MASS DEFECT

According to 'MATTER (Re-examined)'

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Abstract: Although the mass of an object is defined to represent the equivalent of 3D matter it contains, it is often considered as the quantity of 3D matter contained in the object. Mass is the mathematical relation between an external linear effort on an object and the rate of the rate of its displacement in the direction of the external effort. This relationship is often ignored, and the value of a body's mass is regarded in almost all academic fields as the quantity of 3D matter present in the object. Loss (or gain) of mass of an object during its development stage or changes in its structure is understood as 'mass defect'. This is often related to an assumed phenomenon of binding energy required to stabilize the nucleons in the atoms in a body.

Keywords: matter, mass, effort, force, photons, bitons, nucleons, mass defect, binding energy, universal medium.

Introduction:

This article explores an unconventional viewpoint on the fundamental nature of matter. It argues that mass is only a mathematical relation assumed to represent the equivalent of the quantity of 3D matter in a body. Changes in the mass of a 3D material body are directly connected to the changes in the quantity of 3D matter it contains rather than conversion/reversion to/from an imaginary entity called energy.

The substance of an entity provides its objective reality and positive existence in space. In our material world, the existence of matter is closest to absolute truth. Therefore, all real entities have

matter as their substance. Any entity not formed by matter is not real, and it is a functional entity. Functional entities are imaginary and fulfil only those functions assigned to them by their proposers. They exist only in mathematical analyses and in the minds of physicists.

Matter is also defined as the ‘material substance that constitutes the observable universe, and together with energy, forms the basis of all objective phenomena’ (Wikipedia). Here, the matter is a real entity, and the energy is a functional entity. A common definition of matter is "anything that has mass and occupies volume."

Opinions expressed in this article are taken from an alternative concept presented in the book ‘MATTER (Re-examined)’. For details of mechanisms of action, kindly refer to the same.

3D matter:

The existence of a real entity needs space. The space is an imaginary container envisaged by rational beings whenever they think of a real entity. Usually, the space is described by three spatial dimensions. Hence, the volume of space occupied by matter (a real entity) is defined by its spatial dimensions. As we are 3D beings, all of our senses and instruments are devised to sense and measure 3D material objects in volumetric space. Only those material objects that are tangible by the scales used in the 3D spatial system are considered real entities. Despite its existence in a volumetric space, a material object that is apparent only in 1D or 2D spatial systems is not considered real by us. If the measurement of a material object in any spatial dimension is less than that which can be measured by the 3D spatial scale used by us, it is currently considered non-existent. However, its existence in volumetric space is true, and it is our inability to measure that makes them non-existent in our view. Thus, we have 2D material objects that exist in two-dimensional space and 1D material objects that exist in one-dimensional space.

All 3D material objects share certain fundamental properties, as understood from nature. Every 3D physical entity is assumed to have properties of mass, gravity, inertia, etc. All primary properties of 3D material bodies are amenable to mathematical description. Nevertheless, their secondary properties (or qualities) are not considered mathematically. Although the mass of an object is the measure of its inertia, it is commonly taken as the equivalent measure of the amount of 3D material contained in it. 3D matter in bulk may have several states of existence in nature.

As no reference is available to form a measuring scale for the quantity of 3D matter in an object, we use one of its attributes—the mass—to represent its equivalent. Hence, a mathematical relation between an external effort (force) on a 3D material object and the acceleration of its linear displacement in the direction of the external effort (the mass) is used to represent the equivalent of the quantity of 3D matter contained in a real object. However, the importance given to the mass as a substitute for the quantity of 3D matter contained in an object caused the 3D matter to be regarded as an unnecessary factor even for the existence of material bodies. Modern physics defines mass in terms of inertia and energy at the expense of matter. Currently, all scientific enquiries are based on the mass of a 3D material entity rather than the quantity of 3D matter in it. Even if mass is a mathematical abstraction, it remains useful in describing observable phenomena.

During the development and decaying stages, masses of superior 3D material bodies appear to vary from the total masses of constituent 3D matter particles in it. The reason for this difference is alleged to be the conversion or reversion of mass to or from imaginary binding energy between constituent 3D matter particles. The difference between total mass and the sum of the masses of constituent 3D matter particles is termed 'mass defect' and is related to the speed of light for fictitious reasons.

