Journal of Multidisciplinary Engineering Science and Technology (JMEST)
ISSN: 2458-9403
Vol. 6 Issue 3, March - 2019

General Orbit Dynamics(GOD): Dark Nothing

No Dark-matter, No Dark-energy, No Space-time, No Surprise

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***Abstract*—Dark Matter and Dark Energy have no real existence in the universe; they exist only in our misunderstood reality.** If **the universe is dominated by Dark Matter and Dark Energy, they should have an equal influence on all the orbiting systems in the universe, not just on the heavyweight stars and galactic orbiting systems. The fact that Dark Matter and Dark Energy have no effect on the lightweight solar system provides clues to the genesis of the Darkness Problem. The need for Dark Matter and Dark Energy stemmed from the forcing of lightweight Keplerism on to heavyweight orbiting stars and galaxies. Although the Newtonism in its general form is universal, the Keplerism or approximate Newtonism is not. The knowledge of masses within an orbit alone is not sufficient for estimating the speed of a star or a galaxy on any orbit. Here, the Orbit Dynamics for General Orbiting Systems are derived by introducing a new vector, the Eccentricity Vector. The Eccentricity Vector of a multi-object Orbiting System is time-varying. If the speed of a star or a galaxy is estimated using Keplerism, estimated speed will be only a small fraction of the actual speed. What holds true for lightweight solar systems under assumptions does not hold true for heavyweight General Orbiting Systems such as stars and galaxies. Some hidden mysterious Dark Matter is not driving the stars and galaxies to orbit faster. The forcing of lightweight Keplerism on heavyweight stars and galactic orbit systems has made the estimated speed lower. Keplerism has no place in heavyweight orbiting systems such as stars and galaxies. Dark Matter is a result of our forcing of Keplerism where it does not belong. Dark Energy is an outcome of misinterpreted galactic red-shift. Both are results of human errors. Time is a definition. Time and mass are absolute. Display of a clock represents time only when the clock is in an environment that meets the design specifications. It is the mechanism of a measuring device that depends on the speed, gravity, electromagnetic forces, and ambient conditions; not what is being measured. Contrary to the widespread claim by physicists, Global Positioning System (GPS) has nothing to do with Special Relativity. Although satellites are equipped with high accuracy pricy atomic clocks, mobile land receivers come with low accuracy cheap electronic clocks. For this reason, a mobile land receiver has to completely avoid the use of its low accuracy local clock, and instead use data from four or more low-orbit satellites in the vicinity in estimating its location as well as the local time. Since all the satellites in the vicinity are more or less in the same environment, the use of data from satellites alone in estimating the location of a local receiver also minimizes any environment bias. If time itself is relative, GPS, as we know it, is not possible since the low-orbit satellites are not at constant speed on linear paths. The design of GPS does not require any knowledge of Special Relativity. Light is not relative. Half-life of muons says nothing about life-time of individual muons. Although half-life of muons is small fraction of the time required for a muon to reach the ground, life-time of some muons are more than long enough to reach the ground. The presence of muons at the ground does not require a mythical time-dilation. Gravity has nothing to do with mythical space-time. Gravitational waves are human fantasy waves. If there is a space-time and it gets warped in the presence of a mass, and light has to follow the curvature of the space-time, the speed of light cannot be a constant even in a vacuum. There is no space-time. Light is always a wave, never a particle. There are no light particles or photons. Irrespective of the size, particles are not waves. Wave propagation is a physical process, not a probability distribution. Non-livings don't throw dies, only the livings do. Mechanical Energy is not quantized and has no existence without an associated mass, and hence is associated with gravity through the associated mass. It is only the Electromagnetic Energy that is quantized, and has no association with any mass, and hence has no gravity. Mass and electromagnetic energy are not equivalent. Universe can neither expand nor contract. Space cannot expand. Only the matter expands or contracts. Time has no existence in the absence of conscious beings, and as a result, you can travel neither forward nor backward in time. There is no Dark-Matter, no Dark-Energy, no Space-Time, and no Relative-Time. Dark Matter is in the brain, nowhere else in the universe.**

Keywords—Dark-Matter; Space-Time; Red-Shift; Newton-Laws; Dark-Energy; Kepler-Laws; Gravity; Energy; Orbits; Eccentricity; Time; Light ; GPS

I. INTRODUCTION

The estimated speeds of the planets in our solar system agree with the observed speeds. However, when the same estimation method is used to obtain the speeds of stars/galaxies in orbiting star/galactic systems, the estimated speeds do not match the observed speeds. The actual observed speeds of stars and galaxies are much higher than the estimated speeds with the knowledge of the masses within the orbits. If it is some Dark Matter that is making the stars and galaxies orbit faster, then, the same Dark Matter should make the planets orbit faster. If there is Dark Matter, the Dark Matter should not make its influence selectively. Similarly, if some Dark Energy is making the space to expand causing galaxies to move apart, the same space expansion should make the planets to move away in the solar system; the same space expansion should also make the stars to move away from orbit centers of the star orbiting systems. If the gravity prevents the planets moving away from the sun in the presence of space expansion, the same gravity should also prevent the galaxies from moving away from the orbiting centers of galactic clusters in the presence of a space expansion. Similarly, the same gravity should prevent stars from moving away from the orbit centers of the star galactic systems. After all, just like planets, stars as well as galaxies are orbiting systems. No mass, large or small, can be independent in the space without its own gravitational orbit in an orbiting system. A group of local stars orbits a central star and a group of local galaxies orbit a central galaxy just like a group of local planets orbit a central star. If the universe is expanding, which is indeed a false preposterous concept, the expansion of the universe should have the same effect on any orbiting system whether it is an orbiting system of stars, orbiting system of galaxies, or orbiting system of planets.

The use of 'one method fit all' estimation approach for planetary systems as well as orbiting star systems and orbiting galactic systems is incorrect. Planetary systems and star/galactic systems are no way even near comparable sizes. Yet, the estimation method that seems to fit for light weight solar system has been used for heavyweight star orbiting systems such as star orbiting systems and galactic orbiting systems as well. This mistake of using 'one method fit all' estimation for light weight as well as heavyweight orbiting systems is the genesis of Dark Matter.

The attribution of the galactic red-shift to the radial movement of galaxies is incorrect. If the electromagnetic energy is proportional to the frequency, the electromagnetic energy loss along the path results in frequency down shift or red-shift. No energy can propagate without a loss, electromagnetic energy is no exception. The idea that the light can keep propagating forever like an energizer bunny is simply preposterous. Nothing can keep propagating forever. It is the mistake of interpreting the galactic red-shift as result of an expansion of universe that lead to the need for Dark Energy.

The assumption of the masses of planets, stars, and galaxies to be time-invariant is incorrect. The stars are continuously loosing mass. The sun is losing mass in millions of tons every second. A planet, star or galaxy could not have a fixed orbit when the masses of an orbiting system are not fixed. It is the change of the masses of an orbiting system that drives the radial movement. The changing masses of orbit centers and orbiting planets, stars, galaxies will have an effect on their radial distances to the orbits. Orbiting systems maintain their stability under the changing masses of the orbiting systems through orbit dilation and contraction or radial distance adjustments [4].

It is necessary to reevaluate our fundamental understanding of General Gravitational Orbiting Systems and galactic re-shift instead of using mysterious Dark Matter or Dark Energy as a fixer upper to fill the gap and justify the discrepancies between the estimates and observations. Instead of extending the methods that work for simple orbiting systems such as solar systems on to the massive orbiting systems such as star/galactic orbiting systems, the process has to be reversed. It is necessary to develop the General Orbit Dynamics (GOD) for massive more General Orbit Systems such as star orbit systems or galactic orbit systems first, and then extend it down to simple orbit systems such as solar system as well as atoms using the appropriate approximations. So, let us look back at the orbit dynamic history for a moment.

Johaness Kepler observed the planetary motion in our solar system and gave us very strict rules that appear to govern the planetary motion; he gave us fixed elliptical orbits. Newton used the hindsight provided by Kepler's observation to develop the mathematical theory of gravitation that governs any general orbiting object. However, just like Kepler did, Newton also assumed the orbits to be fixed or locked in. This was only possible since he disregarded the effect of mutual gravitation between the orbiting objects in a multi-object orbit system. Newton's gravitational laws based on fixed orbits are only applicable to solar system or solar-system-like orbiting systems. Newtonism based on fixed orbits is not applicable to General Gravitational Systems where mutual gravitational effect between orbiting objects are significant. Yet, we still do not have orbit dynamics for General Orbiting Systems where the mutual interactions of the orbiting objects are not negligible.

Newtonism, as applied to the lightweight solar system, cannot be directly extended to heavyweight General Orbiting Systems. The Keplerism is limited to the lightweight solar system or lightweight solar-system-like systems. The Keplerism cannot be applied to heavyweight General Orbiting Systems. Even for the lightweight solar system, Keplerism applies only as an approximation. Keplerism does not apply to any multi-object orbit system in strict sense. The Keplerism is the same as Newtonism when the

orbiting system contains a single orbiting object. However, when we have a General Orbiting System or an Orbiting System of multiple orbiting objects, the Newtonism in its most general form is called for. However, so far, we do not have Newtonism in it most general form that applies to Gravitational Orbiting Systems with multiple orbiting objects. It is our failure to use the Newtonism in its general form in the General Orbiting Systems such as the orbiting star systems as well as orbiting galactic systems that lead us on a wrong mysterious path in to the realm of mysterious Dark Matter.

In the case of the solar system, the mass of the sun is dominant over the masses of the rest of the planets, or in other words, the sun is massive and planets are puny, and hence the masses of the planets are comparatively negligible. So, the mutual gravitational effects of the planets themselves or the gravitational pull from the other planets are comparatively negligible. This gave us the ability to consider an orbit of a planet approximately as if the rest of the planets did not exit. This also gave the solar system with orbits that are approximately fixed or approximately time-invariant, and the speeds of the planets that decrease with the radial distance. We are so well tuned to the nature of our solar system that we forgot about the special nature of our solar system and expected any other General Orbiting Systems such as orbiting star system or orbiting galactic system to behave the same way as our solar system. The real cause of the deviation of the estimated speeds from the actual speeds of stars and galaxies resulted from the forcing of Keplerism or the approximate Newtonism on to General Orbit systems where Keplerism does not belong.

When we observed that the orbiting star systems or orbiting galactic systems were not behaving the way we expected them to behave according to our understanding of the solar system, we were so confident falsely that every orbiting system should behave the same way as our solar system, we wrongfully concluded that there must be some hidden matter not visible to us in the orbiting star systems or in the orbiting galactic systems that is driving the speeds of the stars/galaxies higher and making the orbiting star system or orbiting galactic system to have a deviant behavior. We invented the Dark Matter to force a General Orbiting System such as orbiting star system or orbiting galactic system to behave just like our solar system. We must be out of our mind to expect a heavyweight orbiting system such as star orbiting system or galactic orbiting system to behave as a light weight solar system. We should have known never to put heavyweight boxer against a lightweight boxer in the ring. When our light weight boxer gets defeated in the ring with a heavyweight boxer, we claimed that it must have been due to steroid. There were no steroids involved. It is simply weight class mismatch. We should not have put an estimation technique that is lightweight against heavy weights.

When the estimate is far off the actual, instead of assuming our estimate was correct and taking the trivial path of inventing Dark Matter to fill the offset between the actual and the estimated speeds of the stars/galaxies, what we should have done was to cast the doubt on the estimation technique and find out the real reason for the estimation error. Find out the real reason why the actual speeds of the stars/galaxies is much higher than the estimated speeds. We should have cast the doubt on our estimation techniques. The offset of estimated speed from the actual speed could have been due to an unintentional hidden estimation error that we were making, and indeed it was as we are going to demonstrate later.

The fact of the matter is, the General Orbiting Systems are different from our solar system. Star orbiting systems are different from our solar system. Galactic Orbiting Systems are different from our solar system. Any General Orbiting System cannot be expected to behave as our solar system. When the Newtonism is applied to the solar system, assumptions that are suitable for the solar system had been made. These assumptions that are suitable for the solar system are not applicable to General Orbiting Systems such as star orbiting systems and galactic orbit systems.

Here, we first derive the orbits for a General Gravitational Orbiting System in two different ways; one provides the exact orbits for a General Orbit System, while the other provides approximate orbits:

1. We Use Newton's General Gravitational Laws as applied to any General Gravitational Orbiting System without any approximation regarding the masses of the orbiting objects relative to the mass of the orbit center. We take into account the mutual gravitational interactions of all the objects. We do not assume all the masses within a particular orbit are to be at the orbiting center. We abandon the Keplerism. This provides us the actual speeds of the stars in an orbiting system of stars. In other words, we derive New Gravitational Orbit Dynamics for General Orbit Systems.
2. We also use Newton's approximate Gravitational Laws as applied to solar system under the assumption that the mutual gravitational effects are negligible and all the masses within a particular orbit are at the orbiting center. This is equivalent to the direct extension of the Keplerism to a General Orbiting System. This provides the estimated speeds of stars as a direct extension of our knowledge of the solar system to an orbiting system of stars.

We use the actual speed of the stars obtained using universal Gravitational Orbit Dynamic (GOD), and the estimated speed of the stars obtained using the Keplerism or approximate Newtonism to show why the actual speed of the stars are much higher than the estimated speed of the stars. We also obtain the planetary orbits of the solar system as a special case

of the general orbiting system. Our development starts with the introduction of a brand New Eccentricity Vector for time-varying elliptical orbits for a General Orbit System. When a General Orbiting System becomes time-invariant, the Eccentricity Vector of a General Orbit System will be the same as the time-invariant Eccentricity Vector of a planetary orbit.

Only the material can be altered, or warped, not the non-material such as space. Space cannot be altered or warped. Mass cannot alter the space. Space cannot alter a mass. In fact, nothing can alter the space. It is only the gravitational field strength that varies with the spatial distance. Gravity has nothing to do with time. Time has nothing to do with gravity. It is a measuring instrument that is affected by the gravity, not what is being measured. It is the mechanism of a clock that has everything to do with gravity as well as electromagnetic force, and many other environmental factors such as temperature, pressure, and humidity.

A display of a clock and time are not the same thing. Time is objective; a display of a clock is subjective. Time is a definition; we defined time. A clock is a device we have engineered to display our definition of time. As it is the case with any engineered measuring instrument, the mechanism of the clock is expected to display our definition of time accurately only under a specified baseline environment or design specifications. It is not the time that varies with the frame of reference and gravity; it is the functioning of the mechanism of a clock that varies with the frame of reference and the gravity.

Some clocks are more affected by the environmental conditions than the other. The water clock that was used by the ancient Greeks in the trial of Socrates is much more sensitive to environmental variations and has a low accuracy than the modern clocks. Even within modern clocks, the mechanical clocks are much more sensitive to environment variations and have low accuracy than the electronics clocks and atomic clocks. Still, a mechanism of any clock is subjected to environment variations resulting display-time variations with the environment variations.

Time is the moment, not a dimension. It is the changes in the nature we make use of to define time as a dimension. Our definition of time only exists in our consciousness. The variation of the display of a clock from one environment to another has nothing to do with time itself. Time and mass are absolute, not relative [2,4]. Time and mass cannot be relative. One of the greatest conceptual blunders in science is the assumption of time and mass being relative.

II. GENERAL ORBITING SYSTEM

A General Orbiting System is an Orbiting System consisting of multiple orbiting objects where the masses of the orbiting objects are not negligible compared to the orbiting center mass. An orbiting system of stars is a General Orbiting System. An orbiting system of galaxies or super galaxies is a General Orbiting System. The solar system is also a General Orbiting System as long as we take the mutual gravitation between the planets into account without forcing all the masses within an orbit to be at the gravitational center.

Let us consider a General Orbiting System with n number of masses, m_i, i=1, 2, …, n orbiting a central mass M. The position vector of mass m_i at anytime t with respect to the orbiting center mass M is $\mathbf{r}_i$, where the radial distance r_i to the mass m_i from the orbiting center mass M is given by, $r_i=|\mathbf{r}_i|$, i=1, 2, …, n.

Now, we want to find the orbit of the k^{th} object consisting of mass m_k at any time t, where $1\le k\le n$.

Let $m=m_k$, $\mathbf{r}=\mathbf{r}_k$, $\mathbf{v}=\frac{\partial}{\partial t}\mathbf{r}_k$, $\mathbf{d}_i=-\mathbf{r}+\mathbf{r}_i$ and $d_i=|\mathbf{d}_i|$, $\forall\, i\neq k$.

Then, using the Newtonism in its general form, the orbit dynamics of the k^{th} object is given by,

$$\frac{\partial}{\partial t}\frac{\partial}{\partial t}\mathbf{r}+\nabla[\psi(r)]+\sum_{\forall i\neq k}\nabla[\psi(d_i)]=\mathbf{0} \quad (2.1)$$

where, ψ is the gravitational potential, ∇ is the del operator or the spatial gradient operator.

Since, $\psi(r)=-GM/r$, $\psi(d_i)=-Gm_i/d_i$, $\forall\, i\neq k$, we have,

$$\frac{\partial}{\partial t}\frac{\partial}{\partial t}\mathbf{r}=-(GM/r^3)\mathbf{r}+\sum_{\forall i\neq k}[Gm_i/d_i^3](-\mathbf{r}+\mathbf{r}_i) \quad (2.2)$$

where, G is the Gravitational parameter.

> Angular momentum of a planet in a multi-planets orbiting system is not conserved.

Lemma: Angular Momentum Not Conserved

Angular momentum of an orbiting object is not conserved in a multi-object orbiting system, in general.

Proof: The angular momentum $\boldsymbol{\ell}_m(k)$ of k^{th} object of mass m_k is given by,

$$\boldsymbol{\ell}_m(k)=m_k\mathbf{r}_k\times\mathbf{v}_k \quad (2.3)$$

where, × is the vector cross product, $\mathbf{v}_k=\frac{\partial}{\partial t}\mathbf{r}_k$.

