to retain its stability. This will encourage loss of 3D matter-content from 3D matter-cores of photons at higher rates. These seemingly contradictory actions will continue until the biton reaches a stable state, with lower 3D matter-content but with larger radial size than before it experienced external compression. Under increased external compression, a biton strives to reduce its 3D matter-content level and increase in radial size.

Photons of bitons tend to move away from each other under centrifugal actions against dilated external pressure and thereby increase radial size of their mean circular path. This is not stable state for the biton, because both photons require less than one complete revolution in circular path to complete one spin about their common axis. Change in pattern if their motions require changes in transfer of structural distortions in universal medium about circular path of photons in the biton. Structural changes are always resisted by self-stabilizing property of universal medium.

Tendency to enlarge circular path by dilation of external pressure is assisted by reduction in resistance to linear motion of constituent photons. Attempt to increase linear speed of a photon

results in assimilation of 3D matter-content into its 3D matter-core. As a result, frequencies of photons increase. Due to increased frequency of constituent photons, the biton requires much smaller circular path for its photons to retain its stability. This will encourage assimilation of 3D matter-content into 3D matter-cores of photons at higher rates. These seemingly contradictory actions will continue until the biton reaches a stable state, with higher 3D matter-content but with smaller radial size than before dilation of external compression. Under dilated external compression a biton strives to increase its 3D matter-content level and reduce its radial size.

Heat:

Process of reduction in 3D matter-content level of a macro body is heat or heating. Process of increasing 3D matter-content level of a macro body is cooling. Usually, all materials expand and weigh less, when hot. However, certain compounds/mixers may be anomalous due to different reasons. Heating of a macro body may start (or spread from) any locality in a body.

Entire space (whole of universe) is filled with matter of uniform matter-density. However, we (the rational beings) being three-dimensional bodies, live and operate in 3D spatial system. We can sense only the part of matter that exists in 3D spatial system. Rest of matter that exists in other spatial dimensions is insensible to us. Although matter-densities of 3D matter-cores of photons and universal medium (currently considered as empty space) are identical, we can sense/observe only the photons and superior 3D matter-bodies formed by them.

3D matter-content level of a body is different from its 3D matter-density. Total 3D matter in a body related to total volume of the body gives us body's 3D matter-density. In this case, inter-particle distances between constituent 3D matter-particles of a body at various levels (which are filled with matter in lower spatial dimensions) are not taken into consideration. In case of 3D matter-content level, radial sizes of bitons in the body is specifically considered to determine 3D matter-density of the body. E.g. For a photon, its 3D matter-content level and 3D matter-density are identical. If a biton is considered individually (neglecting space within circular paths of constituent photons), its 3D matter-density and 3D matter-content level are identical. A hot body, under external pressure, should have low 3D matter-content level. However, if structure of material is such that inter-atomic and other inter-particle spaces can vary to compensate for changes in radial sizes of its bitons, its 3D matter-density will not relate to 3D matter-content levels of its bitons.

Changes in external pressure on constituent bitons of a body are the only action required to heat or to cool a body. External pressure about a biton may be varied by two methods: direct heating and indirect heating.

Direct heating:

Bitons are very minute 3D matter-particles, when compared to macro bodies, constituted by them. Hence, external pressure applied on a macro body affects each of its bitons, in affected region, as uniform external pressure. During heating, both constituent photons of biton undergo similar process to reduce their 3D matter-contents, as explained above. Biton reaches a stable state with lower 3D matter-content level and larger size than it had before application of compression on the body (direct heating) started. Effects on the biton are directly induced by the external pressure on the macro body. Hence, this method of heat may be called direct heating. Depending on the locality of external pressure, heating may take place at any part of a body or on the whole body.