An alternative concept:

The concept, proposed in the book 'MATTER (Re-examined)', suggests logical mechanisms for the development of an all-encompassing universal medium by the quanta of matter in lower spatial existence and their actions. This concept is based on only one assumption, namely the existence of matter. It presents an alternative framework for understanding matter, gravitation, and fundamental particles through the existence of an all-encompassing universal medium. The universal medium is inherently under compression. Compressive pressure exerted by the universal medium on real entities is the gravitation. Gravitational pressure is enormously strong and manifests in the form of different natural and other efforts (causes of forces). All actions (including the creation, sustenance, and destruction of 3D material entities) and apparent interactions by and between 3D material objects are initiated, sustained, and terminated by the universal medium.

The universal medium compresses free quanta of matter in (accidental) gaps formed in its structure into a 3D matter core of segmented spherical (disc) shape and moves it at the highest possible (hence, constant) linear speed (restricted by the ability of the universal medium to preserve its structure) and spins it about one of its diameters at a spin speed proportional to the quantity of 3D matter in the 3D matter core. Movements of the 3D matter core are attained by the transfer of structural distortions in the surrounding universal medium. These rotating and linear moving structural distortions have many similarities with electromagnetic waves in each plane. When the 3D matter core and the accompanying structural distortions in the surrounding universal medium attain stability, both of them, together, form a photon—a corpuscle of radiation. Its 3D matter core provides photon's particle nature and structural distortions in the surrounding universal medium provides photon's wave nature.

As long as the linear and rotary speeds of a photon are maintained steady by the universal medium, the quantity of its 3D matter remains constant. An attempt to increase the linear speed of a photon tends to increase its 3D matter content (frequency) rather than increasing its linear speed by acquiring quanta of matter from the surrounding universal medium. Similarly, an attempt to reduce the linear speed of a photon tends to reduce its 3D matter content (frequency) rather than reducing its linear speed by discarding quanta of matter into the surrounding universal medium.

Mass:

Scientists and philosophers searched for a long time to define the nature of matter. Other than observing certain qualities of matter, they were unsuccessful in their attempt to know the true nature

of matter. Frustrated, more influential among them sought an easy way out of this predicament. Instead of considering the matter itself as the fundamental substance or stuff in real entities, an attribute of 3D matter was enthroned in its place as a real entity. Thus, the mass, a measure of the inertia of a 3D object, came to be regarded as a real entity that represents the equivalent of its 3D matter content. All further developments in physics were based on this illogical assumption. Mass is treated as an indirect measure of 3D matter content, yet it is not the same as 3D matter itself.

The inability to directly measure the quantity of 3D matter has led to the adoption of mass as a proxy. The mass of an object is distinct from the quantity of its 3D matter. Since we have no measuring scales for the 3D matter contained in an object directly, we depend on indirect representative measurements. One of the measuring systems used in physics to represent the quantity of 3D matter in an object is its mass. Because 3D matter is a poorly defined concept and different definitions of 3D matter agree on its attribute of mass, mass is used to represent the equivalent of 3D matter, often in physics. Hence, we say that all real entities (made of 3D matter) have the attribute of mass. All 3D material objects have the property of mass, but not all mass is associated with identifiable 3D matter. Mass is defined as the cause of the inertial property (resistance to changes of state when acted on by an external effort) of an object. Since the functional entities contain no matter, they do not have the attribute of mass. They can provide only intentional objects. An intentional object is part of a state of mind, whereas a material object always has an independent (and objective) existence of its own in space. However, the reverse is not always held. For there are real objects, which are assumed to have no mass.

Energy:

Energy is the most important concept in contemporary physics—a fundamental quantity that governs all physical processes. It is currently defined as the ability or capacity to do work. Ability is an adjective. Like any other adjective, it is a quality and a functional entity. It has neither real objectivity nor a positive existence in space. It is a mathematical abstraction that quantifies the changes in field interactions. Although energy has no physical existence, it is considered the basis of all physical phenomena in nature. Energy is a convenient functional entity that can be used as the cause of any action where a logical cause is not obvious.

