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HEAT AND WEIGHT

(According to "*Hypothesis on* MATTER")

Nainan K. Varghese, matterdoc@gmail.com

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. 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 of actions and 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 quanta, by gravitational actions from surrounding 2D energy fields, converts the quanta into 3D status and form matter-bodies of a photon. Photons (corpuscles of light) are the basic 3D matter particles, which move at the speed of light. Unions of photons in various combinations form different types of superior fundamental particles and atoms, etc. Matter content of a photon is spherical-segmented (disc-shaped) spinning body. Each photon 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 the matter body of a photon breaks the continuity of 2D energy fields in the planes, passing through them. Discontinuity of a 2D energy field causes gravitational forces from 2D energy fields to act on the matter body of the photon. Gravitational force can act only on the curved periphery of the disc shaped body of photon. Magnitude of gravitational force is proportional to the extent of 2D energy field,

acting on the matter body of a photon. Extent of 2D energy field in any direction from matter-body of a photon, in free space, is infinity. If there are two photons (their disc planes) in a plane, gravitational forces on them from their outer sides are greater than the gravitational forces on them from in-between. As a result the photons tend to move towards each other. Resultant force, trying to move the photons towards each other, is the apparent attraction due to gravity 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. Apparent attraction due to gravity between two macro bodies is the resultant of apparent attractions due to gravity, between their constituent photons, whose disc planes coincide. At any instant, only those photons in both macro bodies, whose disc planes coincide, contribute towards apparent attraction due to gravity between two macro bodies.

Heating is a process by which a matter body loses its matter and energy contents. Reduction of matter content reduces photon-disc's thickness and reduces its spin speed. Conversely, cooling is a process by which a matter body gains matter and energy contents. Enhancement of matter content increases photon-disc's thickness and increases its spin speed. Temperature of a matter body gives an indication of its matter or energy content level 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. All conclusions expressed in this article are taken from the "*Hypothesis on* MATTER" [1]. For details, kindly refer to the same.

Heat:

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 body are brought nearer and held in that relative position against natural forces trying to take these constituents back to their regular mutual distances in their natural formations. This pressure energy invested in the macro body, to reduce its volume, is held within the body till compression of macro body is removed and the body attains its original volume. During the 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. Body radiates matter in the form of heat. (In current theoretical terms, certain energy is radiated away from the macro body in the form of heat and lost to the body). Gradually the macro body loses enough matter content that its temperature returns to room temperature. Energy input or work-one in the 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. So, the matter content lost from the body is not related to the pressure energy put into the body. During heating of a macro body, it loses part of its energy content, corresponding to the lost matter content. Thus, heating a macro body reduces its matter and energy levels and thereby reduces total matter and energy contents of the body. This is contrary to common belief that during heating, energy level of a body increases.

Conversely, when external pressure on a body is reduced, a macro body cools down. That is, it takes-in matter content from surrounding 2D energy fields. External pressure on a body is least when it is in free space. Because, in free space, there is no other 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 body. Temperature of a 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 order to determine the matter content of a small 3D macro body, in the proximity of (much larger 3D macro body's) earth'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, the factors affecting the weight of a small macro body, earth's total matter content and the distance between the body and the 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 this case g = a. Thus, the weight of a body is able to give us the numerical equivalent of the mass of the body and that is generally taken as equivalent to the matter content of the small macro body.

Weight of a body may also be understood 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 the small macro body can be obtained only when the acceleration of the body due to apparent attraction due to gravity between the body and the earth is fully neutralized by an acceleration provided by the reactive force from the support or a restricting force on the small macro body's fall towards the center of earth.

Consider a small macro body, accelerating towards a large macro body under the action of mutual apparent attraction due to gravity. (For the sake of this discussion, we shall ignore acceleration of the larger macro body and consider that the acceleration of the smaller macro body is the combined action of the 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 force, applied against the apparent attraction due to gravity, is more than that is required to prevent small macro body's acceleration towards the larger macro body, the weight of the small macro body will be proportionately higher. This is how a person in an accelerating rocket feels higher gravitational force (weight).

Action of an external force on a macro body, in the direction of its linear motion and the body's acceleration also depend on the present linear speed of the 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. Its acceleration declines. However, the 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 particles breakdown to primary particles. Thus, many of the smaller bodies, accelerating in space towards a larger body, normally revert to their constituent primary particles long before the body attains the velocity of light. Liberated primary particles of the disintegrated 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 bodies from the outer space, bombarding earth or any other larger bodies in space. Many of the smaller 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 force

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

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

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 the matter content of a photon changes the angular thickness of its disc segments. Higher matter content increases and lower matter content reduces the angular thickness of photons' disc segments. As the 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 the angular sweep area of the photon-segments and increase the number of instants of apparent attraction 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 the smaller macro body is heated.

Let the rest masses of small macro body is m and rest mass of the large macro body is M. G is the gravitational constant in 3D space 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 force 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 due to gravity of small macro body 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 $(K_1 t)$. Mass of the small macro body increases to m $(K_1 t)$, 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.

$$\text{Apparent attraction due to gravity, } GF = Mm\,(K_1 t) G \div d^2$$

Putting these values in equation (2);

$$Mm\,(K_1 t) G \div d^2 = m(K_1 t) \times a$$

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

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) does not affect its acceleration due to gravity towards the larger macro body. However, due to their increased matter content during cooling, photons in the smaller macro body spins faster. Due to increase in the spin speed, disc plane of each photon in smaller macro body coincides more frequently (in unit time) with the disc planes of photons in the 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 $K_2 t$, where K_2 is constant of proportion and t is the change in temperature.

$$\text{Apparent attraction due to gravity, } GF = Mm\,(K_1 t)(K_2 t) G \div d^2 \tag{5}$$

Putting the mass of smaller macro body as m $(K_1 t)$ and the value of external force from equation (5) in equation (2);

$$Mm\,(K_1 t)(K_2 t) G \div d^2 = m(K_1 t) \times a$$

$$a = M\, G(K_2 t) \div d^2 \tag{6}$$

In this case, the magnitude of acceleration (due to gravity) is higher by a factor $(K_2 t)$, compared to equation (4). Acceleration due to gravity of a smaller macro body towards a larger macro body increases as the smaller macro body is cooled. Reverse action takes place, when the temperature of the 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:

[1] Nainan K. Varghese, *Hypothesis on MATTER* (second edition), (2008), http://www.booksurge.com/Hypothesis-on-MATTER-Second-Edition/A/1419689789.htm

[2] Paolo Zuchi, Thermal free fall, http://www.permotionenergy.com

[3] Nainan K. Varghese, ARTICLES, http://wbabin.net/papers.htm#Varghese

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