Differentiating $\boldsymbol{\ell}_m(k)$ with respect to time under the assumption that the masses of the objects are time-invariant, we get,

$$\frac{\partial}{\partial t}\boldsymbol{\ell}_m(k)=m_k[(\frac{\partial}{\partial t}\mathbf{r}_k)\times\mathbf{v}_k+\mathbf{r}_k\times\frac{\partial}{\partial t}\mathbf{v}_k] \quad (2.4)$$

$$\frac{\partial}{\partial t}\boldsymbol{\ell}_m(k)=m_k\mathbf{r}_k\times\frac{\partial}{\partial t}\mathbf{v}_k \quad (2.5)$$

Using the orbit dynamics from eqn. (2.2), and substituting $\mathbf{r}=\mathbf{r}_k$, we get,

$$\frac{\partial}{\partial t}\boldsymbol{\ell}_m(k)=m_k\mathbf{r}_k\times[-(GM/r_k^3)\mathbf{r}_k+\sum_{\forall i\neq k}[Gm_i/d_i^3](-\mathbf{r}_k+\mathbf{r}_i)] \quad (2.6)$$

$$\frac{\partial}{\partial t}\boldsymbol{\ell}_m(k)=\sum_{\forall i\neq k}[Gm_km_i/d_i^3](\mathbf{r}_k\times\mathbf{r}_i)] \quad (2.7)$$

If $\mathbf{r}_k=\alpha_k\mathbf{r}$ and $\mathbf{r}_j=\alpha_j\mathbf{r}$, where α_k and α_j are scalar, then, $\frac{\partial}{\partial t}\boldsymbol{\ell}_m(k)=\mathbf{0}$. However, in general, $\frac{\partial}{\partial t}\boldsymbol{\ell}_m(k)\neq\mathbf{0}$, $\forall$ k, and hence the angular momentum of an orbiting object, a planet, a star, a galaxy, in a multi-object orbiting system or even an orbiting electron in a multi-electrons atom is not conserved. Although there are special situations where $\frac{\partial}{\partial t}\boldsymbol{\ell}_m(k)=\mathbf{0}$ is satisfied for certain k, it is not satisfied ∀k. In general, $\frac{\partial}{\partial t}\boldsymbol{\ell}_m(k)\neq\mathbf{0}$ ∀k, and as a result, the angular momentum of an orbiting object is not conserved.

Lemma: Total Angular Momentum Conserved

The total angular momentum of a multi-object orbiting system is conserved.

Proof: The total angular momentum $\boldsymbol{\ell}_T$ is given by,

$$\boldsymbol{\ell}_T=\sum_{\forall k}\boldsymbol{\ell}_m(k) \quad (2.8)$$

Differentiating with respect to time t, we get,

$$\frac{\partial}{\partial t}\boldsymbol{\ell}_T=\sum_{\forall k}[\frac{\partial}{\partial t}\boldsymbol{\ell}_m(k)] \quad (2.9)$$

Substituting for $\frac{\partial}{\partial t}\boldsymbol{\ell}_m(k)$ from eqn. (2.7), we get,

$$\frac{\partial}{\partial t}\boldsymbol{\ell}_T=\sum_{\forall k}\{\sum_{\forall i\neq k}[Gm_km_i/d_i^3](\mathbf{r}_k\times\mathbf{r}_i)\} \quad (2.10)$$

We know that,

$$\mathbf{r}_k\times\mathbf{r}_i=-\mathbf{r}_i\times\mathbf{r}_k \ \forall i\neq k \quad (2.11)$$

$$\mathbf{r}_k\times\mathbf{r}_i=\mathbf{0} \ \forall i=k \quad (2.12)$$

Substituting eqn. (2.11) and eqn. (2.12) in eqn. (2.10), we get,

$$\frac{\partial}{\partial t}\boldsymbol{\ell}_T=\mathbf{0} \quad (2.13)$$

The total angular momentum of an orbiting system is conserved.

Corollary:

The sum total of angular momentums of all the planets in any orbiting system is conserved.

Corollary:

The angular momentum of an electron in a multi-electrons atom is not conserved. It is the sum total of angular momentums of all the electrons in an atom that is conserved.

Angular momentum of an electron in an atom cannot be quantized. Vectors cannot be quantized. Time-varying quantities cannot be quantized.

It is the total angular momentum of all the planets in an orbit system that is conserved.

Corollary:

Out of all the atoms, it is only the angular momentum of the electron in a Hydrogen atom that is conserved since the Hydrogen atom is an orbiting system of a single electron.

Bohr atomic model is invalid even for Hydrogen atom since vectors cannot be quantized.

Since the angular momentum of an electron in an atom is a vector that is not conserved, one should not even think of quantizing angular momentum of an electron in an atom. First of all, you cannot quantize a vector since vectors do not come in quanta. If only the amplitude of an angular momentum is quantized as it is done in the Bohr atom, then, the direction information will be lost. Second of all, the angular momentum is not conserved and hence the angular momentum cannot be quantized.

Time-varying quantities do not come in quanta. Time-varying quantities cannot be quantized. Vectors do not come in quanta. Vectors cannot be quantized. The blind quantization of the angular momentum of an electron that is carried out in the Bohr atomic model is invalid and incorrect, meaningless, cannot be done.

Corollary:

Atoms are not spherical. Orbiting electrons in an atom are planar and hence atoms are circular disks of thickness equal to the diameter of the nucleus. The radius of a circular disk is equal to the radius of the orbit of the outermost electron in the atom.

III. GENERAL ORBIT DYNAMICS (GOD)

We can derive the General Orbit Dynamics of any orbiting object in a General Orbiting System by taking the mutual gravitation interactions between the orbiting objects into account. Let us consider the actual orbit dynamics of the k^{th} object given in eqn. (2.2),

$$\frac{\partial}{\partial t}\frac{\partial}{\partial t}\mathbf{r}=-(GM/r^3)\mathbf{r}+\sum_{\forall i\neq k}[Gm_i/d_i^3](-\mathbf{r}+\mathbf{r}_i) \quad (3.1)$$

where, $\mathbf{r}=\mathbf{r}_k$, $r=|\mathbf{r}_k|$, $\mathbf{d}_i=-\mathbf{r}+\mathbf{r}_i$ and $d_i=|-\mathbf{r}+\mathbf{r}_i|$.

We can write eqn. (3.1) as,

$$\frac{\partial}{\partial t}\frac{\partial}{\partial t}\mathbf{r}=-(GM/r^3)\{1+\sum_{\forall i\neq k}[(m_i/M)(r/d_i)^3]\}\mathbf{r}+\sum_{\forall i\neq k}[Gm_i/d_i^3]\mathbf{r}_i \quad (3.2)$$

Let us define effective orbiting center mass M_{eff} as,

$$M_{eff}=M\{1+\sum_{\forall i\neq k}[(m_i/M)(r/d_i)^3]\} \quad (3.3)$$

We now have,

$$\frac{\partial}{\partial t}\frac{\partial}{\partial t}\mathbf{r}=-(GM_{eff}/r^3)\mathbf{r}+\sum_{\forall i\neq k}[Gm_i/d_i^3]\mathbf{r}_i \quad (3.4)$$

$$\frac{\partial}{\partial t}\frac{\partial}{\partial t}\mathbf{r}=-(GM_{eff}/r^3)\{\mathbf{r}-\sum_{\forall i\neq k}[(m_i/M_{eff})(r/d_i)^3]\mathbf{r}_i\} \quad (3.5)$$

Let us define effective radial distance of the k^{th} orbiting object $\mathbf{r}_{eff}$ as,

$$\mathbf{r}_{eff}=\mathbf{r}-\sum_{\forall i\neq k}[(m_i/M_{eff})(r/d_i)^3]\mathbf{r}_i \quad (3.6)$$

Substituting eqn. (3.6) in eqn. (3.5), we now have,

$$\frac{\partial}{\partial t}\frac{\partial}{\partial t}\mathbf{r}=-(GM_{eff}/r^3)\mathbf{r}_{eff} \quad (3.7)$$

Real Gravitational Orbit Dynamics (real-GOD)

$$\frac{\partial}{\partial t}\frac{\partial}{\partial t}\mathbf{r}+(GM_{eff}/r^3)\mathbf{r}_{eff}=\mathbf{0}$$

Theorem: General Orbit Dynamics (GOD)

The General Orbit Dynamics (GOD) of an orbiting object of multi-object orbiting system is given by,

$$\frac{\partial}{\partial t}\frac{\partial}{\partial t}\mathbf{r}+(GM_{eff}/r^3)\mathbf{r}_{eff}=\mathbf{0}, \quad (3.8)$$

where $\mathbf{r}$ is the position vector of the k^{th} object relative to the orbiting center, $r=|\mathbf{r}|$, and M_{eff} is given by,

$$M_{eff}=M\{1+\sum_{\forall i\neq k}[(m_i/M)(r/d_i)^3]\} \quad (3.9)$$

the effective position vector $\mathbf{r}_{eff}$ is given by,

$$\mathbf{r}_{eff}=\mathbf{r}-\sum_{\forall i\neq k}[(m_i/M_{eff})(r/d_i)^3]\mathbf{r}_i \quad (3.10)$$

the distance to the i^{th} orbiting object from the k^{th} orbiting object, d_i given by,

$$d_i=|-\mathbf{r}+\mathbf{r}_i|. \quad (3.11)$$

M is the mass of the orbiting center, $r=|\mathbf{r}|$,

$\mathbf{r}_i$ is the position vector of the i^{th} object relative to the

orbit center.

Theorem: approximate General Orbit Dynamics (aGOD) of the Solar System

The approximate General Orbit Dynamics of the solar system is a special case of the General Orbit Dynamics when $m_i<<M$, $\forall i$, and it is given by,

$$\frac{\partial}{\partial t}\frac{\partial}{\partial t}\mathbf{r}+(GM/r^3)\mathbf{r}=\mathbf{0} \quad (3.12)$$

Proof: From the General Orbit Dynamics, we have,

$$\frac{\partial}{\partial t}\frac{\partial}{\partial t}\mathbf{r}+(GM_{eff}/r^3)\mathbf{r}_{eff}=\mathbf{0} \quad (3.13)$$

The approximate General Orbit Dynamics is obtained when the masses of the orbiting objects m_i, $\forall i$, are negligible compared to the orbiting center mass M. When $m_i<<M$, $\forall i$, we have,

$$M_{eff}\approx M \quad (3.14)$$

$$\mathbf{r}_{eff}\approx\mathbf{r} \quad (3.15)$$

Substituting eqn. (3.14) and eqn. (3.15) in (3.13), we get,

$$\frac{\partial}{\partial t}\frac{\partial}{\partial t}\mathbf{r}+(GM/r^3)\mathbf{r}=\mathbf{0} \quad (3.16)$$

This is the approximate General Orbit Dynamics. Since the planetary masses in our solar system are negligible compared to the sun, this is also the familiar orbit dynamics that we approximate our solar system with. This is the Newton's approximate orbit dynamics. This is the orbit dynamics derived by Newton to make a mathematical sense out of Kepler's experimental observations or Kepler's laws.

Corollary: Orbiting Star Systems

In the case of an orbiting star system, masses of the orbiting stars are significant and not negligible compared to the orbiting center star. As a result, orbit dynamics of an orbiting star system must be expressed using the General Orbit Dynamics (GOD),

$$\frac{\partial}{\partial t}\frac{\partial}{\partial t}\mathbf{r}+(GM_{eff}/r^3)\mathbf{r}_{eff}=\mathbf{0} \quad (3.17)$$

Corollary: Orbiting Galactic Systems

In the case of an orbiting galactic system, masses of the orbiting galaxies are significant and not negligible compared to the orbiting center galaxy. As a result, orbit dynamics of an orbiting galactic system must be expressed using the General Orbit Dynamics (GOD),

$$\frac{\partial}{\partial t}\frac{\partial}{\partial t}\mathbf{r}+(GM_{eff}/r^3)\mathbf{r}_{eff}=\mathbf{0}, \quad (3.18)$$

The orbit dynamics of a system of orbiting stars are different from the orbit dynamics of a planetary system like our solar system. Similarly, the orbit dynamics of a galactic orbiting system is also different from the orbit dynamics of a planetary system like our solar system that we are familiar with. As a result, we cannot expect the orbiting star system or orbiting galactic system to behave as planetary orbits. We cannot impose the approximate rules of the planetary motion in our solar system such as Keplerism or approximate Newtonism on to orbiting star systems or orbiting galactic systems. If we force the Keplerism on to orbiting star systems or orbiting galactic systems, what we get are the wrong estimates, highly underestimated values.

Corollary: General Elliptical Orbits (GEO)

All the orbits in general are time-varying. There are no time-invariant multi-object systems. The ability to apply time-invariance depends on the ability to disregard the mutual interactions between the objects in an orbiting system.

Corollary: Planetary Orbits of Solar System (PLOSS)

The Planetary Orbits of the Solar System can be approximated to be time-invariant only because the masses of the planets in the solar system are negligible compared to the mass of the sun. This is a luxury that is not available for heavyweight orbit systems such as star or galactic orbiting systems.

Property:

Orbits of Stars and Galaxies cannot be assumed to be time-invariant. Stars or galactic orbits are time-varying.

As we will see later, the time-invariant assumption used in the estimation of the orbiting speeds of the stars is the main culprit for under estimating the speeds of stars. Since it is our speed estimation methodology that is incorrect, we indeed have no need for Dark Matter. Dark Matter only exists in the human imagination, not in reality. Dark Matter has no real existence. Dark Matter resides only in the darkness of the human mind, not in reality.

Dark-Matter Resides in Our Minds, in our misunderstood reality.

IV. NEW ECCENTRICITY VECTOR

What distinguishes an elliptical orbit from a circular orbit is its Eccentricity Vector. If we know the Eccentricity Vector of an elliptical orbit, we know everything about the elliptical orbit. It is surprising that we still do not have the Eccentricity Vector for an Elliptical Gravitational Orbit (EGO). What we have so far is only the Runge-Lenz vector that lies on the major axis of an elliptical orbit [1]. However, Runge-Lenz vector does not represent the Eccentricity Vector of an elliptical orbit. Runge-Lenz vector is only applicable to solar system or solar-system-like planetary systems where the orbits can be assumed to be time-invariant or fixed. Runge-Lenz vector is not applicable to orbiting star systems and orbiting galactic systems since the orbiting star systems and orbiting galactic systems are time-varying or not fixed. Runge-Lenz vector works with Keplerism or approximate Newtonism for approximate General Orbit Dynamics under fixed orbits. Runge-Lenz vector is not applicable to General Orbit Dynamics (GOD).

It is the Eccentricity Vector that defines an elliptical

orbit completely. What we need is the General Eccentricity Vector for an orbit that could be time-varying or time-invariant. If the Eccentricity Vector is time-invariant, then, the orbit is time-invariant. If the Eccentricity Vector is time-varying, the orbit is time-varying. Since the actual orbit of a General Orbiting System is time-varying, finding the actual orbit of any General Orbiting System is equivalent to obtaining the Eccentricity Vector for a General Orbiting System, which can be an orbiting star system, orbiting galactic system, planetary system or any gravitational orbiting system or electromagnetic orbiting system such as atoms. Once the Eccentricity Vector for an elliptical orbit is known, the magnitude of the Eccentricity Vector provides the eccentricity of the elliptical orbit while the direction of the Eccentricity Vector describes the major axis of the elliptical orbit. In other words, the Eccentricity Vector in essence describes the elliptical orbit completely. When the Eccentricity Vector is a null vector, the orbit is circular.

Definition: Rotation Vector

The Rotation Vector $\boldsymbol{\ell}(t)$ of an orbiting object at any time t is defined as the,

$\boldsymbol{\ell}(t)=\mathbf{r}(t)\times\mathbf{v}(t)$

where, $\mathbf{r}(t)$ is the position vector of the orbiting object at time t relative to the orbit center mass, and $\mathbf{v}(t)$ is the velocity of the orbiting object at time t.

The Rotation Vector $\boldsymbol{\ell}$ is also the normalized angular momentum or the angular momentum of the orbiting object per unit mass of the object at time t,

$$\boldsymbol{\ell}=(1/m)\,\boldsymbol{\ell}_m$$

where, the angular momentum $\boldsymbol{\ell}_m=m\mathbf{r}\times\mathbf{v}$, m is the mass of the orbiting object, $\mathbf{r}$ is the radial distance to mass m from the orbit center mass M, $\times$ is the vector cross product, $\mathbf{v}$ is the velocity of mass m.

It is not the angular momentum of an orbiting object that defines the Eccentricity Vector of an elliptical orbit. It is the Rotation Vector $\boldsymbol{\ell}$ that defines the Eccentricity Vector of an elliptical orbit. As far as a gravitational orbit is concerned, it is the Rotation Vector of an orbiting object that is important, not the angular momentum of an orbiting object.

Definition: New Eccentricity Vector

New Eccentricity Vector $\mathbf{e}$ of the k^{th} orbit of a General Orbiting System consisting of n objects of masses, m_i, i=1,2,…,n and the orbit center mass M is given by,

$$\mathbf{e}=-(1/GM_{eff})\,\boldsymbol{\ell}\times\mathbf{v}-(\sec\theta_{eff})\nabla r_{eff} \quad (4.1)$$

where θ_{eff} is the angle between $\mathbf{r}$ and $\mathbf{r}_{eff}$, ∇ is the spatial gradient operator or Del operator, $\boldsymbol{\ell}$ is the Rotation Vector or the normalized angular momentum (angular momentum per unit mass) given by,

$$\boldsymbol{\ell}=\mathbf{r}\times\mathbf{v},\ \mathbf{v}=\frac{\partial}{\partial t}\mathbf{r}, \quad (4.2)$$

$\mathbf{r}$ is the position vector of orbiting object k with respect to the orbiting center mass M, G is the gravitational parameter, and M_{eff}, $\mathbf{r}_{eff}$ are given by,

$$M_{eff}=M\{1+\textstyle\sum_{\forall i\neq k}[(m_i/M)(r/d_i)^3]\} \quad (4.3)$$

$$\mathbf{r}_{eff}=\mathbf{r}-\textstyle\sum_{\forall i\neq k}[(m_i/M_{eff})(r/d_i)^3]\mathbf{r}_i \quad (4.4)$$

$m=m_k$, $r_{eff}=|\mathbf{r}_{eff}|$, $\mathbf{v}=\mathbf{v}_k$, $\mathbf{r}=\mathbf{r}_k$, and $\mathbf{r}_i$ $\forall i$, is the position vector of i^{th} mass relative to the orbiting center mass M, $r=|\mathbf{r}|$, $\mathbf{d}_i=-\mathbf{r}+\mathbf{r}_i$, $d_i=|\mathbf{d}_i|$, and d_i is the distance to the i^{th} orbiting mass m_i relative to the k^{th} orbiting object of mass m_k.

