HEAT AND WEIGHT

(According to "*Hypothesis on* MATTER")

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Abstract: Weight of a macro body is its acceleration due to gravity, in gravitational units, towards another larger macro body. During variations in its temperature, a macro body changes its mass (matter content). Since mass is a factor in both the equations, to determine the gravitational attraction and the acceleration of a body, body's acceleration due to gravity does not change by variation in body's mass. However, "Hypothesis on Matter" advocates a mechanism, which causes additional changes in the gravitational attraction over and above the changes caused by changes in a body's mass. Thus, it is logical to find that a macro body weighs less, when hot compared to its weight in cooler state.

Keywords: Heating, cooling, attraction due to gravity, weight, heat, Hypothesis on MATTER.

Introduction:

'Hypothesis on MATTER' describes an alternative concept, based on a single type of postulated matter particle. In it: Entire space is filled with quanta of matter in the form of latticework-structures of 2D energy fields. 2D energy fields exist in all possible planes in 3D space system. Each 2D energy field extends infinitely in all directions in its plane. 2D energy fields act as the all encompassing medium for all actions and hence, there are no actions at a distance. 2D energy fields gather and compress quanta of matter, freed from them during local breakdowns in any part of space. Compression of the collective body of free quanta of matter, by gravitational actions from surrounding 2D energy fields, converts the quanta of matter into 3D status and form core-bodies of photons. 3D matter core-body and associated distortions in universal medium constitute a photon. Photons are corpuscles of light or similar radiations. They are the basic 3D matter particles. Unions of photons in various combinations form different types of superior fundamental particles, atoms, etc. Matter core-body of a photon is spherical-segmented (disc-shaped) spinning body. A photon moves at constant linear speed (of light) and spins about one of its diameters. Spin speed (frequency) and angular thickness of a spinning photon-disc are proportional to its matter content.

Presence of 3D matter core-body of a photon breaks continuity of 2D energy fields in all the planes, passing through them. Discontinuity of a 2D energy field causes gravitational actions from 2D energy fields on the matter body of the photon. Gravitation can act only on the curved periphery of the disc shaped core-body of a photon. Magnitude of gravitational effort is proportional to the extent of 2D energy field, acting on the 3D matter core-body of a photon. Extent of 2D energy field in any direction from core-body of a photon, in free space, is infinity. If there are two photons (their disc planes) in a plane, gravitational efforts on them from their outer sides are greater than gravitational efforts on them from in-between. As a result, the photons tend to move towards each other. Resultant gravitational effort, trying to move the photons towards each other, is the gravitational (apparent) attraction between the photons. Similar actions between constituent photons (in the same planes at any given instant) in two macro bodies result in gravitational attraction between the macro bodies. Gravitational attraction between two macro bodies is the resultant of gravitational (apparent) attractions, between their constituent photons, whose disc planes coincide. At any instant, only those photons in both macro bodies, whose disc planes coincide, contribute towards gravitational attraction between two macro bodies.

Heating is a process by which a macro body loses its matter and energy contents. Reduction of matter content of a photon reduces photon-disc's thickness and reduces its spin speed. Conversely, cooling is a process by which a macro body gains matter and energy contents. Enhancement of matter content increases photon-disc's thickness and increases its spin speed. Temperature of a macro body gives an indication of its matter or energy content levels with respect to the same body's matter or energy content level at room-temperature.

A free body is a lone body situated in vast space and which is not under influence from any external sources other than surrounding (stable) 2D energy fields. A macro body is a union of more than few primary/fundamental particles. The term 'force' is used in its general meaning to indicate cause of an action. All conclusions expressed in this article are taken from the "*Hypothesis on* MATTER" [1]. For details, kindly refer to the same.

Heat:

In physics, heat is the energy transferred from a high-temperature system to a lower-temperature system. 'Hypothesis on MATTER' envisages heat as the process of losing matter content of a macro body with reduction in its associated energy content. [1] Kinetic theory of fluids is a group of assumptions, which this concept does not accept. Every constituent particle in a macro body has its fixed position relative to its neighbours. As inter-particle bond is relatively weak, certain relative motion (under external efforts) of constituent particles, in loose groups, are permitted in fluid macro bodies.

We shall consider a macro body in gaseous state for illustrations. When a gaseous macro body is compressed, compressive pressure reduces its volume. Smaller constituents of the macro body are pushed nearer and held in that relative position against natural tendency of macro body trying to take these constituents back to their regular mutual distances in their natural formations. Pressure energy, invested in the macro body to reduce its volume, is held within the macro body till its compression is removed and the macro body attains its original volume. During reduction of its volume, a macro body under compression is heated without any other external influences as can be noted by increase in its temperature. Macro body radiates matter (and associated work) in the form of heat [1]. (In current theoretical terms, certain energy is radiated away from the macro body in the form of heat and lost from the body). Gradually macro body loses enough matter content that its temperature returns to room temperature. Energy input or work-done in the macro body, to compress it, has not changed but the macro body has lost some matter content (heat). Matter content (heat), lost from the macro body, is not originated or converted from pressure energy due to compression. Therefore, matter content lost from macro body is not related to pressure energy put into the macro body. During heating of a macro body, it loses part of its energy content, corresponding to lost matter content. Thus, heating a macro body reduces its matter and energy levels and thereby reduces its total matter and energy contents. This is contrary to prevailing common belief that during heating, energy level of a body increases.