In the alternative concept, proposed in the book ‘MATTER (Re-examined)’, the energy is shown as a shadow of work. This concept fundamentally redefines energy as an abstract functional entity rather than a physically real entity. Strain in the universal medium is structural distortions in it. The structural distortions in the universal medium, being physical displacements of quanta of matter, are real and are called the ‘work’. Stress in the universal medium, in association with the work, is the energy. It is an intangible byproduct of structural distortions in the universal medium and a physically non-existent entity. However, in contemporary physics, energy is used as a real entity on which the structure of the entire universe and all actions in our natural world depend.

Mass and energy are functional entities, convenient for mathematical representations. Too many physical theories are based on these fictional assumptions. I think it is time to revise our conception

of physical reality and consider matter the sole real substance and energy as its shadow, denoting the work in and about it.

Fundamental particles:

Photons (corpuscles of radiation) are the most basic 3D matter particles. Two complementary photons, in a binary fashion, form a primary 3D matter particle—a biton. Constituent photons of a biton move at the speed of light in a circular path about a common centre. A biton is the most stable primary 3D matter particle. Structural distortions in the universal medium in and about a biton sustain its self-stabilizing property. Photons of a biton spin in phase with each other, and their spin axes coincide with the diameter of their common circular path. Each photon completes one revolution around the centre of a biton during one turn of its 3D matter core. That is, the length of the perimeter of a biton is equal to one wavelength of its constituent photons.

In a stable biton, gravitational attraction between the 3D matter cores of constituent photons compensates for the centrifugal actions on them due to their common circular path. As long as the photons' 3D matter contents do not vary, gravitational attraction between them remains steady and neutralises centrifugal actions on them due to their curved paths. Variations in the structural distortion density in the surrounding universal medium change external pressure on the biton. An increase in the external pressure assists gravitational attraction and tries to push the constituent photons towards each other and shrink the biton's radius. A reduction in the radius of a biton tends to increase the linear speeds of constituent photons. An attempt to increase the linear speed of a photon tends to reduce its 3D matter content. This, in turn, reduces gravitational attraction between the photons with an accompanied increase in their wavelength, resulting in the enlargement of the biton.

An increase in external pressure on a biton reduces its total 3D matter content and enlarges its radial size. Similarly, a reduction in external pressure on a biton increases its total 3D matter content and decreases its radial size. The equivalent of 3D matter content of a material body is represented by its mass. Therefore, the mass of a biton under higher external pressure reduces with an enlargement in its size. Similarly, the mass of a biton under lower external pressure increases with a reduction in its size.

Mass defect:

All 3D matter particles and superior 3D material bodies are sustained by the structural distortions in the universal medium in and around them. The structural distortion density in a region of universal medium in and about a body increases as the number of constituent 3D matter particles in the region increases. Higher structural distortion density in the universal medium applies higher external pressures on all bitons within the region. Hence, the bitons in a combined 3D material body are under higher external pressure from the universal medium. Conversely, a biton in free space is under the least external pressure. It has the highest mass (indicating a corresponding highest 3D matter content) and the smallest volumetric size.

All superior 3D material bodies are formed by bitons in various combinations. Variations in the radial sizes and 3D matter contents of bitons under variations of external pressure affect the volumetric sizes and the masses of superior 3D material bodies. Therefore, the mass of a combined 3D material body is always less than the total mass of constituent 3D matter particles. This difference is called 'mass defect'.

Similar variations are noticed in the masses of 3D material bodies during heating and cooling also. During heating, structural distortion density in the universal medium in and about a material body increases with a corresponding enlargement in volumetric size and reduction in its mass. During cooling, structural distortion density in the universal medium in and about a body reduces with a corresponding shrinkage in volumetric size and an increment in its mass. A 3D material entity is at its highest 3D matter content and coolest state in free space.

Conclusion:

Mass defect is a structural necessity of smaller or larger 3D material entities formed by combinations of primary 3D matter particles—the bitons. The phenomenon of mass defect is not restricted to the development of nuclei alone, but it applies to all types of combinations of 3D material bodies. Mass defect has nothing to do with an assumed binding energy or other forms of imaginary energies. It also has no direct relation to the linear speed of light.

Reference:

1. Nainan K. Varghese, 2013, MATTER (Re-examined), https://www.amazon.com/dp/1492241865, www.matterdoc.info