Why the vector $\mathbf{e}$ is the Eccentricity Vector of an orbiting object in multi-object General Orbiting System will be clear later.

Lemma: approximate New Eccentricity Vector

The approximate Eccentricity Vector for an orbit in the solar system where $m_i<<M$, $\forall i$ is given by,

$$\mathbf{e}=-\frac{1}{GM}\boldsymbol{\ell}\times\mathbf{v}-\nabla r \quad (4.5)$$

where, $\boldsymbol{\ell}=\mathbf{r}\times\mathbf{v}$, $\mathbf{v}=\frac{\partial}{\partial t}\mathbf{r}$, $r=|\mathbf{r}|$.

Proof: The approximate Eccentricity Vector is a direct result of the Eccentricity Vector $\mathbf{e}$ for the General Orbiting Dynamics in eqn. (4.1) when $m_i<<M$, $\forall i$. When $m_i<<M$, $M_{eff}\approx M$, $\mathbf{r}_{eff}\approx\mathbf{r}$, $\theta_{eff}\approx 0$ and hence the Eccentricity Vector $\mathbf{e}$ for a General Orbit Dynamics given in eqn. (4.1) will be reduced to the approximate General Orbit Dynamics given in eqn. (4.5). We can obtain the Eccentricity Vector of a planetary orbit simply by disregarding the effect of mutual interactions between the planets.

$$\mathbf{e}(\text{approximate})=\mathbf{e}(\text{actual when } m_i<<M,\ \forall i) \quad (4.6)$$

$$\mathbf{e}(\text{a planet in the solar system})=\mathbf{e}(\text{approximate}) \quad (4.7)$$

Eccentricity Vector of General Orbit System
$\mathbf{e}=-(1/GM_{eff})\,\boldsymbol{\ell}\times\mathbf{v}-(\sec\theta_{eff})\nabla r_{eff}$

Approximate Eccentricity Vector of a Planet in the Planetary System
$\mathbf{e}=-(1/GM)\,\boldsymbol{\ell}\times\mathbf{v}-\nabla r$

V. ACTUAL GRAVITATIONAL ORBITS

The Kepler's laws do not apply to General Orbit Systems. Kepler's laws apply to the solar system or the solar-system-like orbiting systems only as an approximation. In order to obtain actual orbit of an object in a General Orbit System, we have to use the Newton's general gravitational laws taking the mutual interactions of the objects into considerations. Here, we first develop the actual gravitational orbits for General Orbit Systems such as galactic orbit systems or orbiting star systems. Then, we derive the orbits of the solar system as a special case of the General Orbit System.

A. Actual General Gravitational Orbits

So far, we have defined the Eccentricity Vector for an actual orbit in a general orbiting system. However, we still have to demonstrate that the New Eccentricity Vector $\mathbf{e}$ indeed represents the Eccentricity Vector of

an elliptical orbit in a General Orbiting System. Until we can show that the magnitude of the Eccentricity Vector, e=|**e**| is the eccentricity of the general elliptical orbit and the direction of the vector **e** is the major axis of the general elliptical orbit, we cannot be sure that the New Eccentricity Vector **e** is the Eccentricity Vector of an elliptical orbit. Let us first convert the New Eccentricity Vector **e** into the polar form as well as the Cartesian form.

Theorem: General Elliptical Orbit (GEO)

If the New Eccentricity Vector **e** of a General Elliptical Orbit (GEO) of a multi-object General Orbiting System is given by,

$$\mathbf{e}= - (1/GM_{eff})\boldsymbol{\ell}\times\mathbf{v} - (\sec\theta_{eff})\nabla r_{eff} \quad (5.1)$$

then, the General Elliptical Orbit (GEO) of the k^{th} object is given by,

$$\mathbf{e}\bullet\mathbf{r}=R_{eff}-r \quad (5.2)$$

$$r(1+e\cos\varphi)=R_{eff} \quad (5.3)$$

where, φ is the angle between **e** and **r**, $\mathbf{r}=\mathbf{r}_k$, $\mathbf{r}_k$ is the position vector of the k^{th} orbiting object of interest, $\mathbf{v}=\mathbf{v}_k$, θ_{eff} is the angle between **r** and $\mathbf{r}_{eff}$, $r=|\mathbf{r}|$, $r_{eff}=|\mathbf{r}_{eff}|$,

$$\boldsymbol{\ell}=\mathbf{r}\times\mathbf{v},\ \mathbf{v}=\frac{\partial}{\partial t}\mathbf{r},\ \ell=|\boldsymbol{\ell}|, \quad (5.4)$$

$$R_{eff}=(\ell^2)/GM_{eff} \quad (5.5)$$

Proof: The Eccentricity Vector by itself represents an elliptical orbit. However, we are more familiar with the polar or Cartesian representation of an elliptical orbit. In order to represent an elliptical orbit in a form we are familiar with, all we have to do is take the dot product of **e** with **r**,

$$\mathbf{e}\bullet\mathbf{r}= - (1/GM_{eff})(\boldsymbol{\ell}\times\mathbf{v})\bullet\mathbf{r} - [(\sec\theta_{eff})\nabla r_{eff}]\bullet\mathbf{r} \quad (5.6)$$

This simplifies to,

$$\mathbf{e}\bullet\mathbf{r}=R_{eff}-r \quad (5.7)$$

where,

$$R_{eff}=(1/GM_{eff})\ell^2. \quad (5.8)$$

If the angle between **e** and **r** at any time t is φ, we have,

$$er(\cos\varphi)= R_{eff}-r \quad (5.9)$$

$$r(1+e\cos\varphi)= R_{eff} \quad (5.10)$$

This is an ellipse centered at one of its focal points. The eccentricity of the ellipse is e=|**e**|, and the direction of the Eccentricity Vector **e** is the major axis.

Since r, e and R_{eff} are time dependent in general, we can write the orbit in a form that brings out the time dependence,

$$r(t)[1+e(t)\cos\varphi(t)]=R_{eff}(t) \quad (5.11)$$

Now, we have an elliptical orbit of a general orbiting system in a polar form. This is still not in a form many of us are familiar with. We are much more familiar with ellipses in the Cartesian coordinates.

> General Elliptical Orbit (GEO) is given by,
> $r(t)[1+e(t)\cos\varphi(t)]=R_{eff}(t)$

Lemma: General Elliptical Orbit (GEO) in Cartesian Coordinates (x,y).

The General Elliptical Orbit (GEO) of an orbiting object in a General Orbiting System in Cartesian coordinates (x,y) is given by,

$$[(x+ea)/a]^2+[y/b]^2=1 \quad (5.12)$$

where,

$$a=R_{eff}/(1-e^2) \quad (5.13)$$

$$b^2=aR_{eff} \quad (5.14)$$

$$R_{eff}=(1/GM_{eff})\ell^2 \quad (5.15)$$

$\boldsymbol{\ell}=\mathbf{r}\times\mathbf{v}$, $\mathbf{v}=\frac{\partial\mathbf{r}}{\partial t}$, $\mathbf{r}=\mathbf{r}_k$, $\mathbf{v}=\mathbf{v}_k$, $\ell^2=\boldsymbol{\ell}\bullet\boldsymbol{\ell}$,

$\mathbf{e}= - (1/GM_{eff})\boldsymbol{\ell}\times\mathbf{v} - (\sec\theta_{eff})\nabla r_{eff}$,

ℓ, M_{eff}, R_{eff}, θ_{eff}, and e are time-varying, θ_{eff} is the angle between **r** and $\mathbf{r}_{eff}$, 'a' is the length of the semi-major axis and 'b' is the length of the semi-minor axis.

Proof: We already have the elliptical orbit in polar form,

$$r(1+e\cos\varphi)=R_{eff} \quad (5.16)$$

$$r=R_{eff}-er\cos\varphi \quad (5.17)$$

Squaring both sides, we get,

$$r^2=(R_{eff}-er\cos\varphi)^2 \quad (5.18)$$

We can write eqn. (5.18) as,

$$r^2(\cos^2\varphi + \sin^2\varphi) =(R_{eff}-er\cos\varphi)^2 \quad (5.19)$$

Now, choose the vector **e** as the x-axis and let,

$$x=r\cos\varphi \quad (5.20)$$

$$y=r\sin\varphi \quad (5.21)$$

In other words, the direction of the Eccentricity Vector **e** is the x axis. The direction of the Eccentricity Vector e is also the major axis of the ellipse. The **x** is the projection of vector **r** on the Eccentricity Vector **e** or the major axis. The **y** is the projection of **r** on the axis perpendicular to the vector **e**, which is also the minor axis of the ellipse.

Substituting equations (5.20) and (5.21) in eqn. (5.19), we have,

$$x^2+y^2=(R_{eff}-ex)^2 \quad (5.22)$$

$x^2-(R_{eff}-ex)^2 +y^2=0$

$(x+ex-R_{eff})(x-ex+R_{eff})+y^2=0$

$$[(1+e)x-R_{eff}][(1-e)x+R_{eff}]+y^2=0 \quad (5.23)$$

$(1-e^2)x^2+2R_{eff}ex-R_{eff}^2+y^2=0$

$x^2+2[R_{eff}ex/(1-e^2)]-[R_{eff}^2/(1-e^2)]+[y^2/(1-e^2)]=0$

$[x+R_{eff}e/(1-e^2)]^2-[R_{eff}^2/(1-e^2)][1+e^2/(1-e^2)]+[y^2/(1-e^2)]=0$

$[x+R_{eff}e/(1-e^2)]^2-[R_{eff}/(1-e^2)]^2+[y^2/(1-e^2)]=0$

$[x+R_{eff}e/(1-e^2)]^2+[y^2/(1-e^2)]=[R_{eff}/(1-e^2)]^2$

Let,

$$a= R_{eff}/(1-e^2) \quad (5.24)$$

Then, we have,

$[x+ea]^2+[y^2/(1-e^2)]=a^2$

$[(x+ea)/a]^2+[y^2/(1-e^2)a^2]=1$

Let,

$$b^2=(1-e^2)a^2 \quad (5.25)$$

Now, we have,

$$[(x+ea)/a]^2+[y/b]^2=1 \quad (5.26)$$

This is an ellipse centered at focus 'ea'. The Eccentricity Vector **e** is the major axis. The magnitude of the Eccentricity Vector **e** is the eccentricity 'e' of the ellipse. The length of the semi-major axis 'a' and the length of the semi-major axis 'b', are given by,

$$a=R_{eff}/(1-e^2),\ b^2=(1-e^2)a^2,\ \text{or}\ b^2=aR_{eff} \quad (5.27)$$

where, $R_{eff}=(1/GM_{eff})\ell^2$, e=|**e**|, e≠1, $\ell^2=\boldsymbol{\ell}\bullet\boldsymbol{\ell}$, and **ℓ** is the angular momentum that is time-varying.

Corollary: Circular Orbits of General Orbit Systems

When the Eccentricity Vector **e** is a null vector, **e**=**0**, the orbit of an object in a General Orbit System is circular at any time,

$r=R_{eff}$ (in polar form) (5.28)

$x^2+y^2=R_{eff}^2$ (in Cartesian coordinates) (5.29)

where, $R_{eff}=(1/GM_{eff})\ell^2$, $\ell^2=\boldsymbol{\ell}\cdot\boldsymbol{\ell}$, and $\boldsymbol{\ell}$ is the angular momentum that is time-varying.

B. Planetary Orbits of Solar Systems (POSS)

The General Orbit System has to be considered for any orbit system where the masses of the orbiting objects are not negligible compared to the mass of the orbit center. In an orbit in a General Orbit System, the Eccentricity Vector is time-varying, orbit is time-varying, and the angular momentum of an orbiting object is time-varying. In a General Orbit System, everything is time-dependent, nothing is time-invariant.

However, in orbiting systems like our solar system, where the masses of the orbiting objects are negligible compared to the mass of the orbit center, General Orbit System can be assumed to be time-invariant. The solar system can be simplified approximately as a special case of the General Orbit System when masses of the orbiting objects are negligible compared to the mass of the orbit center. In solar system, orbits can be considered to be locked-in and everything can be assumed to be time-invariant provided that the masses of the planets and the sun remain the same or masses are time-invariant. In reality, the masses are time-varying and therefore, there are no locked-in orbits.

Lemma: Eccentricity Vector of the Solar System

When the masses of planets are negligible compared to the mass of the sun, the Eccentricity Vector **e** of a planet in the solar system is given by,

$$\mathbf{e}=-\frac{1}{GM}\boldsymbol{\ell}\times\mathbf{v}-\nabla r \quad (5.30)$$

where, $\nabla=\left(\frac{\partial}{\partial x},\frac{\partial}{\partial y},\frac{\partial}{\partial z}\right)$, $r=|\mathbf{r}|$, $\boldsymbol{\ell}=\mathbf{r}\times\mathbf{v}$, $\mathbf{v}=\frac{\partial}{\partial t}\mathbf{r}$.

Proof: We already have the Eccentricity Vector for a General Orbit System,

$$\mathbf{e}=-(1/GM_{eff})\boldsymbol{\ell}\times\mathbf{v}-(\sec\theta_{eff})\nabla r_{eff} \quad (5.31)$$

When $m_i<<M$ $\forall i$, we have,

$M_{eff}\approx M$, and $r_{eff}\approx r$, $\theta_{eff}\approx 0$, and hence,

$$\mathbf{e}=-\frac{1}{GM}\boldsymbol{\ell}\times\mathbf{v}-\nabla r.$$

> Approximate Eccentricity Vector of Solar System
> $\mathbf{e}=-(1/GM)\,\boldsymbol{\ell}\times\mathbf{v}-\nabla r$

Lemma: Planetary Orbits for the Solar System

In the case of solar system, planetary masses are negligible compared to the mass of the sun, $m_i<<M$, $\forall i$, and hence the planetary orbits are time-invariant and given by,

$\mathbf{e}\cdot\mathbf{r}=R-r$ (in vector form) (5.32)

$r(1+e\cos\varphi)=R$ (in polar form) (5.33)

where, φ is the angle between **e** and **r**,

$\mathbf{e}=-\frac{1}{GM}\boldsymbol{\ell}\times\mathbf{v}-\nabla r$

$R=\frac{1}{GM}\ell^2$, and ℓ, e, R are approximately time-invariant.

Proof: We already have the orbits for a General Orbit System,

$e\cdot r=R_{eff}-r$ (in vector form) (5.34)

$r(1+e\cos\varphi)=R_{eff}$ (in polar form) (5.35)

When $m_i<<M$ $\forall i$, we have, $M_{eff}\approx M$, $R_{eff}\approx R$ and hence,

$$e\cdot r=R-r$$
$$r(1+e\cos\varphi)=R.$$

Corollary: Circular Planetary Orbits in Solar System

The orbit is circular when the Eccentricity Vector **e** is a null vector, **e**=**0**, and the circular planetary orbit is given by,

$r=R$ (polar form) (5.36)

$x^2+y^2=R^2$ (in Cartesian coordinates) (5.37)

where, $R=\frac{1}{GM}\ell^2$.

For circular orbits, $\ell=RV$, where V is the speed of the planet on a circular orbit. Therefore, under the assumption that the masses of the planets are negligible relative to the mass of the sun, we have the well known gravitational relationship for a circular orbit,

$$GM/R^2=V^2/R \quad (5.38)$$

This relationship only holds for circular orbits of the solar system or solar-system-like planetary systems where the masses of the planets are negligible compared to the orbit center. This relationship does not hold for orbit system of stars or orbit system of galaxies since the masses of stars or galaxies cannot be disregarded relative to the mass of the orbit center. In fact, the total mass of the orbiting stars in an orbiting star system is more than the mass of the orbiting center itself. Similarly, the total mass of the orbiting galaxies in an orbiting galactic system is more than the mass of the orbiting center itself. This fact has to be taken into account in the case of orbiting star/galactic systems.

> Circular Orbit of a General Orbit System at any time t is given by,
> $r(t)=R_{eff}(t)$ (polar form)
> $x^2(t)+y^2(t)=R_{eff}^2(t)$ (in Cartesian coordinates)

VI. SPEED OF OUTERMOST STAR OR GALAXY

Consider a galactic orbiting system, where n galaxies of mass m_i, i=1,2,…,n with position vectors $\mathbf{r}_i$, i=1,2,…,n orbiting a central galaxy of mass M. The masses of the orbiting galaxies m_i, i=1,2,…,n are comparable (not negligible) to the mass of the orbiting center galaxy, M. We want to find out the actual speed of the outermost galaxy.

A. **Actual Speed of the Outermost Galaxy**

We already have the actual orbit for the k^{th} galaxy in a galactic system of n galaxies. When k=n, we have the outermost galaxy,

$$r_n(1+e\cos\varphi)= R_{eff} \quad (6.1)$$

where, $r=|\mathbf{r}_n|$.

For circular orbits, the Eccentricity Vector **e** is a null vector, **e**=**0**, and hence, at any time t, the elliptical orbit given in eqn. (6.1) becomes,

$$r_n=R_{eff} \quad (6.2)$$

Substituting for R_{eff} from eqn. (5.8), we have,

$$R_{eff}=(1/GM_{eff})\ell^2 \quad (6.3)$$

where,

$$M_{eff}=M\{1+\sum_{\forall i\neq n}[(m_i/M)(r_n/d_i)^3]\} \quad (6.4)$$

$d_i=|-\mathbf{r}+\mathbf{r}_i|$, the distance from the outer most orbit to the i^{th} galaxy, i<n, $\mathbf{r}=\mathbf{r}_n$, the radial distance of the outer most galaxy relative to the orbiting center mass M.

When the orbit is circular, $|\mathbf{r}\times\mathbf{v}|=R_{eff}V_{act}$ and hence,

$$\ell=R_{eff}V_{act} \quad (6.5)$$

where V_{act} is the actual speed of the outermost galaxy on a circular orbit.