Indirect heating:

Heating may also be induced by increasing 3D matter-contents of constituent-photons of bitons, separately or together. Photons of low frequency radiation, incident on a macro body, are slowed down during their entry into body's matter field (matter field of a macro body is the distorted region of universal medium, in and about the body). These photons come to a halt before they can be reflected away from the body. There are also numerous photons in the bitons of the body, near body's surface, moving in circular paths. As and when, 3D matter-core of one of photons in a biton

happens to be co-planar with 3D matter-core of halted photon, they combine under action of gravitational attraction to increase 3D matter-content of photon in the biton. Increase in 3D matter-content of one or both of its photons, destabilize the biton. Photons of biton start to trace separate circular paths about common centre of biton. Increased resistances to their linear and spin motions tend to effectively reduce their speeds. Tendency to reduce speed of a photon reduces its 3D matter-content rather than its speed. Therefore, both photons reduce their 3D matter-contents (at rates proportional to their frequencies).

Free quanta of matter, discarded from 3D matter-cores of photons may form new photons and radiate from the region. Many of low-frequency photons from this radiation may heat up neighboring bitons in the same way as done by external radiation, incident on the body.

This process will continue until the biton achieves stability and settles at lower 3D matter-content level and enlarged size than when it had started to receive low frequency radiation (indirect heating). All bitons in the neighborhood also synchronizes with the biton that received 3D matter-content from photons in incident ray. Increase in size of the biton reduces inter-particle spaces in the neighboring region, which raises pressure in universal medium in the region. Increased pressure in universal medium acts as external pressure on all bitons in the region. All these bitons reduce their 3D matter-contents as in the case of direct heating. This method of reducing 3D matter-content level of a body by spreading external pressure (created during absorption of low frequency photons) in a body may be called indirect method of heating. This method is called indirect because absorption of low frequency radiation initially develops external pressure about the bitons, which in turn reduces their 3D matter-contents.

Cooling:

Cooling is a process in reverse direction to heating. Unlike heating, cooling takes only at the surface of a macro body, which is in direct contact with lower (distortion) pressure region in universal medium. As a constituent photon of a biton with low 3D matter-content level enters low distortion pressure region in universal medium it experiences lower resistance to its forward motion, on its forward surface. Lowered resistance let forward push on photon's 3D matter-core to accelerate it. Forward surface of 3D matter-core of photon presses strongly on to distorted region in universal medium and assimilates few quanta of matter from universal medium into its own 3D matter-core. Assimilation of quanta of matter increases 3D matter-content of photon and increases photon's frequency. Every half-spin constituent photons of biton reverse roles. After half-spin of photons, the photon that was moving through lower distortion-density region (facing outwards from the body) of universal medium will now move through higher distortion-density region (facing inwards to the body), while other photon will now move through lower distortion-density region (facing outwards from the body) in universal medium and assimilate quanta of matter into its 3D matter-core. In this way, 3D matter-cores of both photons will acquire more and more 3D matter-content. This process will continue until distortion-densities on both sides (region facing outwards from the body and region facing inwards to the body) of biton in universal medium have similar distortion-densities. This condition can occur only when whole of the body has reached room temperature. This is the cooling process of a hot body.

If two parts of a body are at different 3D matter-content levels (one hotter than the other) hotter part of the body may continue to radiate low-frequency photons, while the other cooler part of the body may continue to receive 3D matter-content from low-frequency photons radiated from hotter part. As a result, cooler part tends to heat up and hotter part tends to cool down simultaneously.

Mechanism of heating:

Heating of a gaseous body may be considered for illustration. When a gaseous body is compressed, compressive pressure reduces its volume. Smaller constituents of body are brought nearer and held in that relative position against natural efforts trying to keep them at regular

distance in their natural formations. External pressure has invested some work about the body to reduce its volume. Work-done is held within the body till compression of body is removed and it is dissipated by equal work in opposite direction by inter-molecular forces, when the body attains its original volume.

