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Why is there Difference among Free Space, Mass and Energy? Why Space-Time Shows, at Times, Free Space, at Times, Mass and the Other Times, Energy Only

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Abstract: ***In general physics, free space is a region that has no gravitational or electromagnetic fields. It is used as an absolute standard of reference. Non-technically, it is also called absolute vacuum or theoretically "perfect" vacuum. It is a standard reference medium for electromagnetic effects. The "perfect" vacuum is a concept of electromagnetic theory. This concept is an abstraction from nature, a baseline or reference state that is unattainable in practice, like the absolute zero of temperature. About the properties of free space, it is characterized by the fixed defined value of the parameter*** μ_0 ***which is known as the permeability of free space or the magnetic constant and the fixed defined value of the parameter*** ε_0 ***which is called the permittivity of free space or the electric constant. Maxwell showed that the permeability is a quantity related to density, and he also showed that the dielectric constant, the reciprocal of permittivity, is a quantity related to transverse elasticity. He deliberately used these quantities in Newton's equation for the speed of sound to obtain a wave speed that is equal to the speed of light*** C_0***. This famous calculation concludes around equation (136) in Part III of his 1861 paper "On Physical Lines of Force" with the estimate that*** C_0***=1, 95, 647 miles per second. The electric and magnetic fields in these waves are related by the fixed defined value of the characteristic impedance of vacuum*** Z_0***. In this paper, I will show the differences among real free space, masses and energies. I will also show that the space-time fabric, at times, looks like free space, at times, masses and the other times, energies only.***

Keywords: Permeability and Permittivity, Transverse Elasticity, The Dielectric Constant, The Speed of Light, The Space-time Fabric

1. Introduction

The "ideal" vacuum or "ideal" free space is not the same as a physically obtainable vacuum or real free space [1, 2]. Typically, physicists use the term "vacuum" in many ways [3]. One use of it is to describe ideal test results that would occur in an "ideal" vacuum or "ideal" free space, which physicists simply call vacuum or free space [4, 5]. Physicists generally use the term "partial" vacuum to describe the imperfect vacuum or real free space realizable in practice [6, 7]. The term "partial" vacuum suggests a typical space where the pressure is very low but not zero [8, 9]. Recently, the classical concept of "ideal" vacuum as a simple void has been replaced by the "quantum" vacuum [10, 11], by separating free space still further from the earlier concept of an "ideal" vacuum [12, 13]. The "quantum" vacuum or the vacuum is not an empty state [14, 15]. An approximate meaning is the "quantum" vacuum describes a region devoid of real particles in its lowest energy state [16, 17]. The quantum vacuum is by no means a simple empty space, and it is a mistake to think of any physical vacuum as some absolutely empty spaces [18, 19]. According to the theory of quantum mechanics, empty space (the "vacuum") is not truly empty but instead it contains fleeting electromagnetic waves as well as tiny particles that pop in and out of existence.

2. Space-time Shows, At Times, Free Space, At Times, Masses and the Other Times, Energies Only

A space-time looks like null and void at times that we term as real free space because in the real free space, the space-time fabric does not interact or have minimum interaction with electromagnetic radiation such as Sun light. We can term "ideal" free space as "normal" space-time fabric where ideally theoretically no gravitational attractions or no electromagnetic interactions exist. In real free space (say "sub-normal" space-time), there are very low gravitations and little electromagnetic waves and tiny little particles pop in and out [20, 21]. Still the real free space looks like null and void too as no significant interactions of electromagnetic waves (such as sunlight) exist. Thus, "sub-normal" space-time fabric looks like empty as if nothing is there or absolute null and void. But a little more deformation in the space-time makes "sub-normal" space-time into a "Quasi-sub-normal" space-time which exhibits energies such as gravitational force or electromagnetic force which accelerates or decelerates masses. Thus, energy is "Quasi-sub-normal" space-time fabric that can be felt only but cannot be seen with naked eyes. A further deformation in space-time makes "Quasi-sub-normal" space-time into an "Abnormal" space-time which exhibits masses. Yet, we do not know that "normal" space-time exists or not. But there is "sub-normal" space-time which we call real free space. The transition from "sub-normal" space–time (real free space) to "abnormal" space-time (masses), there is always "Quasi-sub-normal" space-time exists (energies) in between. The transition from "sub-normal" space-time to "abnormal" space-time is very gradual with distance. That is why, very near to the mass, there is strong gravitational force, the farther from the mass, the gravitational force decreases [22, 23] according to the Newton's first law as follows-

$$F \propto \frac{1}{d^2}$$

Where F is the force acted between two masses, d is distance between the two masses. The difference among real free space, masses and energies are illustrated with some real life figures of balloons that we encounter day to day life where shrinked-side, expanded side and the transition in between explains the real free space, masses and energies.