Substituting in eqn. (6.3), we have,

$$(V_{act})^2=(1/r_n)GM_{eff} \quad (6.6)$$

$$(V_{act})^2=(1/r_n)GM\{1+\sum_{\forall i\neq n}[(m_i/M)(r_n/d_i)^3]\} \quad (6.7)$$

In order to obtain the actual speed V_{act} of the outermost galaxy in an orbiting system of galaxies, we require mass of the orbiting center, mass of each galaxy, the radial distance to each galaxy from the outermost galaxy, and the radial distance to each galaxy from the orbiting center galaxy at a given time t. If all we have is the total mass of the galactic system $M+\sum_{\forall i<n} m_i$, and the radial distance r to the outermost galaxy, we are not able to obtain the actual speed of the outermost galaxy, V_{act}. The actual speed of the outermost galaxy V_{act} depends on the orbit center mass and the masses of all the galaxies within the outermost orbit as well as the location of the all the galaxies with respect to the outermost galaxy at any given time. So, the actual speed of the outermost galaxy V_{act} is time-varying, not time-invariant.

However, just for the purpose of comparison, we can obtain the upper bound for the speed of the outermost galaxy V_{act} or $V_{act}(max)$. As we can see from equation (6.6), $V_{act}(max)$ is achieved when M_{eff} is maximum.

The maximum M_{eff} is achieved, when,

$$\mathbf{d}_i=\alpha_i\mathbf{r}_n \quad (6.8)$$

where, α_i is a scalar and $0<\alpha_i<1$.

In this case, we have,

$$r_n/d_i=1/\alpha_i \quad (6.9)$$

where, $1\leq i<n$.

If the orbits are equally spaced radially, then, we have,

$$\alpha_i=(n-i)/n \quad (6.10)$$

Substituting in eqn. (6.8), we get,

$$r_n/d_i=n/(n-i) \quad (6.11)$$

Substituting eqn. (6.11) in eqn. (6.4), we get,

$$M_{eff}(max)=M\{1+\sum_{\forall i\neq n}(m_i/M)[n/(n-i)]^3\} \quad (6.12)$$

Lemma: Upper Bound for the Actual Speed of the Outermost Galaxy

The upper bound for the actual speed of the outermost galaxy in an orbiting galactic system, $V_{act}(max)$ is given by,

$$(V_{act})^2(max)=(1/r_n)GM\{1+\sum_{\forall i\neq n}(m_i/M)[n/(n-i)]^3\} \quad (6.13)$$

where, r_n is the radial distance of the outer most galaxy relative to the orbiting center.

If the masses of galaxies m_i, ∀i, are comparable to the mass M of the orbit center galaxy, as it is the case with all the orbiting star systems as well as all the orbiting galactic systems, for large n, we have,

$$M_{eff}(max)\approx \sum_{\forall i\neq n} m_i[n/(n-i)]^3 \quad (6.14)$$

In the case of a star orbiting system with large number of orbiting stars, the gravitational force on outermost star is dominated by the mass of the other orbiting stars within the outermost orbit than the mass of the orbit center star itself.

Substituting eqn. (6.14) in eqn. (6.6), we get the approximate upper bound for the actual speed of the outermost orbit $V_{act}(max)$,

$$(V_{act})^2(max)\approx(1/r_n)G\sum_{\forall i\neq n} m_i[n/(n-i)]^3 \quad (6.15)$$

Lemma: Approximate Upper Bound for the Actual Speed of the Outermost Galaxy

The approximate upper bound for the actual speed of the outermost galaxy in an orbiting galactic system, $V_{act}(max)$ is given by,

$$(V_{act})^2(max)\approx(1/r_n)GM\sum_{\forall i\neq n}(m_i/M)[n/(n-i)]^3$$

where, r_n is the radial distance of the outer most galaxy relative to the orbiting center.

B. **Estimated Speed of the Outermost Galaxy**

Let us consider the Eccentricity Vector for the actual outermost orbit,

$$\mathbf{e}= -(1/GM_{eff})\boldsymbol{\ell}\times\mathbf{v} - (\sec\theta_{eff})\nabla r_{eff} \quad (6.16)$$

where, $r_{eff}=|\mathbf{r}_{eff}|$ and,

$$M_{eff}=M\{1+\sum_{\forall i\neq n}[(m_i/M)(r_n/d_i)^3]\} \quad (6.17)$$

$$\mathbf{r}_{eff}=\mathbf{r}_n-\sum_{\forall i\neq n}[(m_i/M_{eff})(r_n/d_i)^3]\mathbf{r}_i \quad (6.18)$$

Since we don't have d_i and r_i, ∀i, at any time t, let's make the approximation,

$$r_n/d_i\approx 1,\ \forall i,\ i\neq n \quad (6.19)$$

This is simply an unrealistic and outrageous approximation that does not hold true in reality. In any case, let us make this assumption and see where it leads us as far as the estimated speed of the outermost star under this approximation is concerned. This indicates that all the galaxies are on an arc of radius $d_i=r_n$ with the outermost n^{th} planet being the center of the arc all the time. This assumption is simply not realistic. Yet, as we are going to see, this is exactly an assumption that we are making, in hindsight, when we use all the masses within the outermost orbit alone to estimate the speed of an outer most galaxy. So it is not surprising why the estimated speed of the outer most star or galaxy is far below the actual values.

Substituting eqn. (6.19) in eqns. (6.17) and (6.18), we get,

$$M_{eff}=M+\sum_{\forall i\neq n} m_i \quad (6.20)$$

$$M_{eff}=M_T \quad (6.21)$$

where, $M_T= M+\sum_{\forall i\neq n} m_i$, the total mass within the outermost orbit of the orbiting system.

Now, the $\mathbf{r}_{eff}$ is given by,

$$\mathbf{r}_{eff}= \mathbf{r}-(1/M_T)\sum_{\forall i\neq n} m_i\mathbf{r}_i \quad (6.22)$$

Let also assume that the center of the mass of the galactic system excluding the outer most galaxy is also the orbit center. Then, we have,

$$\sum_{\forall i\neq n} m_i\mathbf{r}_i=\mathbf{0} \quad (6.23)$$

Substituting in eqn. (6.22), we wet,

$$\mathbf{r}_{eff}= \mathbf{r} \quad (6.24)$$

When $\mathbf{r}_{eff}= \mathbf{r}$, we have,

$$\theta_{eff} =0 \quad (6.25)$$

We now have the approximate Eccentricity Vector $\mathbf{e}_{app}$ for the outermost orbit,

$$\mathbf{e}_{app}= - (1/GM_T)\boldsymbol{\ell}\times\mathbf{v} - \nabla r_n \quad (6.26)$$

When the approximate orbit is circular, $\mathbf{e}_{app}$ is a null vector,

$$\mathbf{e}_{app}=\mathbf{0} \quad (6.27)$$

If the estimated speed of the outer most galaxy on an approximate circular orbit of radius r_n is V_{est}, then, substituting eqn. (6.27) in eqn. (6.26), we get,

$$(V_{est})^2=(1/r_n)GM_T \quad (6.28)$$

Since, $M_T= M+\sum_{\forall i\neq n} m_i$, we have

$$(V_{est})^2=(1/r_n)GM[1+\sum_{\forall i\neq n} m_i/M] \quad (6.29)$$

If we know the total mass of the galaxies within the outermost orbit, we can estimate the speed of the outermost galaxy provided we know the radial distance r_n to the outermost galaxy relative to the orbiting center. This is exactly how the speed of the outermost star is estimated in practice with the knowledge of the masses within the outermost orbit.

It is interesting that if we estimate the speed of the outermost galaxy by forcing all the masses within the outermost orbit to be at the orbit center, in effect, it is equivalent to making the following assumptions in hindsight,

1. $r_n/d_i\approx1$, $\forall i$, $i\neq n$
2. $\sum_{\forall i\neq n} m_i\mathbf{r}_i\approx\mathbf{0}$.

When the first approximation is taken alone, we are also forcing all the galaxies to be on an arc of radius r_n with the outermost galaxy (n^{th} galaxy) being at the center of the arc all the time; all the galaxies have to orbit around the orbit center while maintaining their distances to the n^{th} galaxy equal to the radial distance to the n^{th} galaxy relative to the orbit center, $r_n=d_i$, $\forall_i$, $i\neq n$.

These are not realistic assumptions. Taken together, these two assumptions are equivalent to placing all the masses within the outermost orbit at the orbit center.

When we lump all the masses within the outermost orbit at the orbit center, we are in effect forcing the center of mass of the all the galaxies within the outermost orbit to be at the orbit center, which may approximately hold true for the solar system since the masses of the planets are negligible compared to the mass of the sun. However, these assumptions do not hold even approximately for General Orbiting Systems such as stars or galaxies since the masses of the stars and galaxies are not negligible compared to the orbit center mass.

When we consider all the masses within an orbit to be at the orbiting center, these two conditions are satisfied. However, it is achieved at the cost of estimation error. In the case of orbiting galactic or orbiting star systems, this estimation error is significant. The estimated speed of an outer most star is much lower than the actual speed of the outermost star as a result of our using of all the masses within the outermost orbit alone and forcing them to the orbit center in estimating the speed of the outermost star.

The knowledge of all the masses within the outermost orbit alone is sufficient for estimating the speed of the outermost planet in the solar system. However, when we are dealing with General Orbit Systems such as orbiting stars or galaxies, the knowledge of all the masses within the outermost orbit alone is not sufficient for estimating the speed of the outermost star or galaxy. In order to estimate the speed of the outer most star or galaxy accurately, we also require the radial distances of all the masses of the stars or galaxies at any time t.

Lemma: Estimated Speed of the Outermost Galaxy

The estimated speed of the outermost galaxy in an orbiting galactic system, V_{est} with the knowledge of all the masses within the outermost orbit alone is given by,

$$(V_{est})^2=(1/r_n)G[M+\sum_{\forall i\neq n} m_i]$$

where, r_n is the radial distance of the outer most galaxy relative to the orbiting center.

VII. RATIO OF ACTUAL TO ESTIMATED SPEED OF OUTERMOST STAR $[V_{act}/V_{est}]$

We already have the actual as well as the estimated speeds of the outermost galaxy of an orbiting galactic system,

$$(V_{act})^2=(1/r_n)GM\{1+\sum_{\forall i\neq n}[(m_i/M)(r_n/d_i)^3]\} \quad (7.1)$$

$$(V_{est})^2=(1/r_n)GM[1+\sum_{\forall i\neq n} m_i/M] \quad (7.2)$$

Lemma:

The actual speed V_{act} of the outermost star is always greater than the estimated speed V_{est}.

Proof: In general, for any orbiting system,

$M\{1+\sum_{\forall i\neq n}[(m_i/M)(r_n/d_i)^3]\}>M[1+\sum_{\forall i\neq n} m_i/M]$.

As a result, we have, $V_{act}>V_{est}$.

The actual speed of an outer most star is always greater than the estimated speed of the outermost star with the knowledge of masses within the outermost orbit alone.

Now, we want to find out a compact approximate relationship between the actual speed and the estimated speed of the outermost galaxy. For this, we use the upper bound of the actual speed, $(V_{act})^2(max)$ given in eqn. (6.13). In order to achieve that, we are going to assume all the orbiting galaxies are of approximately the same mass, $m_i\approx m$, $\forall i$, where,

$m=[(n-1)^{-1}\sum_{\forall i\neq n} m_i$.

In effect, we are replacing all the masses of stars with the average mass of all the stars within the outermost orbit. Now, using $(V_{act})^2(max)$, we have,

$$(V_{act})^2(max) \approx (1/r_n)GM\{1+(m/M)n^3\sum_{\forall i\neq n}[1/(n-i)]^3\} \quad (7.3)$$

$$(V_{est})^2 \approx (1/r_n)GM[1+(m/M)(n-1)] \quad (7.4)$$

What we want here is to get rough idea of in what order $V_{act}(max)$ differs from V_{est}. We can further simplify $V_{act}(max)$ by keeping only the largest term of the summation in eqn. (7.3) and disregarding the rest. The approximate $V_{act}(max)$ or $\tilde{V}_{act}$ is now given by,

$$(\tilde{V}_{act})^2 \approx (1/r_n)GM[1+(m/M)n^3] \quad (7.5)$$

$$(V_{est})^2 \approx (1/r_n)GM[1+(m/M)(n-1)] \quad (7.6)$$

For a general orbiting system such as an orbiting system of galaxies or an orbiting system of stars, the mass of the orbiting object is comparable to the mass of the orbit center, and hence for large n, we have,

$$(m/M)n^3\sum_{\forall i\neq n}[1/(n-i)]^3 >> 1 \quad (7.7)$$

$$(m/M)(n-1)] >> 1 \quad (7.8)$$

Substituting in eqns. (7.7) and (7.8) in eqns. (7.5) and (7.6), we get,

$$(\tilde{V}_{act})^2 \approx (1/r_n)Gmn^3\} \quad (7.9)$$

$$(V_{est})^2 \approx (1/r_n)Gm(n-1) \quad (7.10)$$

Dividing eqn. (7.9) by eqn. (7.10), we get,

$$[\tilde{V}_{act}/V_{est}]^2 \approx n^3/(n-1) \quad (7.11)$$

For large n, we have,

$$[\tilde{V}_{act}/V_{est}] \approx n \quad (7.12)$$

$$\tilde{V}_{act} \approx nV_{est} \quad (7.13)$$

$$V_{est} \approx (1/n)\tilde{V}_{act} \quad (7.14)$$

where n is the number of stars/galaxies in the orbiting system.

> Estimated speed of the outermost star/galaxy is only a small fraction of the actual speed of the outermost star/galaxy,
> $V_{est} \approx (1/n)V_{act}$
> where, n is the number of stars/galaxies in the orbiting star/galactic system.

Lemma:

Estimated speed of the outermost star in an orbiting star system with the knowledge of all the masses within the outermost orbit alone is approximately related by,

$$V_{est} \approx (1/n)V_{act}$$

where, n is the number of stars in the orbit system, V_{est} is the estimated speed, and V_{act} is the actual speed of the outermost star in the star orbit system.
The same approximate relationship holds for orbiting galactic system.

The estimated speed of the outermost galaxy using the masses within the outermost orbit alone is just a fraction of the actual speed. The larger the number of galaxies in the orbit system, the smaller is the fraction. There is nothing to be surprised of if the observed orbiting speed of an outermost star or galaxy is much higher than expected. We don't have all the necessary information to estimate the actual speed. The knowledge of the all the masses within the outermost orbit alone is not sufficient for obtaining the speed of the outermost galaxy or star. In order to calculate the speed of stars in a star orbit system, we need $[m_i, \mathbf{r}_i]$ pairs, $\forall i$, where, m_i is the mass of the i^{th} star and $\mathbf{r}_i$ is the position vector of the i^{th} star at any time t in the orbiting star system.

In practice, how do we estimate the speed of the outermost star/galaxy in a star/galactic orbit system? When we estimate the speed of the outermost star in a star orbit system, we lump all the masses within the orbit at the orbit center. The same is done for galactic orbit systems. We also disregard the mutual interactions between orbiting stars even though these interactions are significant and not negligible for star orbit systems. We also disregard the mutual interactions between orbiting galaxies when these interactions are significant for orbiting galactic systems. We consider galactic or star orbits to be time-invariant when they are not. We impose our knowledge of solar system on the galactic orbit systems. We force the Keplerism that approximates the motion of the solar system on to orbiting star or galactic systems where Keplerism has no place.

In our solar system, speed of the planets decreases with the radial distance only because the masses of the planets are negligible compared to the mass of the sun, the orbit center. In the case of galactic orbit systems or star orbit systems, the masses of the orbiting objects are comparable to the orbiting center mass and hence the masses of the orbiting objects are not negligible compared to the orbit center mass. As a result, Keplerism does not apply to General Orbit Systems such as galactic orbit systems or orbit star systems. Keplerism applies to solar system or solar-system-like systems only as an approximation. Keplerism cannot be extended blindly to galactic orbit systems or orbiting star systems. If we are forcing Keplerism on star or galactic orbit systems, what you get are the highly underestimated speeds of the stars or galaxies, far below the actual speeds.

There is no need for dark matter. There is no dark matter. The dark matter is a result of a human mistake. The hypothetical dark matter only resides in the human mind. It is our misunderstanding and misapplication of Newtonism that led to the dark matter. Keplerism is not universal. Approximate Newtonism as applied to solar system is not universal. Keplerism does not hold in reality in any strict sense. Keplerism is an approximation that seems to apply for the solar system or the solar-system-like orbiting systems. Keplerism has no place in the grand scheme of gravitational systems, in general orbiting systems.

Neither Keplerism nor approximate Newtonism has any place in the General Orbiting Systems such as galactic orbit systems or star orbiting systems. It is the Newtonism in its most fundamental form that has to be used in General Orbit Systems such as galactic orbit systems or orbiting star systems.

VIII. ACCOUNTING FOR THE UNACCOUNTED MASS: NOT SO DARK DARK-MATTER

As we have seen, when we consider a orbiting system of n stars with masses m_i, i=1,2,…,n and the orbiting center mass M, the effective gravitational center mass, M_{eff} for the outer most star m_n is given by,

$$M_{eff}=M\{1+\sum_{\forall i\neq n}[(m_i/M)(r_n/d_i)^3]\} \quad (8.1)$$

The total mass within the outermost orbit M_T is given by,

$$M_T= M[1+\sum_{\forall i\neq n} m_i/M] \quad (8.2)$$

The mass not taken into account in the estimation, ΔM is given by,

$$\Delta M= M_{eff}- M_T \quad (8.3)$$

Now, we have,

$$\Delta M=\sum_{\forall i\neq n}[m_i(r_n/d_i)^3] - \sum_{\forall i\neq n} m_i \quad (8.4)$$

$$\Delta M= \sum_{\forall i\neq n}[(r_n/d_i)^3 – 1]m_i \quad (8.5)$$

Lemma: Unaccounted Mass

The unaccounted mass in the estimation, ΔM is given by,

$$\Delta M= \sum_{\forall i\neq n}[(r_n/d_i)^3 – 1]m_i$$

where, r_i is the radial distance to the i^{th} star from the orbit center, d_i is the distance to the i^{th} star from the outer most n^{th} star, m_i is the mass of the i^{th} star, i=1,2,…,n, and n is the number of stars in the orbiting system.