Conversely, when external pressure on a macro body is reduced, it cools down. That is, the macro body takes-in matter content from surrounding 2D energy fields and work is done by surrounding 2D energy fields to increase its energy content. External pressure on a macro body is least when it is in free space. Because, in free space, there is no other 3D body nearby to influence the macro body's surrounding

2D energy fields. In free space, a macro body will be coolest and at its highest matter and energy content levels. Cooling a macro body increases its matter and energy content levels and thereby increases the total matter and energy contents of the macro body. Temperature of a macro body is generally taken as an indication of its (matter content level and) energy content level. Contrary to present belief, higher temperature indicates lower energy level and lower temperature indicates higher energy level of a macro body. For details on the mechanism that conducts this phenomenon, please refer [1].

Weight:

In physics, as well as in 'Hypothesis on MATTER', 'weight' is the name given to external effort on a macro body due to gravity. On a rotating planet with atmosphere, centrifugal effect on the macro body is included and buoyancy of the macro body, due to atmosphere is excluded.

In order to determine the matter content of a small 3D macro body, near earth's (much larger 3D macro body's) surface, a functional entity 'weight' is used. Weight is the magnitude of (apparent) attraction due to gravity between the small macro body and the earth. Normally, factors affecting the weight of a small macro body, factors like; earth's total matter content (assumed concentrated at a point below the macro body) and the distance between centers of macro body and earth, are considered constant, while determining the weight of the body. Knowing the acceleration of a small macro body under free fall, we are able to determine the magnitude of (apparent) attraction due to gravity − weight − between the small macro body and the earth by using the equation, F = ma. This value is further converted to gravitational units by dividing the right hand side factors of the equation by a predetermined value of acceleration due to gravity near earth's surface, 'g' in units of force. In this case g = a. Thus, the weight of a body is able to give us the numerical equivalent of 'mass' and that is generally taken as equivalent to the matter content of the small macro body.

Weight of a body may also be understood (in operational definition) to be the effort required to support a body in a relatively static condition with respect to the surface of the earth, from moving towards earth's center. Full weight of a small macro body can be obtained only when acceleration of the macro body due to (apparent) attraction due to gravity is fully neutralized by an acceleration provided by reaction from support or a restricting effort on small macro body's fall towards the center of earth.

Consider a small macro body, accelerating towards a large macro body under action of mutual (apparent) attraction due to gravity. (For the sake of this discussion, we shall ignore acceleration of larger macro body and consider that acceleration of smaller macro body is the combined action of accelerations of both the macro bodies). Smaller macro body continues to be under acceleration due to gravity until it merges with the larger macro body. When the smaller macro body is free to accelerate towards the larger macro body, it is assumed to be under free fall. Since the small macro body is not restricted (supported), it appears to be 'weightless'. If the supporting effort, applied against (apparent) attraction due to gravity, is more than that is required to prevent small macro body's acceleration towards the larger macro body, weight of the small macro body will be proportionately higher. This is how a person in an accelerating rocket feels higher gravitational effort (weight).

Action of an external effort on a macro body, in the direction of its linear motion and the macro body's acceleration also depend on present linear speed of the macro body. Therefore, as the velocity of a small macro body towards a larger macro body increases, effect of (apparent) attraction due to gravity on the small macro body decreases.[3] Magnitude of its acceleration declines. However, the macro body continues to increase its velocity at a slower rate. This process will continue until the velocity of the small macro body reaches a stage when its body-parts breakdown to primary particles. Thus, many of the smaller macro bodies, accelerating in space towards a larger macro body, normally revert to their constituent primary particles long before the smaller macro body attains the velocity of light. Liberated primary particles of the disintegrated macro body move away in various directions, depending on the direction of their motion at the instant of liberation. This phenomenon reduces the probability of too many small macro bodies from the outer space, bombarding earth or any other larger macro bodies in space. Many of the smaller macro bodies, which are able to attain linear speeds nearer to the speed of light, disintegrate before they can approach the earth.

Temperature & acceleration due to external effort:

Changes in matter contents of primary particles in a macro body, due to difference in its temperature, affect inertial actions of the macro body under external efforts. Relation between external effort and the macro body's acceleration is the 'mass' of the macro body. Magnitude of external effort, divided by the magnitude of acceleration of a (static) macro body is its rest mass. Rest mass of a macro body is assumed to represent its matter content. In these calculations, variations in the matter content of the macro body, under changes of its temperature are not taken into consideration. Since a change in the temperature of a macro body changes its matter content level, its rest mass also changes.