Figure 1: If the shrinked-side of the balloon represents real free space ("sub-normal" space-time fabric), then expanded side must be mass ("abnormal" space-time fabric). The transition from shrinked-side to expanded side is nothing but "Quasi-sub-normal" space-time which is energy (for example, gravity).

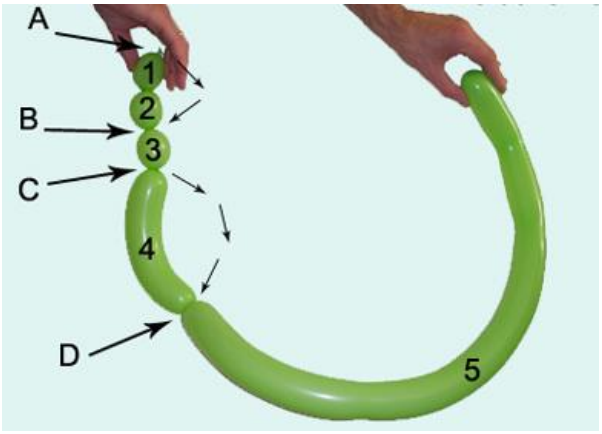

Figure 2: If the shrinked-side of the balloon at points A, B, C, D represents real free space ("sub-normal" space-time fabric), then expanded side such as 1, 2, 3, 4, 5 must be masses ("abnormal" space-time fabric) separated by real free space A, B, C, D. There are two transition space-time fabrics between real free space B, C and mass 3 are "Quasi-sub-normal" space-time fabrics which are nothing but energies such as gravitational force.

Figure 3: Two expanded sides are two masses. The shrinked-side in between is real free space. The transitions from expanded sides to shrinked-side are energies.

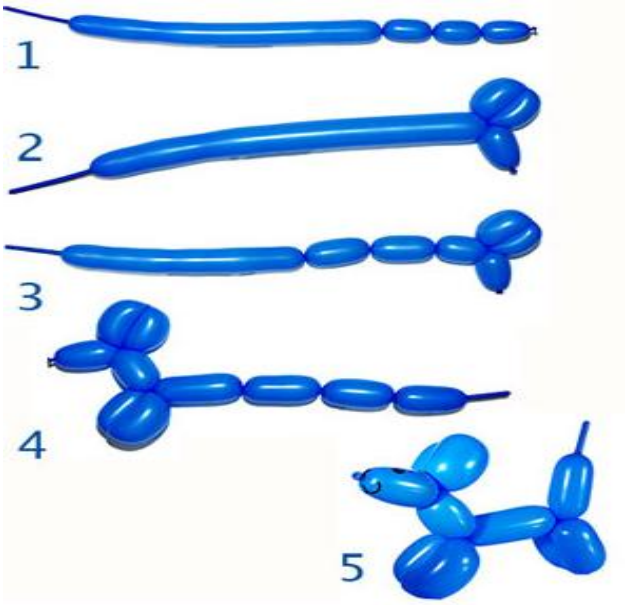

Figure 5: Different masses distribution in the real free space along with energy distributions

3. Why The Universe Is In Motion

The space deformation from "sub-normal" space-time to "Quasi-sub-normal" space-time or "abnormal" space-time produces energy and mass respectively. We know that, masses are in motion because time moves forward. If time would be stagnant, masses would be stagnant too and we would have the Universe at absolute rest. As the motions of masses are function of time, the deformations of space are also function of time. As the time progresses, it looks like deformations of space also move from one discrete space point to the other discrete space point. That is why the Universe is in motion because space deformations moves with time only. The Universe will be motionless only when time stops forwarding. Because of uneven distribution of real free space, mass and energy; and because masses are highly distorted space-time fabric; random erratic motions of masses can be observed over a long time span. Even solar system has erratic motions over very long time span [24, 25].

4. Conclusion

We have no proper idea whether "absolute" vacuum or "perfect" free space exists or not. But we know that we have low energy, low pressure, low gravity real free space exists. Only the space deformation is the cause of difference among real free space, masses and energies. Low deformation creates energy and high deformation creates masses. There is always "Quasi-sub-normal" state (energy) exists between "sub-normal" state (real free space) and "abnormal" state (masses). That is why masses are always associated with energies. Because masses are very highly distorted form of space-time fabric; and because of uneven distribution of real free space, masses and energies; motions of masses are highly chaotic over very long time span. But masses and energies move because time moves in forward direction. If time would be motionless, the whole Universe would be motionless too. Due to various deformations of space-time,

the space-time, at times, looks like real free space, at times, energies, and the other times, masses only.

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