If the orbits are equally spaced, we have,

$$\Delta M<\Delta M_{max} \quad (8.6)$$

where, the maximum of ΔM, ΔM_{max} is given by,

$$\Delta M_{max}= \sum_{\forall i\neq n}\{[n/(n-i)]^3 – 1\}m_i \quad (8.7)$$

Let the average mass of a star be m. Then m is given by,

$$m=[1/(n-1)] \sum_{\forall i\neq n} m_i \quad (8.8)$$

If we assume the mass of stars to be of nearly equivalent to the average mass m of all the stars in the orbit system, we have,

$$\Delta M_{max}=m\{ \sum_{\forall i\neq n}[n/(n-i)]^3 \} – m(n-1) \quad (8.9)$$

$$\Delta M_{max}\approx mn^3 – m(n-1) \quad (8.10)$$

The upper bound $\Delta M_{ub}(max)$ of ΔM_{max} is given by,

$$\Delta M_{ub}(max)<mn^3 \quad (8.11)$$

The unaccounted mass due to the estimation error is bounded by the relationship,

$$\Delta M< n^2 \sum_{\forall i\neq n} m_i \quad (8.12)$$

Lemma: Upper Bound for the Unaccounted Mass

The upper bound for the unaccounted mass ΔM due to the estimation error is bounded by the relationship,

$$\Delta M<n^2 \sum_{\forall i\neq n} m_i$$

where, m_i is the mass of the i^{th} orbiting star, n is the number of stars, i=1,2,…,n.

The missing mass in the estimation, ΔM depends on the location of the orbiting stars. As a result, the missing mass in the estimation, ΔM depends on the time. It is this ΔM that has been referred to as Dark Matter. The missing mass ΔM is the effect of mutual gravitation of the stars in the orbiting system of stars. Mass ΔM is real. The mass ΔM would have been accounted for if the mutual gravitational effect of the stars in an orbiting system of stars has been taken into account in the estimation of the speed of the outermost galaxy. ΔM is not Dark Matter. It is due to the real mutual gravitational influence of the stars. It is time dependent. We do not come across ΔM in the Solar System since the masses of the planets in the solar system are negligible compared to the mass of the sun, $m_i<<M$, $\forall i$. The so called Dark Matter is a result of not taking the mutual gravitational effect of the orbiting stars into account in the estimation. If you take the mutual gravitational effect of the stars into account, you do not come across any need for inventing ghost matter or Dark Matter.

IX. SPEED OF OUTERMOST PLANET IN THE SOLAR SYSTEM

The actual speed V_{act} and the estimated speed V_{est} of the outermost orbiting object in any General Orbiting System are given by eqns. (6.7) and (6.29),

$$(V_{act})^2=(1/r_n)GM\{1+\sum_{\forall i\neq n}[(m_i/M)(r_n/d_i)^3]\} \quad (9.1)$$

$$(V_{est})^2=(1/r_n)GM[1+\sum_{\forall i\neq n} m_i/M] \quad (9.2)$$

where, V_{act} is the actual speed of the outermost object in the orbiting system consists of n orbiting objects, V_{est} is the estimated speed of the outermost object with the knowledge of the masses within the outermost orbit, r_n is the radial distance to the outermost object relative to the orbiting center of mass M, m_i is the mass of the i^{th} object, d_i is the distance to the i^{th} object from the outermost planet, $\mathbf{d}_i=-\mathbf{r}_n+\mathbf{r}_i$, $\mathbf{r}_i$ is the position vector of the i^{th} orbiting object relative to the orbit center, $d_i=|\mathbf{d}_i|$.

Since $\sum_{\forall i\neq n}[(m_i/M)(r_n/d_i)^3]> \sum_{\forall i\neq n}[m_i/M]$, in general, except for some special cases, where $d_i>r_n$ $\forall i$, which does not happen in reality, we have,

$$V_{act}> V_{est} \quad (9.3)$$

For any orbit system, the actual speed of the orbiting object in the outermost orbit is higher than the estimated speed of the object with the knowledge of the masses within the outermost orbit alone.

In the case of the solar system, the masses of the planets are negligible compared to the mass of the sun,

$$m_i<<M, \forall i \quad (9.3)$$

If the orbits are equally spaced radially, from eqns. (7.1) and (7.2), we have,

$$(V_{act})^2(max)=(1/r_n)GM\{1+\sum_{\forall i\neq n}(m_i/M)[n/(n-i)]^3\} \quad (9.4)$$

$$(V_{est})^2=(1/r_n)GM[1+\sum_{\forall i\neq n} m_i/M] \quad (9.5)$$

If the average mass of the planets excluding the mass of the outermost planet is m, where

$$m=[1/(n-1)]\sum_{\forall i\neq n} m_i \quad (9.6)$$

then, we have the approximate bound for actual speed of the object on the outermost orbit, V_{act},

$$(V_{act})^2\approx(1/r_n)GM[1+(m/M)n^3] \quad (9.7)$$

$$(V_{est})^2\approx(1/r_n)GM[1+(m/M)(n-1)] \quad (9.8)$$

Now, we have,

$$[V_{act}/V_{est}]^2\approx[1+(m/M)n^3]/[1+(m/M)(n-1)] \quad (9.9)$$

Since number of planets in the solar system, n is small and m<<M, we also have (m/M)(n-1)<<1, and as a result, we have,

$$[V_{act}/V_{est.}]^2 \approx [1+(m/M)n^3][1-(m/M)(n-1)] \quad (9.10)$$
$$[V_{act}/V_{est.}]^2 \approx 1+(m/M)n^3 \quad (9.11)$$

As far as the solar system is concerned, we have, $(m/M)n^3 << 1$ and hence,

$$V_{act}/V_{est.} \approx 1+(1/2)(m/M)n^3 \quad (9.12)$$
$$(V_{act}-V_{est})/V_{est.} \approx (1/2)(m/M)n^3 \quad (9.13)$$

The estimation error grows with the number of planets in the solar system in cubic order as long as the orbits are equally spaced radially or if all the radial distances between any two adjacent planets are equal.

In general, for the solar system or any solar-system-like orbiting system, we have,

$$V_{act}/V_{est} > 1 \quad (9.14)$$

It is only for the orbiting systems with small number of planets where the masses of the planets are negligible compared to the orbiting center mass, $m << M$, as it is in the case of the solar system, that it is possible to assume that the estimated speed is approximately equal to the actual speed,

$$V_{act}/V_{est} \approx 1, \text{ when n is small and } m << M \quad (9.15)$$

However, even for the solar system, the actual speed of the outermost planet is greater than the estimated speed. This difference between actual and estimation speed is solely due to the estimation error, not a result of hidden Dark Matter. In the case of the Solar System, even though the orbits are not equally spaced radially, the actual speed of the outermost planet will still be slightly higher than the estimated speed.

> The actual speed of the outermost planet is always higher than the estimated speed in any orbiting system including the solar system. However, in the case of the solar system, this difference is insignificant.

Lemma:

If the orbits are equally spaced radially, and $m_i << M$, $\forall i$, the estimation error of the speed of the outermost planet of the solar system is given by,

$$(V_{act}-V_{est})/V_{est.} \approx (1/2)(m/M)n^3$$

where V_{act} is the actual speed of the outermost planet,
V_{est} is the estimated speed of the outermost planet,
n is the number of planets in the orbiting system,
m is the average mass of the planets within the outermost orbit, and M is the mass of the orbit center.

Corollary:

The estimated speed of the outermost planet in an orbiting system is approximately equal to the actual speed only when the number of planets in the system is small and the planetary mass is negligible compared to the orbiting center mass.

X. SPEED VARIATION OF ORBITTING OBJECTS WITH THE RADIAL DISTANCE

In the case of a single orbiting object, the speed of the object decreases with the radial distance since the gravitational potential decreases with the distance. However, this is not the case for multi-object orbiting system since the mutual interactions of the orbiting objects come into play.

Let us consider a General Orbit System consisting of n orbiting objects of mass m_i, i=1,2,…,n and the orbiting center mass M. The General Orbit System could be a star orbit system, galactic orbit system, or planetary orbit system. In eqn. (6.13), we have already seen the orbiting speed of the outermost object. Using eqn. (6.13), the orbiting speed V_k of the k^{th} orbiting object at radial distance r_k can be written as,

$$(V_k)^2(max) \approx (1/r_k)GM\{1+\sum_{\forall i<k}(m_i/M)[k/(k-i)]^3 + \sum_{\forall i>k}(m_i/M)[k/i]^3\} \quad (10.1)$$

where V_k is the speed of the k^{th} orbit, $1<k<n$, and n is the number of orbiting objects in the orbiting system.
Since we have considered the objects to be uniformly distributed or orbits to be equally spaced radially, we have,

$$r_k = \alpha k \quad (10.2)$$

where α is the radial distance between two adjacent orbits.
Now, we have,

$$(V_k)^2(max) \approx (1/\alpha k)GM\{1+\sum_{\forall i<k}(m_i/M)[k/(k-i)]^3 + \sum_{\forall i>k}(m_i/M)[k/i]^3\} \quad (10.3)$$

The maximum speed of the object on $(k-1)^{th}$ orbit is given by,

$$(V_{k-1})^2 \approx [1/\alpha(k-1)]GM\{1+\sum_{\forall i<k-1}(m_i/M)[(k-1)/(k-1-i)]^3 + \sum_{\forall i>k-1}(m_i/M)[(k-1)/i]^3\} \quad (10.4)$$

Dividing eqn. (10.3) by (10.4), we get,

$$[V_k/V_{k-1}]^2 \approx [(k-1)/k][M_{eff}(k)/M_{eff}(k-1)] \quad (10.5)$$

where,

$$M_{eff}(k) = M\{1+\sum_{\forall i<k}(m_i/M)[k/(k-i)]^3 + \sum_{\forall i>k}(m_i/M)[k/i]^3\} \quad (10.6)$$
$$M_{eff}(k-1) = M\{1+\sum_{\forall i<k-1}(m_i/M)[(k-1)/(k-1-i)]^3 + \sum_{\forall i>k-1}(m_i/M)[(k-1)/i]^3\} \quad (10.7)$$

V_k/V_{k-1} is the speed ratio between two consecutive orbits for a General Orbiting System.

If the average mass of all the orbiting object excluding the k^{th} object is m,

$$m = [1/(n-1)]\sum_{\forall i \neq k} m_i.$$

If we assume $m_i \approx m$, $\forall i \neq k$, we have,

$$M_{eff}(k) = M\{1+(m/M)k^3\{\sum_{\forall i<k}[1/(k-i)^3] + \sum_{\forall i>k}[1/i^3]\}\} \quad (10.6)$$
$$M_{eff}(k-1) = M\{1+(m/M)(k-1)^3\{\sum_{\forall i<k-1}[1/(k-1-i)^3] + \sum_{\forall i>k-1}[1/i^3]\}\} \quad (10.7)$$

where $1<k<n$, n is the total number of stars/galaxies in the orbiting system.

Lemma:

The speeds V_{k-1} and V_k of two objects orbiting in two consecutive orbits k-1 and k in a General Orbiting System is related approximately by,

$$[V_k/V_{k-1}]^2 \approx [(k-1)/k][M_{eff}(k)/M_{eff}(k-1)] \quad (10.8)$$

where,

$$M_{eff}(k) = M\{1+(m/M)k^3\{\sum_{\forall i<k}[1/(k-i)^3] + \sum_{\forall i>k}[1/i]^3\}\} \quad (10.9)$$
$$M_{eff}(k-1) = M\{1+(m/M)(k-1)^3\{\sum_{\forall i<k-1}[1/(k-1-i)]^3 + \sum_{\forall i>k-1}[1/i]^3\}\} \quad (10.10)$$

A. Orbiting Star or Galactic System Speed Variation with Distance

In the case of an orbiting star/galactic system, the masses of stars/galaxies are comparable to the mass of the orbiting center star/galaxy. As a result, for large k, we have,

$$M_{eff}(k)\approx M[(m/M)k^3] \quad (10.11)$$

$$M_{eff}(k-1)\approx M[(m/M)(k-1)^3] \quad (10.12)$$

Substituting eqns. (10.11) and (10.12) in eqn. (10.8), the ratio of the speed V_k of the orbiting object on k^{th} orbit to the speed V_{k-1} of the orbiting object on $(k-1)^{th}$ orbit in an orbiting star or orbiting galactic system is given by,

$$[V_k/V_{k-1}]^2\approx[k/(k-1)]^2 \quad (10.13)$$

$$[V_k/V_{k-1}]\approx[k/(k-1)] \quad (10.14)$$

$$V_k>V_{k-1} \quad (10.15)$$

If the stars in an orbiting star system are uniformly distributed or the orbits are equally spaced radially, then the speed of orbiting star/galaxy in a star/galactic orbit system increases with the radial distance. Further a star/galaxy away from the orbiting center, higher the speed.

Lemma:

The speed of a star/galaxy increases with the distance in an orbiting star/galactic system,

$$V_k>V_{k-1}$$

where V_k and V_{k-1} are the speeds of stars on k^{th} and $(k-1)^{th}$ orbits, k≤n, n is the number of stars/galaxies in the orbiting system.

> The speed of stars/galaxies increases with the radial distance in an orbiting system of stars/galaxies.

B. Solar System Planetary Speed Variation with Distance

In the case of the solar system, the reverse of the star/galactic system is true; the masses of the planets are negligible compared to the mass of the orbit center, the sun. Further, in the case of the solar system, we have smaller number of planets, n=8.

For a general orbiting system, we already have,

$$[V_k/V_{k-1}]^2\approx[(k-1)/k][M_{eff}(k)/M_{eff}(k-1)] \quad (10.16)$$

where,

$$M_{eff}(k)=M\{1+\sum_{\forall i<k}(m_i/M)[k/(k-i)]^3 + \sum_{\forall i>k}(m_i/M)[k/i]^3\} \quad (10.17)$$

$$M_{eff}(k-1)=M\{1+\sum_{\forall i<k-1}(m_i/M)[(k-1)/(k-1-i)]^3 + \sum_{\forall i>k-1}(m_i/M)[(k-1)/i]^3\} \quad (10.18)$$

For the solar system, $m_i<<M$, ∀i, and hence, $M_{eff}(k)\approx M$, and $M_{eff}(k-1)\approx M$.

Now, we have the speed ratio of the adjacent orbits,

$$[V_k/V_{k-1}]^2\approx[(k-1)/k] \quad (10.19)$$

$$V_k<V_{k-1} \quad (10.20)$$

The speed of planets decreases with the distance in the solar system since the mass of the planets are negligible compared to the mass of the orbiting center, the sun, and the number of planets in the system is as small as 8. If our solar system had contained a large number of planets, the situation might have been completely the opposite. If the masses of the planets had been comparable to the mass of the sun, the situation would not have been the same; it would have been the completely opposite. If the solar system had had many planets that are comparable to the mass of the sun, the speed of planets would have increased with the radial distance in general.

Lemma:

The speed of the planets in the solar system decreases with the radial distance only because the masses of the planets are negligible compared to the mass of the sun, $m_i<<M$, ∀i and the number of planets is small, n=8,

$$V_k<V_{k-1}$$

where, V_k and V_{k-1} are the speed of k^{th} and $(k-1)^{th}$ orbits, k≤n, n is the number of planets in the solar system.

> The speed of the planets in the solar system decreases with the radial distance

XI. KEPLERISM IN PERSPECTIVE

Keplerism is not universal. Keplerism is an approximation for the solar system. Let us consider Kepler laws one by one:

1. Kepler's First Law: Planets orbit the sun on fixed elliptical orbits with the sun being at the one of foci.

In reality, planetary orbits are not fixed. Planetary orbits are time-varying elliptical orbits [4]. There are no fixed elliptical orbits in a multi-planets orbiting system. Planetary orbits can be time-invariant or locked-in only when there is a single planet in the system and the mass of the planet as well as the mass of the sun are time-invariant. In addition, if the planetary masses are negligible compared to the sun in a multi-planetary system, the planetary orbit can be approximated to be time-invariant. Kepler's first law approximately holds for the solar system solely because the planetary masses are negligible compare to the sun, the orbiting center. Since the mass of the sun as well as the masses of planets are decreasing, planetary orbits are never static. Planetary orbits are dynamic. Planetary orbits dilate or contract with the variation of the radial distance to a planet from the sun due to the mass variation of the planets as well as the sun. The orbit dilation or contraction depends on the mass variations [4]:

- If the mass of a planet increases, $m\rightarrow m+\Delta m$, the radial distance to the planet increases or orbit dilates $r\rightarrow r+\Delta r$.
- If the mass of a planet decreases, $m\rightarrow m-\Delta m$, the radial distance of the planet decreases or orbit contracts $r\rightarrow r-\Delta r$.
- If the mass of sun increases, $M\rightarrow M+\Delta M$, the

radial distance to a planet increases or orbit dilates $r \rightarrow r + \Delta r$.

- If the mass of sun decreases, $M \rightarrow M-\Delta M$, the radial distance to a planet decreases or orbits contracts $r \rightarrow r-\Delta r$.

Since the mass of the sun is continuously decreasing, the effect of it on planets will always be a orbit contraction. The mass of the sun decreases in millions of tons in mass every second. Occasional collision of the foreign objects with the sun will result in occasional orbit dilation of the planets.

2. Kepler's Second Law: The position vector or the radial joining a planet to the sun at one of the foci of the elliptical orbit, which is the orbiting center, scans the area of the orbit at constant rate.

This only holds true for fixed orbits. This does not hold true generally since the angular momentum of a planet is not conserved. It is the total angular momentum of the whole planetary system that is conserved, not the angular moments of individual planets. This holds true approximately for the solar system since the masses of the planets are negligible compare to the mass of the sun, the orbiting center, as long as the change of masses of the objects in the orbiting system can be approximated to be negligible. However, since the mass of the sun is decreasing continuously, there comes a point where the relative decrease of the mass of the sun, $\Delta M/M$, is no longer negligible.

3. Kepler's Third Law: The orbital period T and the length of the semi-major axis 'a' are related by the proportionality,

$$T^2 \propto a^3.$$

This only holds true for fixed or locked-in orbits. For this to hold true, the angular momentum of a planet must be conserved. The angular momentum of a planet in a multi-planets orbiting system is not conserved. This holds true for solar system approximately since the masses of the planets are negligible compared to the sun, the orbiting center, and the change of the masses of the objects in the orbiting system can be approximated to be negligible. In reality, the masses of the planets and the mass of the sun are time-varying and hence Kepler's third law does not hold true in strict sense.

4. Kepler's 0^{th} Law: Planetary orbits are planar.

This law is an exception that holds true in general for any orbiting system since the total angular momentum of a planetary system is conserved.