Let an external effort, acting on a macro body, is of constant magnitude. Let this action accelerate a macro body, whose temperature varies. At higher temperature, the macro body has less matter content and hence its acceleration will be higher in magnitude. This indicates a reduction in macro body's rest mass. Similarly, at lower temperature, the macro body has higher matter content level and its acceleration will be of lesser magnitude. This indicates an increase in the body's rest mass. Thus, a macro body at higher temperature will have higher acceleration compared to acceleration of the same macro body at lower temperature, under the action of identical external effort.

Temperature & acceleration due to gravity:

Consider a small macro body in the vicinity of a large macro body. (Apparent) attraction due to gravity between the two macro bodies takes place, whenever the disc planes of (constituent) photons of both the macro bodies coincide [1]. Changes in matter content of a photon change angular thickness of its disc segments. Higher matter content increases and lower matter content reduces angular thickness of photons' disc segments. As a smaller macro body is cooled, its matter content level increases. Corresponding to the increase in the matter content level of the macro body, angular thickness of segments and spin frequencies of constituent photons increase. These changes increase angular sweep area of photon-segments and increase number of instants of (apparent) attraction due to gravitation between the macro bodies. As the smaller macro body is cooled its (apparent) attraction towards the larger macro body, due to gravity, increases. Opposite conditions occur, when smaller macro body is heated.

Let rest mass of small macro body is 'm' and rest mass of the large macro body is 'M'. 'G' is the gravitational constant in 3D spatial system and 'd' is the distance between the centers of the macro bodies.

Apparent gravitational attraction between the macro bodies at reference temperature,

$$GF = Mm\,G \div d^2 \tag{1}$$

GF is the accelerating effort on the small macro body.

$$\text{Accelerating force} = \text{mass} \times \text{acceleration} \tag{2}$$

Substituting apparent attraction due to gravity in this equation;

$$Mm\,G \div d^2 = ma$$

where 'a' is the acceleration of small macro body due to gravity towards larger macro body.

$$a = M\,G \div d^2 \tag{3}$$

Let the increase in mass due to enhancement of sweep area of the photon-segments, during reduction in temperature, is proportional to (K_1t). Mass of the small macro body increases to m (K_1t), where 'K_1' is the constant of proportion and 't' is the change in temperature.

This increment affects both sides of the above equation equally. Let the distance between the centers of the bodies remain constant.

$$\text{Apparent attraction due to gravity, } GF = Mm\,(K_1t)G \div d^2$$

Putting these values in equation (2);

$$Mm\,(K_1t)G \div d^2 = m(K_1t) \times a$$

$$a = M\,G \div d^2 \tag{4}$$

Equation (4) is the same as equation (3). Hence, increment in the mass of the small macro body, due to reduction in temperature (or due to any other phenomenon, except addition of matter) does not affect its

acceleration due to gravity towards the larger macro body. However, due to their increased matter content during cooling, photons in smaller macro body spins faster. Due to increase in spin speed, disc plane of each photon in smaller macro body coincides more frequently (in unit time) with disc planes of photons in larger macro body. This increases the average magnitude of (apparent) attraction due to gravity between the macro bodies.

Let the increase in the attraction due to gravity, by enhancement of frequency, is proportional to K_2t, where 'K_2' is constant of proportion and 't' is the change in temperature.

$$\text{Apparent attraction due to gravity, } GF = Mm(K_1t)(K_2t)G \div d^2 \quad (5)$$

Putting mass of smaller macro body as m (K_1t) and the value of external force from equation (5) in equation (2);

$$Mm(K_1t)(K_2t)G \div d^2 = m(K_1t) \times a$$

$$a = M\,G(K_2t) \div d^2 \quad (6)$$

In this case, the magnitude of acceleration (due to gravity) is higher by a factor (K_2t), compared to equation (4). Acceleration due to gravity of a smaller macro body towards a larger macro body increases as smaller macro body is cooled. Reverse action takes place, when the temperature of smaller macro body is raised. A (small) hot macro body has lesser acceleration due to gravity towards a larger macro body compared to the same body in cooler state.

Conclusion:

Acceleration due to gravity, in gravitational unit, is the weight of a macro body. Gravitational unit, determined for a large macro body is assumed to be a constant. Hence, an increase in gravitational acceleration of a smaller macro body towards the larger macro body effectively increases small macro body's weight. Thus, weight of a small macro body, near a large macro body, increases as the body's temperature is lowered (the body is cooled). Conversely, a reduction in gravitational acceleration of the smaller macro body towards the larger macro body effectively reduces small macro body's weight. Thus, weight of a small macro body, near a large macro body, decreases as the body's temperature is raised (the body is heated).

References:

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