During reduction of its volume, primary 3D matter-particles (bitons) in body under compression discard 3D matter-contents in the form of free quanta of matter into surrounding universal medium. If available in sufficient quantity, free quanta of matter are compressed by universal medium to create and radiate new photons from the region, initially in the form of low-frequency heat radiations. This may be indicated by increase in body's temperature. Body radiates 3D matter in the form of low-frequency photons (heat rays) away from the body and the same is lost to the body. Gradually, as 3D matter-content level of the body reaches steady state. Work done about the body to compress it (either by external mechanism or sealed container) has not changed and constituent photons of bitons of the body are held nearer and at lowered 3D matter-content level. In this state, work done about the body is continuously opposed and neutralized by work done by inter-particle field efforts. Low-frequency radiation of photons from the body ceases gradually. Due to container, the gaseous body is unable to transfer compression pressure outside the body. That is, the body cannot influence 3D matter-content level of an outside body (a thermometer). When 3D matter-content level of the body stabilizes, thermometer will indicate temperature of the body as at room-temperature (which is equivalent to much higher 3D matter-content level).

When external pressure on a body is reduced, work done by inter-particle field-efforts and centrifugal actions surpass gravitational attraction to move photons in bitons away from each other. As external pressure is lowered, 3D matter-cores of photons bitons assimilate matter from surrounding universal medium to increase their 3D matter-content levels (body cools down). After some time, gradually, the body regains enough matter from surroundings so that constituent photons in bitons may return to their stable distances from each other. At any stage, when the body reaches steady state, at which work done by external pressure is balanced by work done by inter-particle field-efforts, it is at room temperature.

As there is no other body nearby, external pressure on a body in free space is minimum. In free space, a body will be coolest and at its highest 3D matter-content level. Heating a body is to reduce its 3D matter-content level and total 3D matter-content of the body. Cooling a body is to increase its 3D matter-content level and total 3D matter-content in the body. It is found that a hot body weighs less than the same body in cooler conditions. It shows that 3D matter lost or gained by a body during heating or cooling change gravitational attraction between the body and other bodies. Since gravitational attraction depends on 3D matter-content of a body, we can infer that heating or cooling can change 3D matter-content (represented by it mass) of a body. During heating, a body loses 3D matter-content and thus reduces its weight. During cooling body absorbs 3D matter-content and gains weight.

Heat and temperature:

Heat and temperature are different phenomena. However, currently, they are often considered same or equivalent. This belief is based on human experience that by heating a body, its temperature can be increased. Heat (or heating) is a process by which 3D matter-content level of a body reduces. Conversely, cooling is a process by which 3D matter-content of a body increases. Temperature is a number, denoting average 3D matter-content level of a body with respect to 3D matter-content level of a reference body, calibrated with respect to 3D matter-content levels at different reference states.

Changes in temperature of a body do not always mean corresponding changes in 3D matter-content level of the body, which depends solely on external pressures on its constituent bitons. To indicate 3D matter-content level of a body, reference material in thermometer has to be in direct

contact with the body. 3D matter-content level of a body, cooling below room temperature, cannot be measured by remote sensing thermometers.

Heat and energy:

Currently, heat is regarded as a form of energy that can be transferred and transformed. Only an entity that has objective existence and some form of structure can be transferred or transformed. But energy is understood as ability to do work. As ability is quality, ability (itself) cannot be transferred or transformed. A real entity that has ability may be transferred or transformed to improve or deteriorate its ability. Hence, energy cannot be regarded as a real entity. Energy being a functional entity, it can perform all functions assigned to it by rational beings, however illogical they may be.

Heat is related to transfer and transformation of 3D matter. Due to changes in 3D matter-content of a body, energy associated with the body also may change. Here, energy is considered as a shadow of work-done in association with a 3D matter-body.

Conclusion:

Heat (heating/cooling) is a process that changes 3D matter-content level of a 3D matter-body. Direct (and indirect) method of heating/cooling is caused solely by variations in external pressures on constituent bitons (primary 3D matter-particles) of the body. Simple mechanical actions by universal medium accomplish heating/cooling of a body. During heating, 3D matter-content level of a body reduces and (usually) the body expands. During cooling, 3D matter-content level of a body increases and (usually) the body contracts. A 3D matter-body is at its highest 3D matter-content level, when it is coolest and in free space.

References:

References are self-published by the author. They are neither reviewed nor edited.

[1] Nainan K. Varghese: *MATTER (Re-examined)*. Createspace on-line publishers, (2013), Vol I - https://www.createspace.com/4415292, Vol II - https://www.createspace.com/4415297 .

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