It is clear that the Kepler laws are not universal. They are approximations to the orbits in the solar system or solar-system-like planetary systems. We can't force what is approximately true for a solar system on to a General Orbit System such as star orbit systems or galactic orbit systems without unexpected adverse effects.

XII. DARK MATTER IS IN THE HUMAN BRAIN

When we look at orbiting systems and found that the stars are not behaving the way we expected them to according to our understanding of the solar system, we tried to make star orbit systems and galactic orbit systems to fit our perception. When we found out that the outermost star of an orbiting star system orbits much faster than the speed we estimated using the estimated masses within the orbit alone, we concluded that there must be some hidden mass or Dark Matter, which is responsible for that increased speed. We knew Keplerism that was derived from our solar system well, so we expected every orbiting system to behave as our solar system does. Since the speed of planets decreases with distance in the solar system, we expected every orbiting system to work that way. When we see a system where the speed of objects increases with the distance, we said 'oh no, that should not be happening'. We concluded that there should be some hidden mass driving that speed, or else galaxies will be torn apart; we called it 'Dark Matter.

> Dark Matter is in the human brain, nowhere else in the universe.

A forgotten fact is that the speed of a star cannot be calculated using the knowledge of all the masses inside the orbit alone. If we are estimating the speed of a star using the masses within the orbit alone, we are under-estimating the speed by a significant factor. To fill the estimation gap, we had to invent Dark Matter so that star orbiting systems behave as the solar system to satisfy our expectations. We invented Dark Matter in order to force the behavior of the solar system on to an orbiting star system. No orbiting star system or orbiting galactic system behaves as the solar system. Star/galactic orbiting systems are not in compliance with the Keplerism. Star/galactic orbiting systems are not in the same weight-class as the solar system. Star/galactic systems are in the heavy-weight category while the solar system is in the light-weight category. Although, the Orbit Dynamics developed for star/galactic orbit system can be used for the solar system, the Orbit Dynamics developed exclusively for the solar system under very specific assumptions cannot be extended to star/galactic orbit systems.

Orbiting star/galactic systems behave the way they are expected to behave according to the General Newtonism. Keplerism or approximate Newtonism does not apply to orbiting star/galactic systems. If the orbiting star systems or orbiting galactic systems do not behave the way they are expected to behave, then, it is our expectation that must be wrong; it must be the estimation method that is in error. Don't try to force the human error on to the nature. The forcing of erroneous conclusions on the nature will make the nature looks spooky to human eye as it has happened in Quantum Mechanics. We already have created

enough voodoo-spookiness by erroneously forcing particles to behave as waves in Quantum Mechanics. Clearly, the Dark Matter is also a result of a theoretical blunder as much as Quantum Mechanics is.

No Dark Matter is required. No Dark Matter is there. Dark Matter exists only in human brain, not in stars and galaxies. The solar system behaves according to the Kepler laws because of the approximations we made to the Newton laws as applied to solar system. These assumptions are reasonable and approximately hold true for the solar system or solar-system-like light-weight systems. They do not hold true for any other orbiting system. If we haven't made approximations to the Newton laws as applied to the solar system, the Kepler laws could apply neither to the solar system nor any other solar-system-like multi-planetary systems in any strict sense.

Although Kepler's laws are not real and do not apply to multi-planetary orbit systems in any general sense, the historical significance of the Keplerism is tremendous and cannot be undermined. Kepler's laws provided Newton the necessary clue, or the trigger, to formulate the gravitational orbit dynamics. Without the insight brought forward by the Kepler's laws, Newtonism would not have been possible. The indispensible key for Newtonism was the Kepler's observation that $T^2 \propto a^3$, where T is the orbit period and 'a' is the length of the semi-major axis.

Keplerism is not universal.
Keplerism is limited to Light-Weight Solar-System-Like Systems.

Although, the General Orbit Dynamics (GOD) developed for star/galactic orbit systems can be used for the Solar System, the approximate Gravitational Orbit Dynamics (aGOD) developed exclusively for the Solar System cannot be used for star/galactic orbit systems.

When Newton came across the Kepler's third law that the square of the periodicity of an orbit is proportional to the cube of the semi-major axis, he realized that it could only happen if the gravitational field is proportional to the inverse square distance [1]. Kepler laws provided a great insight to the approximate behavior of the solar system. A real problem was encountered when we treated Keplerism as universal and try to extend it to other orbiting systems. When the Keplerism did not fit into the orbiting star/galactic systems, we had to invent Dark Matter to make those systems fit into the Kepler laws. After all, if we consider Keplerism to be universal, then, some kind of mass hidden from us must be present to make the stars to behave the way they do, deviating from the way we expected them to behave with orbiting speed increasing with the distance.

The fact is that the Keplerism is not universal. What is interesting is that, even though the Newtonism is born out of Keplerism, which is only an approximation to the solar system, Newtonism in its general form is universal. It is important to stress the word 'general' here. The Newtonism in its general form is the real Gravitational Orbit Dynamics (real-GOD).

The Newtonism in its approximate form is the Keplerism that only applies to the solar system or the solar-system-like light-weight systems where the planetary masses are negligible compared to the mass of the orbit center.

Corollary:
Keplerism is not universal. Keplerism applies to the solar system only as an approximation.

Corollary:
Even though the Newtonism was born out of the Keplerism, which is non-universal, the Newtonism in its general form is universal.

XIII. PLANETARY PRECESSION

Planetary Precession of an elliptical orbit is a result of the Eccentricity Vector rotation due to the change of the mass or the effective mass of the orbit center, the sun.

Theorem: Precession or the Eccentricity Rotation
The rate of rotation or the rate of change of angle β of the Eccentricity Vector is given by,

$$\frac{d\beta}{dt}=(1/e^2)H\frac{\ell}{GM}\frac{dr}{dt}$$

where, $H=\frac{d}{dt}\ln M$, and $e\neq 0$,
β is the angle of the Eccentricity Vector rotation, $\ell=|\boldsymbol{\ell}|$, $\boldsymbol{\ell}$ is the angular momentum at time t, r is the radial distance to the planet at time t, M is the mass of the orbiting center at time t, G is the gravitational parameter, e is the eccentricity of the elliptical orbit at time t, and $0\leq e<1$.

The proof of the Theorem is left as an exercise for the reader.

Theorem: Change of Orbit Eccentricity e
The rate of change of eccentricity e of an elliptical orbit due to the change of the mass M of the orbiting center or the sun in our solar system is given by,

$$\frac{de}{dt}=\frac{1}{e}\frac{R}{GM}H_r$$

where, $H_r=[(GM/r^2)-(v^2/r)]H$,
$R=\frac{1}{GM}\ell^2$, $H=\frac{d}{dt}(\ln M)$,
v is the speed at time t, $\boldsymbol{\ell}$ is the Rotation Vector, $\ell=|\boldsymbol{\ell}|$, M is the mass of the sun at time t, r is the radial distance at time t, e is the eccentricity at time t, $e=|\mathbf{e}|$, G is the gravitational parameter.

The proof of the Theorem is left as an exercise for the reader.

The change of the mass M of the orbit center can be a result of two causes:

1. Due to the physical mass degradation of the sun from the mass emission and mass consumption in fusion.
2. The effect of the gravitational pull from other planets is equivalent to the cyclic fluctuation of the mass of the sun. The gravitational pull from other planets is equivalent to the gradual increase of the effective mass of the sun for one half of the orbit and the gradual decrease of the effective mass of the sun for the other half of the orbit.

When **e=0**, or when the Eccentricity Vector is a null vector, the orbit is circular. Circular orbits do not have precession since circular orbits do not have an Eccentricity Vector to rotate. Even though the angle of rotation $\Delta\beta$ of the Eccentricity Vector is negligibly small, $r(\Delta\beta)$ is significant since the radial distance r is large and hence noticeable for planets with higher eccentricity such as Mercury. The Newtonism in its General form or the real Gravitational Orbit Dynamics (real-GOD) fully explains the planetary orbit precession.

XIV. NOTEWORTHY FACTS ABOUT ORBITING SYSTEMS

1. Angular momentum of a planet in a multi-planet orbit system is not conserved. What is conserved is the total angular momentum of all the planets in the orbit system. The angular momentum of an individual planet is time-varying.
2. Planetary orbits are elliptical with time-varying parameters. Planetary orbits are not fixed or locked-in.
3. The speed of planets increases with the radial distance if the planetary orbits are equally spaced or the distribution of the planets is radially uniform.
4. The speed of the planets decreases with the radial distance only when the masses of the planets are negligible compared to the mass of the orbit center as it is the case with the solar system.
5. The actual speed of the outermost star/galaxy is always higher than the estimated speed using the knowledge of the masses within the outermost orbit alone. The speed of the outermost star cannot be calculated with the knowledge of the masses within the orbit alone.
6. Kepler laws are not universal. Kepler laws are approximations that apply only to the solar system or solar-system-like systems. Kepler laws do not apply even approximately to orbiting star/galactic systems.
7. Newtonism in its General form or the real Gravitational Orbit Dynamics (real-GOD) is universal. The objects in the universe are held together by real-GOD, not a religious GOD.
8. Newtonism fully explains the cause for the precession of an elliptical planetary orbit. The precession of an elliptical orbit is a result of the rotation of the Eccentricity Vector due to the mass degradation of the sun as well as the due to the cyclic fluctuation of the effective mass of the sun from the gravitational pull from other planets. There is no precession when the Eccentricity Vector is a null vector or orbit is circular.
9. There is no Dark Matter. There is no need for Dark Matter. Dark Matter exists only in the human brain, in the human insanity, nowhere else in the universe.
10. The only orbiting systems that can be approximated by Keplerism are the orbiting systems where the masses of the orbiting objects are negligible compared to the orbiting center, the sun. The solar system satisfies this condition approximately and hence the solar system can be narrated by Keplerism. No star/galactic system can be narrated by the Keplerism since the masses of the stars and galaxies are significant and not negligible. All the gravitational orbiting systems can be narrated by the Newtonism in its General form or real Gravitational Orbit Dynamics (real-GOD).
11. The Newtonism in its General form or real Gravitational Orbit Dynamics (real-GOD) that takes the mutual interaction of all the orbiting objects in an orbiting system into account is universal. Newtonism is independent of the observer. Mass of an object is independent of the speed. Mass of an object is independent of an observer. It is only the mass density that varies with the speed [2]. The mass density of an object varies with the speed since the volume contracts with the speed while the mass remains independent of the speed. Mass is absolute, independent of the frame of reference.
12. Newtonism in its General form clearly explains the precession of planets on elliptical orbits. Orbit precession is a result of the Eccentricity Vector rotation due to the depleting mass of the sun as well as due to the change of gravitational pull from other planets, which is equivalent to the cyclic fluctuation of the effective mass of the orbit center.

XV. MYSTERIOUS DARK ENERGY

When we observed that the lights from distant galaxies are red-shifted, we erroneously concluded that the distance galaxies are moving away from us. We made further errors by attributing the galactic motion to a space expansion [4]. Any expansion requires energy, and lots of it. In order to justify space expansion hypothesis, we had to hypothesize some mysterious Dark Energy. So, Dark energy is in fact a result of a chain of erroneous, on the fly, in the dark, authoritative, hasty, inconclusive, short-sighted, out of the blue, human conclusions. Dark Energy is in human insanity, not in reality.

The galactic red-shift is a result of propagation electromagnetic energy loss or the path loss.

However, the increasing galactic red-shift is a result of radial movement of galaxies. The radial movement of galaxies is not a result of a hypothetical space expansion or universe expansion. Space cannot expand. Expanding universe is in human insanity, not in reality.

The change of radial distance of a galaxy or any orbiting object is due to the changing mass of the orbit center as well as the changing of the mass of the galaxy or the orbiting object. The masses of the planets, stars, and galaxies are not constants. Masses of planets, stars, and galaxies are time-varying. When the mass of an orbiting object and the mass of the orbiting center are time varying, the result is the change of the radial distance of the orbiting object relative to the orbit center. Universe is not expanding. When we misinterpreted the radial movement of galaxies as an outcome of a universe expansion incorrectly, we had to invent Dark Energy to justify that claim. There is no Dark Energy. There is no need of mythical and mysterious Dark Energy to explain the natural behavior of the radial movement of galaxies as much as there is no need of mythical and mysterious Dark Matter to explain the natural behavior of orbiting star/galactic systems.

Galactic red-shift is a result of electromagnetic energy loss due to propagation loss [4]. Increase galactic red-shift is due to the orbit dilation. Decreasing red-shift is due to orbit contraction. The visible universe is the maximum distance light could travel before being frequency faded, down-shifted or red-shifted below the visible region of the light spectrum. Visible universe is a moving horizon. My visible universe is different from someone else's visible horizon. Visible universe relative to somebody on earth will be different from the visible universe of somebody else in another planet.

The frequency red-shifted light below the visible region represents the so-called microwave background. Microwave background is not some remnant from the origin of the universe, a baby universe or a big-bang. When we look into the distance, what we see is not our past, but our neighbor's past. When our distant neighbor's look into distance toward us, what they see is not their past, but our own. If we send a light burst, our out of the visible region distance neighbors will receive it in the microwave band due to the path electromagnetic energy loss. The whole concept of space expansion is simply preposterous, a result of our blindness to the reality, human insanity. It is the matter that expands or contracts. Space can neither expand nor contract. The range of universe that can be probed using light is limited by the path loss. Light is not an energizer bunny that keeps going and going for ever. Light loses electromagnetic energy with the distance as it propagates. Since the frequency is the electromagnetic energy, light undergoes a frequency down-shift or red-shift with the distance as light propagates. Larger is the distance light travel, the higher is the electromagnetic energy path loss and hence higher is the red-shift. The path electromagnetic energy loss is insignificant for short distances for us to have any notice, and become only significant for light from distance stars. Light consists of wave bursts of short duration, not particles. Light is always a wave, never a particle. Universe has neither a beginning nor an end, and hence has no age. Universe is not expanding. Big-Bang is indeed a Big-Nonsense, a real joke.

XVI. CLOCK AND TIME

Clock and time are not synonymous. Display of a clock and time are not one and the same. Display of a clock and the time are the same only when the engineering specifications for the measuring conditions of the clock are satisfied since the clock is an instrument engineered to measure the time. Time is a definition. It is we who have defined the time in an internationally agreeable manner. A clock is a measuring device just like any other engineered measuring instrument; no exception. A clock is a device we engineered to display the time that we have defined. What is displayed on a clock depends on the environment the clock is in. If a clock is not in the environment that it is engineered to display the right measurement, it will not display the right measurement or the right time. Whether it is a mechanical clock, electronics clock, or atomic clock, what is displayed on the clock depends on the speed of motion of the clock, gravitational and electromagnetic forces as well as the ambient conditions such as temperature, pressure and the humidity at the location of the clock.

If what is displayed on the dial of the clock differs from one location to the other, one speed to the other, or from one environment to the other, that is due to the effect of the variation of the environmental forces on the mechanism of the clock. When we engineer an instrument for measuring, we have to specify base line standard for the correct measurements for that instrument or the design specifications; a clock is no exception. No engineered device gives the correct measurement under varying conditions. Any engineered device provides the correct measurements when the device is in an environment that meets the engineering specifications for that device. Any engineered device gives the correct measurement for a narrow bandwidth of environment conditions, speeds, gravitational and electromagnetic forces; any deviation from that narrow bandwidth results in a deviation of the measurement.

Take a pair of atomic clocks, a pair of mechanical clocks, and a pair of electronic clocks and synchronizes them at one Global location-A. Leave one atomic clock, one electronics clock, and one mechanical clock at that Global location-A, and move the rest of the clocks to a different Global location-B. What you will find is that the time displayed in all three clocks in Global location-B will be different from the

time displayed on all three clocks in the Global location-A even thought all the clocks were initially synchronized at the Global location-A before half of them were being brought to the Global location-B. Further, time displayed in all three clocks in the Global location-B will also be different from each other since the mechanisms of all three clocks are different and the effect of the environment variation on the different mechanisms of the clocks are different.

For the displays of two clocks of same kind to be the same, both clocks must be under the same operating environment conditions; the forces acting on the clocks must be the same. A clock is no different from any other engineered measuring device. Different reading on two synchronized clocks with same operating mechanism at different locations indicates the effect of the changes in the environmental forces at those locations. You get the same reading on two synchronized clocks with the same operating mechanism in different location only if the forces acting on the two devices are the same.

An atomic clock on a mountain peak displays a different time than the atomic clock in your lab even though both clocks were synchronized in the lab at the beginning. The reason for the two atomic clocks to display different time is that the environmental forces such as the gravitational and the electromagnetic forces those two clocks are subjected to are different. If you are using the difference in the reading of the atomic clock on the mountain from the atomic clock in your lab to proclaim that the gravity changes the time itself, what you are claiming is utter nonsense; you should not even be doing science. It is not possible to test the effect of gravity on time using a physical clock since the mechanism of the clock is affected by gravity. Time itself is independent of gravity. Time has no mass and gravity cannot have any influence on mass-less. A physical clock is dependent on the gravity. Time is independent of gravity. Time is a human definition. The claim of gravity bending light is human insanity, not reality. Gravity cannot bend light. Only a density gradient in a medium bends light. Gravity can generate a density gradient in a medium, which bends light.

If a clock is on a moving frame, then the electromagnetic forces and the ambient conditions acted on the mechanism of the clock are different from the engineering specifications of the clock for the correct measurement, and as a result reading on the display will be different. A clock is no different from any other measuring device. The mechanism of the measuring device is subjected to the environment the device is located at. It is not the time that varies with the frame of reference; it is the mechanism that generated the display of the clock that is affected by the frame of reference. It is not the time that is affected by the gravity; it is the mechanism of the clock that is affected by the gravity. It is not possible to engineer an instrument to display the right measurement for all the environmental conditions; clock is not an exception. It doesn't matter how well you synchronize clocks according to the engineering specifications, it doesn't matter what type of clocks you use, and whether they are atomic clocks, electronics clocks, mechanical clocks, or even water clocks, when you move those clocks to different locations that does not satisfy the engineering specifications, what you see on their display will be different. It is we who define the time. It is we who designs the clocks to measure the time that we have defined. We can only design clocks to display the correct time for given baseline specifications; not for all environments.

Assume we synchronize three atomic clocks, Clock-A, Clock-B, and Clock-C at the Colombo Airport; all the clocks displays the same time. Now, we take Clock-A on an airplane around the world in the clockwise direction and land back at Colombo Airport and place the Clock-A next to Clock-C. We take Clock-B on an airplane in the anticlockwise direction around the world and land back at the Colombo Airport and place Clock-B next to Clock-A. Clock-C remains at the Colombo Airport all the time. Once all the clocks are back at the Colombo Airport, what should we expect the display time of the three clocks to be? We cannot expect the display reading of all the clocks to be the same since the mechanism of the clocks were under different environments under different forces. We should be surprised if the three atomic clocks display the same reading when all the three clocks are back at the Colombo Airport. If the readings of the clocks are the same, it is an indication that the precision of the clocks are poor. If the readings are different, the precision of the clocks are better. Of course, at the end, the reading of the Clock-A, Clock-B, and Clock-C should be different since the clocks were under different environmental forces part of the time.

The use of these differences on the display of three atomic clocks in the past to claim that the time is relative is simply preposterous. The experimenters either had no idea of what they were doing or they were paid to do the experiment and use the data to prove some nonsense. The rest of the crowd, the so called scientist, blindly followed like following a religion without a question for the fear of being sidelined by the ones that had already been placed on the pedestal, the high priests of the cult.

If you place two synchronized clocks at same Global location but at different temperatures, the display time of the clocks will be different. Based on these display time variations on the clocks due to temperature changes, can we claim that the time is dependent on the temperature? If we place two synchronize clocks at different pressure, we will find that the display time on two clocks will be different. Based on the display time differences on the clocks at different pressures, can we claim that the time is dependent on the pressure? Of course, we know it is preposterous to claim that the time is dependent on

the temperature and pressure. However, if we can claim that time is dependent on the frame of reference because two synchronized clocks at two different speeds displayed different times, if we claim that the time is dependent on the gravity because two synchronized clocks placed at different altitudes displayed different time, we should also be able to claim that the time is also dependent on the temperature and pressure since two clocks in different temperatures and two clocks in different pressures display different time. This shows how wrong it is to claim that the time depends on the frame of reference and gravity because two clocks at different speeds displayed different times, and two clocks at different altitudes displayed different times.

Corollary:

It is the mechanism of a clock that depends on the speed, gravity, electromagnetic forces, temperature, pressure, and the environmental conditions in general. It is the display of a clock that is relative, not the time itself.

Corollary:

Time itself is independent of the speed, gravity, electromagnetic forces, temperature, pressure, and the environmental conditions in general. Time is absolute.

A clock is an engineered device for measurement and hence any two or more devices display the same reading if and only if they are under the same environmental conditions.

Clocks and time are not synonymous. Clock is a measuring instrument designed to display time as we have defined the time. Every measuring instrument is subjected to baseline specifications. Any measuring instrument works properly only when the baseline specifications are satisfied; clocks are no exception.

Time and Time-Displayed on a Clock are the same only when the clock is in an environment that meets the design specifications.

Time itself is independent of the frame of reference and the gravity.
Displayed time on a clock is relative and depends on the gravity.

Property:

A clock is a device engineered to display time. A clock displays the correct time only when the clock is in an environment that meets the design specifications, just like any other engineered measuring device.

Corollary:

The display of a clock represents the time only when the clock is at a location where the design specifications of the clock are met.

Property:

Since the effect of the change of environmental conditions on the mechanism of a clock is negligible, by default, it is always assumed that the display of a clock situated anywhere represents the correct time.

XVII. GLOBAL POSITIONING SYSTEM (GPS): NOTHING TO DO WITH SPECIAL RELATIVITY

Differences in the display time of clocks under different environments are extremely small and hence we consider them to be approximately independent of the environment conditions for our daily tasks. However, these minute differences on the display of clocks from one environment to another have to be taken into account in the case of GPS (Global Positioning Systems). In a system such as GPS, where there are clocks of different accuracy, it is important to use only the times from higher accuracy clocks in the estimation of positions. In GPS, the mixing of times from clocks of difference accuracies must also be avoided in order to improve the accuracy location estimates.

In the case of GPS, the low-orbit satellites are equipped with high accuracy atomic clocks while the land receivers making location requests are equipped with low accuracy cheap electronic clocks. In estimating the location of a land receiver, it is necessary to avoid the use of the display time of its own low accuracy local clock. Wherever possible, we have to use the time from high accuracy clocks alone in the location estimation. That means, we have to estimate the location of a local receiver and local time from the high accuracy time from the clocks on satellites and the location of the satellites in the vicinity of the local receiver. That is why we need data from four or more satellites in the vicinity of the land receiver.

When a land receiver sends a request for its location, four or more satellites in the vicinity send the time they have received the request as well as their locations (x_i,y_i,z_i,t_i), i=1,2,3,4 to the land receiver. Land receiver uses this information (x_i,y_i,z_i,t_i), i=1,2,3,4 to estimate its location as well as the local time of the request, (x,y,z,t). This estimation allows the receiver to avoid using the display time of its low accuracy clock in the estimation of its position.

Further, the low-orbit satellites used in GPS are more or less in the same environmental condition while the receiver requesting the location is at different environmental condition. As a result, there is also an environmental time bias between the display time on the clock of a land receiver and the display

times on the clocks of the satellites. When the position and the local time of the position, (x,y,z,t) are estimated by a land receiver using the data from four or more satellites alone, in effect, it also eliminates any environmental time biases. In GPS, a land receiver uses the times from the satellites that are in the vicinity, which are more or less in the same environment, in the estimation of its location and the local time of the receiver. This minimizes the time bias due to environment differences. A land receiver avoids using its own clock since the clock is of low accuracy, and the environment the land receiver is in is different from the environment the satellites are in.

Although some physicists claim that the GPS is not possible without the Special Relativity, this claim has no merit. Not so surprisingly, no engineer has ever made this claim. You won't find this claim in any engineering book. Yet, this baseless claim is ubiquitous in physics. Special Relativity has nothing to do with GPS. We do not have to know anything about Special Relativity to design a GPS system. Most probably, the engineers who designed the GPS system might not even have heard of or had any idea of what the Special Relativity was. You don't need Special Relativity to design GPS. Special Relativity is not even a part of engineering curriculum. Any engineer, who had no idea of what the Special Relativity was, could have designed the GPS system in the same manner.

Not a single equation from the Special Relativity is used in the GPS. Special Relativity is not required for the design of GPS. You don't even have to aware the existence of the Special Relativity to design GPS. In GPS, high accuracy times from four satellites together with their positions are used in estimating the position and time of a land receiver. If time itself is relative, GPS as we know it is not possible since the speed of satellites are not constant. If the time itself is relative, the use of data from four or more satellites in the vicinity of a local receiver is not able to compensate for the relative time; GPS as we know it is not possible.

GPS do not assume time itself being relative as in the Special Relativity. GPS is not designed to make corrections for the relative time if time itself is relative. Time itself is not relative. GPS pays no attention to Special Relativity. GPS do not care about Special Relativity. As far as GPS is concerned, Special Relativity does not exist. If Special Relativity holds true, GPS, as we know it, is not possible. GPS is design to overcome the accuracy differences between pricy atomic clocks on satellites in one environment and cheap low-accuracy electronics clocks on land receivers in different environment. GPS also takes into consideration that all the low-orbit satellites in the vicinity of a land receiver are also more or less in the same environment condition, although it is different from the environment the land receivers are in. When position estimation is done using the satellite data alone, any time bias due to the effect of environment conditions on the mechanisms of the clocks could also be minimized in addition to skipping the use of low accuracy time measurement from a local clock.

Special Relativity itself is conceptually incorrect. Time itself is not relative. Time itself cannot be relative. If time itself is relative, time will not be unique. Further, if the time itself is relative, time will be directional. If the time itself is relative, speed of light cannot be a constant since the Shear Electromagnetic (SEM) waves resulted from time itself being relative has a speed that depends on the frame of reference [4]. Further, if light follows curvature of the space-time, speed of light cannot be a constant in the presence of a warped space-time. More importantly, if time itself is relative, time-delay will also be relative. Although, time depends on the environment the clock is in due to the effect of environment on the mechanism of a clock, the time-delay is independent of the environment a clock is in. It for this reason, we can use clocks in any environment with no regard to the environment we are in. We are only interested in time delay, not the actual time.

If time itself is relative, GPS as we know it is not possible since the satellites are not on linear paths at constant speed.

GPS has nothing to do with Special Relativity or General Relativity.
The claim that GPS wouldn't work without Special Relativity has no merit, a bogus claim.

XVIII. A DIALOG BETWEEN A PHYSICIST AND AN ENGINEER

Physicist: I carried out two interesting experiments. It cost me a fortune, but the results are very clear. As always, it shows that Einstein was right; time does depend on the speed and gravity. Before you say anything, let me explain what I did:

Experiment-1:

I synchronized three atomic clocks A, B, and C. I left clock-A at the airport of my home town. I flew the clock-B in the clockwise direction around the world and placed it back at the same airport next to clock-A. I flew the clock-C in the anticlockwise direction around the world and placed it back at the same airport next to Clock B. Now, after some travelling around the globe in different directions, clocks B and C are together with Clock A at the same airport.

My Observation: When I checked the clocks, all three clocks displayed three different times.

My Conclusion: Einstein was right; time does depend on the speed.

Experiment-2:

I synchronized two atomic clocks A and B in my laboratory. I left Clock-A in my laboratory. I took the clock-B to a mountain top with me and spend sometimes there and came back to the laboratory and placed the clock-B next to clock-A.

My Observation: When I checked clocks, two clocks displayed different times.

My Conclusion:
Einstein was right again; time does depend on the gravity.

So, my dear friend, it is clear that the time depends on the frame of reference. In addition, time also depends on the gravity. Gravity slows time down. Speed also slows time down. These were exactly the theoretical claims that were made by the General Relativity and the Special Relativity. We have proved Einstein was right; isn't he a genius?

Engineer: My friend, calm down. That is exactly what happens when you start to believe historical concepts religiously. That is what happens when you treat physics text as a biblical holy text. That is exactly what happens when you had to please your teachers and supervisors who are Special Relativity priests. Some ideas were believed to be true in the past within the boundaries of understanding in that era do not mean they are true today under the current breadth and depth of understanding. Some ideas have been passed down from generation to generation religiously as facts do not mean they are facts. Religiously believed dogmas by definition are not facts; relative time is one such dogma.

I have one more experiment for you to carry out. Take three synchronized clocks, Clock-A, Clock-B, and Clock-C. Keep Clock-B at different temperature at the same location. Keep Clock-C at different pressure at the same location. After some time, check their display. You may notice that the times on all three clocks are slightly different even though you had synchronized them at the beginning. Based on this observation, I am sure you would jump the gun and say, 'the time displayed on a clock depends on the temperature and pressure', you are indeed right. However, if you use the observation to declare, 'time itself depends on temperature and pressure', you are incorrect. Time and displayed-time on a clock are not synonymous.

Similarly, based on the observations you have made in your previous experiments, if you say, 'the time-displayed on a clock depends on the gravity and the speed' you are right. However, if you use the observations to claim, 'time itself depends on the gravity and speed', you are incorrect. Time and displayed-time on a clock are not one and the same except when the clock is in an environment that satisfies the design specifications. However, we can use the same clock to obtain time in various conditions such as on the ground as well as on an air plane since the deviation of the displayed-time on a clock with the environmental conditions is insignificant for our day to day tasks.

My friend, don't use the differences in the displays of clocks in different environments to claim that the time itself is relative; it is not just wrong, simply silly. Time is not relative. It is the mechanism of a measuring device that is relative, not what is being measured. In strict sense, the display of a clock represents the precise time when the clock is in an environment that meets the engineering specifications. In our day to day needs, we do not require such precision and hence we assume the display of a clock to be the approximate time for all environments. Being late for a meeting by a few billionth of a second is simply not noticeable for us; it is not going to make you lose your job.

Don't blame the nature for your clocks displaying different times in different environments. Don't make wrong conclusions and impose them on the nature; that will make the nature looks spooky in appearance in our mind; appearance is not reality. The reading of any measuring device varies with the environment it is in; clocks are no exception. When in doubt, 'Read the MANUAL!'

Most often, clocks are not accompanied with a manual since the variation of the display of a clock at different environments is not significant for our daily tasks and can be safely assumed to be the same. The effect of the environmental condition on the mechanism of a clock is in the range of few billionth of a second. A few billionth of a second difference makes no difference for us, and hence we can safely consider the display of a clock to be the time for all environments. As a result, we can wear a clock and used the time indicated by the clock as the correct time for all occasions under all circumstances.

Golden Rule of Engineering:

No device could be engineered to give the correct measurement for all the environments.

By taking a clock on an airplane and demonstrating a drift on the display of the clock, the only thing you are proving is your ignorance. By taking a clock on to a mountain and demonstrating a drift on the displayed time, the only thing you are demonstrating is also your ignorance. It also demonstrates the ignorance of the person who is funding the operation. Because, the time shift with the change of environment is the norm, not the exception; it is expected. However, you have demonstrated something the design engineer could be proud of; he/she can be proud of the sensitivity of his/her design; the highest honor any engineer craves for. If you have demonstrated no drift in the displayed-time when the clock is on an airplane and also on the mountain, you have demonstrated something that

design engineer had to worry about; the design of the clock is not great as far as the sensitivity of the device to changing environment is concerned.

A clock is an engineered measuring device that displays our definition of time. It is we who keep time. Nature does not keep time. Time is not a part of the nature's vocabulary. It is the living who defines time. As with any other measuring device, a clock gives the correct measurement only when the clock is in an environment that meets the engineering specifications. The displayed-time on a clock depends on the location of the clock since the gravitational and electromagnetic forces, as well as the temperature, pressure, humidity and any other environment factors varies from location to location.

It is the mechanism of a device that is affected by the frame of reference, gravity or other environmental factors, not what is being measured. The displayed-time on a clock can be considered to be independent of the location since the effect of the variations of the environmental factors on a clock is not significant for our daily operations. The clocks we use are not sensitive enough capture the subtle effect of environment variations. If your clock deviates from the correct time for a certain environment, it is not because time itself is relative; it is because the mechanism of a clock is relative, and the environment you are in is different from the environment the clock is designed to give the correct time; don't blame the nature, read the manual.

In Special Relativity, time had to be relative since the lateral dimension of an object was forced to remain unaltered [5]. Relative time is an assumption made in the development of the Special Relativity. If the lateral dimension of a moving object is allowed to change, assumption of relative time would not have been required in Special Relativity. It is the volume of a moving object that decreases with the speed of the object [2,5]. It is the volume that is relative. Time and mass remain unchanged. It is the mass density of an object that is relative. Time and mass are absolute. You cannot change the mass of an object by making it to move. You can change the mass density of an object by making it to move.

Time is absolute [2,4]. Displayed-time on a clock is relative. Displayed-time on a clock represents the actual time only when clock meets design specifications. Displayed-Time on a clock varies not just with the gravity or speed, but also temperature, pressure and other environmental factors as well. If you claim that the time is dependent on gravity just because the time on a clock varies with altitude, you can also say that the time depends on temperature and pressure too since the time on a clock varies with temperature and pressure, which is indeed ridiculous.

Time is not relative. Time is absolute. Displayed-time on a clock is relative. A second here is a second everywhere, no dilation or contraction. A second is a second is a second everywhere in the universe, nothing more nothing less. It is not a new reality, it is the reality.

> You cannot change the mass of an object by making it to move. You can only change the mass density of an object by making it to move.

XIX. SPACE-TIME: TOTAL NONSENSE

Light is not relative and time is not a function of space [2, 4, 5]. If light is relative, then, the time will not be unique. Further, if light is relative, time will be directional. If the light is relative, the speed of light will no longer be a constant due to the presence of Shear Electromagnetic (SEM) waves [2]. Although the speed of Transversal Electromagnetic (TEM) waves remains constant, the speed of the SEM waves depends on the frame of reference. The speed of light must be independent of the frame of reference. Time must be unique and non-directional. If light is relative, the so called space-time function will not be unique. If there is a space-time, the space-time function must be unique. As a result, light cannot be relative. There is no space-time.

> Speed of light cannot be a constant if light follows the curvature of space-time.
> Speed of light can only be a constant on a linear path.

Space and time are independent. The space has a real existence and hence you can travel in space. Time is simply a human definition and has no real existence; that is why you cannot travel in time. Once time is defined, it is always the time that travels, not you. You cannot change the time. You cannot by-pass the time. Nothing you do affects the time once the time is defined. If you don't like the space you are in, you can move to a different space. No such move is possible if you do not like the time you are in; you just have to bear it and let it pass or you can waste it by working on multi-verse or quantum mechanics.

The speed of light is determined by the permittivity and permeability, electrical properties of the medium. If there exists a space-time and the light is expected to follow the curvature of the space-time, then, the electrical properties must vary with the curvature of the space-time. If the electrical properties vary with the curvature of the space-time, then, the speed of light will vary with the curvature of the space-time. As a result, if there is a space-time and light follows the curvature of the space-time, the speed of light will no longer be a constant in the presence of space-time curvature. In other words, the speed of light cannot be a constant in a warped space-time or in the presence of space-time curvature. Similarly, space-time curvature cannot exist if the speed of light is a constant.

Speed of light cannot be a constant if the light is relative

Space exists. We can travel in space. Time does not exist. We cannot travel in time. We cannot travel in something that does not exist. Time is a definition. Universe is not a stack of states in time. Universe only has one state, its present state. There is no past state of the universe. There is no future state of the universe. The present state of the universe is changing. It is we who use the local changes of the present state of the universe to define what we called time. As far as universe is concerned, time does not exist. Time does not exist outside the human consciousness.

A propagating wave is not a probability distribution. A probability distribution is a mathematical construct; a human invention. A propagating wave is a physical phenomenon. It does not matter how small a particle is, a particle is not a wave [3]. A wave is not a particle. Electromagnetic waves come in bursts of finite duration. You cannot call these electromagnetic wave bursts photons since these wave bursts do not satisfy the definition of photons. Photons are defined as spatially random particles. Electromagnetic wave bursts are not spatially random. A wave burst is still a wave, not a particle.

A momentum of a particle is not independent of the change in position since the momentum is determined by the rate of change of the position. On the other hand, the change in position of a particle is also determined by the momentum. For a given change in position of a particle, a particle cannot have infinitely many momentums. Once the change in position is determined, the momentum is fixed. Similarly, for a given momentum of a particle, a particle cannot have infinitely many changes in positions. For a given change in position, momentum is unique. For a given momentum, the change in position is unique. Once the change in position of a particle Δx is fixed, the momentum of the particle Δp is fixed. As a result, the change in position and the momentum of a particle do not constitute a Fourier Transform pair.

Heisenberg uncertainty principle is based on a wrong assumption that the change of position Δx and momentum Δp constitutes a Fourier Transform pair. The change in position and the momentum of a particle do not constitute a Fourier Transform pair. When the changing position and the momentum do not constitute a Fourier Transform pair, Heisenberg uncertainty principle does not hold true. There is no uncertainty between the change of position and the momentum since one determines the other.

Not all the energies are the same. Mechanical energy is not the same as electromagnetic energy. Mechanical energy has no existence without a mass. Since the existence of mechanical energy is tied to a mass, mechanical energy is associated with gravity through its association with a mass. However, energy itself has no gravity. It is only a mass that is subjected to and exerts a gravitational force. Mechanical energy is continuous, not quantized. Angular momentum of a particle is not quantized. The Plank constant has nothing to do with mechanical energy. It is only the electromagnetic energy that Plank constant is related to. It is only the electromagnetic energy that is quantized.

The existence of electromagnetic energy is not associated with a mass. Since electromagnetic energy has no association with a mass, electromagnetic energy is neither subjected to nor exerts a gravitational force. Electromagnetic energy has nothing to do with gravity. All the energies are not created equally. Not all the energies are the same. As a result, the claim that mass and the energy are one and the same is incorrect. Electromagnetic energy has no mass, has no association with any mass, has no effective mass, and hence has no gravity. Electromagnetic energy has nothing to do with mass. Unlike the mechanical energy, which cannot exist without a mass, electromagnetic energy exists on its own. Electromagnetic energy does not require a mass for its existence. Electromagnetic energy does not require a medium for its propagation. The equality $e=mc^2$ does not hold; it is meaningless since 'e' is the electromagnetic energy and mc^2 is mechanical energy, $e \neq mc^2$.

Space and time cannot make a fabric. Although space can provide a place holder for an object everywhere in space, time can provides a place holder for an object only at the present moment, not in the past, not in the future. An object in the past is not contained in a past time. An object in the future is not contained in a future time. All the objects and events have existence only at the present time. Universe only exists always at the present moment. Time is a single point, the present. Time is this moment, not a continuum. What exists is the space at its present moment. There is no yesterday's space. There is no tomorrow's space. A mass cannot curve the space. Energy cannot curve the space. Mass and energy can only curve matter, never the space. Mass and energy cannot curve non-matter. Space is non-matter. Energy itself has no gravity. Only a mass can exert or influenced by gravity, nothing else.

Gravity is not a wave. If gravity is a wave, any gravitational action will be associated with a time delay since it takes time for a wave to propagate. Gravitational action cannot be associated with a time delay; gravitational action must be immediate without a delay. Gravitational field cannot be a wave. There are no gravitational waves. A mass and its associated gravitational field of infinite span must be a single entity.

Gravity cannot exert any direct influence on light since light is electromagnetic energy that has no associated mass. However, gravity can generate a density gradient in the medium around a gravitational object in the presence of a medium. Light will be

diffracted in the presence of density gradient in the medium. The diffraction of light near a gravitational object is not a direct effect of gravity on light itself; it is not gravity bending light. Gravity does not bend light. Gravity has no direct effect on light. Gravity has indirect effect on light in the presence of a medium. Gravity has no effect on light in the absence of a medium. It is the medium density gradient created by gravity that bends light, not the gravity itself.

There is no space-time. What diffracts light near the sun is the density gradient of the medium created by the sun in the presence of a medium. The diffraction of light near the sun is an indication that there is a medium around the sun. There is also a diffraction of light near the earth due to the density gradient of the air near the earth. This diffraction of light near the earth is not observable since the density gradient due to the earth's gravity is negligible.

According to General Relativity mantra, if mass tells space-time how to curve and space-time curvature tells a mass how to move, and the light follows the space-time curvature, then, in retrospect, space-time curvature is also telling the space how to change the permittivity and permeability in order for light to follow the curvature of the space-time. Light cannot take a non-linear path without the change of permittivity and permeability. Since the permittivity and permeability of the space determines the speed of light, and the permittivity and the permeability varies with the curvature of the space-time, speed of light will no longer be a constant in a warped space-time. And as a result, speed of light is no longer a constant in the free space since light is expected to follow the space-time curvature; that is the irony of General Relativity if it holds.

General Relativity requires the light to follow the curvature of the space-time and at the same time it also requires the speed of light to be a constant; these two are unattainable concurrently. Speed of light cannot be a constant when light has to follow a curved path. Light cannot propagate on a non-linear path at constant speed. Speed of light can be a constant only on a linear path.

How can time create a space-time fabric when neither past time nor future time exists? What exists is only the presence. What exists is state of the universe at this moment. The claim that a mass bends space is fictional nonsense. How can a mass bend space? How can a mass bend time? A mass can only bend another mass; a mass cannot bend a non-mass.

Gravity has no existence without a mass and mass has no existence without gravity. The infinite span of gravitational field and mass is a single entity. Space has nothing to do with time and time has nothing to do with the space. The concept of time is not a part of nature; time is a human invention. Gravity has no effect on space. Space has no effect on gravity. Speed of light is not a universal parameter since the speed of light is determined by the permittivity and permeability of the medium.

Space curvature is an oxymoron. If there is a curvature, it can't be the space. If it is a space, there can't be a curvature. Space cannot have a curvature and curvature cannot exist in space. If the presence of a mass generates a curvature in space, there must be a material medium present in the space. A mass creates a density gradient or curvature in a material medium due to its gravitational force. Light is diffracted by the curvature or the density gradient of the material medium. Light follows the density gradient of the medium. It is this density gradient that has been misinterpreted as a curvature of space-time. There is no space-time. What is there is a density gradient of the medium near a gravitational object. It is this density gradient that diffracts light near a gravitational object. The diffraction of light near a gravitational object signals the presence of a material medium near a gravitational object.

Time does not exist. Have you seen time anywhere? Time is a definition. Once time is defined, nothing in nature can meddle with time. There cannot be a curvature in something that is non-existent. Gravitational object cannot create a curvature on a definition. Time has no existence without conscious beings. Curvature in time is all in the twisted human mind since time itself is a human definition that only exists as long as we remain conscious. Although time has no existence without conscious beings, space exists irrespective of the presence of conscious beings. Time is a human definition based on natural rhythm. Time is not something you can meddle with. You cannot twist, bend, warp or alter time in any manner. You cannot slow the time down by moving fast. You can only change your volume by moving fast.

Speed of light cannot be a constant if light has to follow space-time curvature.
Light cannot propagate on a non-linear path at constant speed.
Speed of light can only be a constant on a linear path.

XX. MUONS ON GROUND HAS NOTHING TO DO WITH MYTHICAL TIME-DILATION

The presence of muons near ground level had been used again and again wrongfully to justify mythical time dilation and the Special Relativity. The claim that muons couldn't be present at the ground level unless some mythical time dilation had taken place is completely wrong, nonsense. It is true that the half-life time of muons is just a small fraction of the time required for a muon to reach the ground level. However, half-life time says nothing about the life-time of individual muons. Not all muons have the same life-time. Half-life time is a population statistics. It does not rule out some muon having life-time many times longer than the time required to reach the ground.

Just because average life span of a human is around 60 years does not mean life time of every

individual is 60; some people live pass 110 years even. The half-life time or average life-time says nothing about the life-time of an individual in a population. A mythical time dilation is not required for some muons to reach the ground level. Even though the half-life of muons is just a small fraction of the time required for muons to reach the ground, some muons have long enough life span to reach the ground, even to take a little rest and hang around little bit longer.

A mythical time dilation is not required for muons to reach the ground. The presence of muons at the ground level does not indicate a mythical time dilation. Half-life of muons says nothing about the life-time of individual muons. It is preposterous to use the presence of muons on the ground to justify mysterious and unrealistic time dilation in Special Relativity. Since time is not a part of nature, there is nothing in nature that can justify a time-dilation. Time itself is not relative. It is the mechanism of a clock that is relative.

XXI. **CONCLUSIONS**

Kepler's laws are not universal. Kepler's laws are not applicable to any orbiting system in reality, in strict sense. However, Kepler's laws are a good approximation to the motion of the planets in the solar system. Kepler's laws provided Newton the insight required in formulating the mathematical universal gravitational laws. Kepler's laws are limited to time-invariant, fixed or locked-in orbits. In reality, no orbit in a multi-object orbit system is strictly time-invariant. Further, in reality, no planet, star, or a galaxy is mass-invariant and hence no planetary orbit, star orbit or galactic orbit will be fixed or time-invariant. In order to maintain the stability of orbiting systems against the variations of the masses or the orbit parameters in general, there must be an adaptive dilation or contraction of orbits, or radial distance adjustments with the variation of the masses or the orbit parameters of any orbiting system.

The angular momentum of an orbiting object in a multi-object orbit system is not conserved. It is the total angular momentum of all the orbiting objects in an orbiting system that is conserved. Similarly, the angular momentum of an electron in an atom is not conserved, except in the Hydrogen atom. The angular momentum of an electron in an atom is a time-varying vector. A vector cannot be quantized. A vector does not come in quanta. A time-varying quantity cannot be quantized. A time-varying quantity does not come in quanta. Angular momentum of an electron does not come in quanta. Angular momentum cannot be quantized. As a result, Bohr atom that is based on the quantization of the angular momentum of an electron is meaningless, invalid, utter nonsense.

Gravity is a vector. Vectors cannot be quantized. Vectors do not come in quanta.

There is no Quantum Gravity.
Quantum Gravity is an Oxymoron.

Vectors do not come in quanta. Any quantity associated with a direction cannot come in quanta. Any quantity associated with a direction cannot be quantized. Gravity is a vector. Gravity cannot come in quanta. Gravity cannot be quantized. There is no Quantum Gravity. Quantum Gravity is an Oxymoron. Only a time-invariant or conserved scalar quantity can come in quanta. It is only the electromagnetic energy that comes in quanta, nothing else. Since the electromagnetic energy represents the frequency of an electromagnetic wave, electromagnetic frequency spectrum is discrete. Contrary to the wide-spread belief, Electromagnetic Spectrum is not continuous.

There are no light particles. Light comes in bursts of finite duration. A wave burst cannot be broken into particles. A wave burst cannot come as a collection of random particles. If light consists of spatially random photons, what keep them as a coherent ray of light? A wave burst cannot propagate as a coherent entity if it consists of a collection of spatially random particles. There is nothing random about light. Propagation of light is a deterministic process, not a random process. Even the very idea of light particles is an utter nonsense. Light is always a wave. Light comes bursts of finite duration. It is these wave bursts that gave us the impression of particles. Electromagnetic wave bursts of finite durations are not particles; they are waves. There are no photons. A particle can travel, and then stop and remains as a particle. Light cannot travel and stop and remains as light. If light stop propagating, it is because the energy has been dissipated. Unlike particles, light cannot propagate, stop, and then remains as light. There are no light particles. If light stops travelling, it is no longer light.

Light particle is an Oxymoron. There are no Photons. Light cannot be particles. Particles cannot be light.

Since Electromagnetic Energy comes in Quanta, Electromagnetic Spectrum is Not Continuous.

You cannot call these wave bursts of finite duration 'photon'; wave bursts are not spatially random. The so called photons are by definition spatially random. If light consists of spatially random particles, light cannot have a directional propagation; this itself shows that light cannot be a particle. There is nothing to keep photons stick together in a directional ray of light. If light consists of spatially random particles, coherent light rays are not possible. Light cannot be exchanged like particles. You cannot exchange an entity that does not have a stand-still existence. Electromagnetic field is not a result of a mythical photon exchange. There is no exchange of particles in an electromagnetic field. Electromagnetic field itself has no particles. You cannot exchange something that has no existence if it stops travelling; light seizes to exist if it stops

travelling or comes to a halt. The claim that an electromagnetic field is a result of exchange of photons or light particles is total nonsense, meaningless royal crap, not reality.

Since the electromagnetic energy must be bounded, the electromagnetic spectrum must be quantized and as a result electromagnetic energy is quantized. Mechanical Energy is continuous and its existence is associated with a mass. Mechanical energy has no existence without an association with a mass and hence mechanical energy does not come in quanta. Mechanical energy cannot be quantized. It is only the electromagnetic energy that comes in quanta, not the mechanical energy. Not all the energies are created equal. Mechanical energy is continuous while the electromagnetic energy is not. The ubiquitous, never proven equation $e=mc^2$, where 'e' is the electromagnetic energy, mc^2 is the kinetic energy, is invalid since the electromagnetic energy and mechanical energy are not the same, $e \neq mc^2$. Electromagnetic energy can be converted to mechanical energy by some mean, and vice versa, but they are not the same.

We introduced the Eccentricity Vector for an orbiting object in a Gravitational Orbit System. The Eccentricity Vector completely determines the Gravitational Orbit Dynamics (GOD) of an orbiting object. The Eccentricity Vector of an elliptical orbit is not time-invariant in a General Orbiting System. It is the time-varying Eccentricity Vector that describes the orbit of an object in a multi-object orbiting system. The Eccentricity Vector of an orbit can be assumed to be time-invariant if the masses of orbiting objects are negligible compared to the mass of the orbiting center. Kepler's laws provide a reasonably good approximation to the motion of the planets in the solar system since the masses of the planets are negligible compared to the sun. In strict sense, Kepler's laws apply only to gravitational systems with a single orbiting object. Instead of using the Solar System, if Kepler had collected observations from an orbiting system of stars or galaxies, Kepler's laws would have been completely different. He would not be able to formulate any law by observing an orbiting system of stars or galaxies except the 0^{th} law. It is a good thing that Kepler concentrated on the Solar System and made the observation on the orbiting planets in the Solar System. Otherwise, we wouldn't have had Gravitational Laws of Newton. Without Kepler, there wouldn't have been a Newton in the field of gravitation.

In the case of a General Orbiting System such as orbiting star/galactic system, masses of the stars/galaxies are significant and cannot be disregarded compared to the mass of the orbit center star/galaxy. The effect of the mutual interactions has to be taken into account in the case of star/galactic orbit systems. The Eccentricity Vector of an orbiting star/galactic system is time-varying, not fixed or not locked in. The orbit of a star/galaxy is time-varying, not fixed or locked-in. Therefore, Keplerism has no place in a General Orbit System such as orbiting system of stars or galaxies. The light-weight Keplerism does not apply for heavy-weight general orbiting systems such as orbiting stars or orbiting galaxies.

The stars/galaxies in an orbiting star/galactic orbit system are not moving faster; they are moving at the exactly right speed corresponding to the masses within the system. The mistake is in the estimation method used in estimating the speeds of the stars and galaxies in stars/galaxies orbit systems. We underestimated the speeds of stars/galaxies and assumed that our estimates were correct, and as a result we incorrectly concluded that the stars are moving faster than the speeds the masses within the system warranted them to.

The basic premise we have used in estimating the speed of stars/galaxies is incorrect. We forced in Keplerism where it does not belong. Keplerism has no place outside the solar system. Keplerism has no place in general orbiting systems such as star/galactic orbit systems. It is not possible to estimate the speeds of stars/galaxies with the knowledge of the masses of the star/galactic orbit system alone. Keplerism does not apply to any orbiting system where the masses of the orbiting objects are comparable or significant to the mass of the orbit center. In short, if the mass of the orbiting objects are not negligible compared to the mass of the orbit center, Keplerism has no place there.

Dark matter is a result of our forcing of Keplerism where it does not belong.

If we estimate the speed of the outermost star/galaxy at radial distance r as $V^2=(1/r)GM_T$, where M_T is the total mass of the stars/galaxies within the outermost orbit, then, it will be equivalent to making two unrealistic assumptions. One assumption is that the radial distance to any other star/galaxy from the outermost star/galaxy is equivalent to the distance to the outermost star/galaxy from the orbiting center star/galaxy. The second assumption is that the center of mass is also where the orbiting center is at. These two assumptions are equivalent to lumping all the masses at the orbit center. The estimate of the speed of the outermost star/galaxy based on these assumptions results in an extremely underestimated speed. The estimated speed of the outermost star/galaxy will be only a fraction of the actual speed. The larger the number of stars/galaxies in the orbiting system, the smaller is the fraction of the actual speed that the estimated speed is equivalent to.

It is the estimate of the speed that is in error. We cannot extend behavior of the solar system to any other system in general unless the system is the same mass-class as the solar system. The Solar System is in light-weight class. The star/galaxies systems are in heavy-weight class. Orbiting star/galactic systems are

heavily influenced by the mutual interactions of the orbiting stars/galaxies that cannot be disregarded as in the case of the solar system. Keplerism does not apply to any orbiting system other than the solar system even approximately. Even for the solar system, Keplerism applies only as an approximation. Keplerism had done its job historically by revealing the necessary clues to Newton in the development of the gravitational laws. There on, it is the Universal Gravitational Orbit Dynamics (universal-GOD) that takes into the account of the mutual interactions of the orbiting objects that prevails for General Orbiting Systems such as orbiting star/galactic systems.

We can't expect any General Orbiting System to behave the same way as the solar system. If the behavior of a General Orbiting System does not agree with our estimated behavior, it is our method of estimation that is to be questioned rather than forcing General Orbiting Systems to behave the way we expect them to by bringing into existence a hypothetical mysterious hidden mass of some sort, Dark Matter. Just because we can approximate the motion of planets in the solar system with Keplerism, we cannot blindly expect Keplerism to work for all the other orbiting systems such as orbiting star/galactic systems in general.

The need for Dark Matter resulted out of our overconfidence that our estimates were correct. The process we used in the estimation of stars/galaxies was incorrect, wrong, and inadequate. The observed speeds of the stars/galaxies are indeed due to the real mass. There is no hidden mass. There is no mysterious Dark Matter. The need for the mysterious Dark Matter resulted from the misunderstood or misinterpreted Keplerism and its limitations and the forcing of the Keplerism or the approximate Newtonism onto the orbiting systems of stars and orbiting systems of galaxies where it does not belong. Keplerism has no place in star/galaxies orbit systems.

The origin of Dark Energy also has a similarity to the origin of the Dark Matter; both resulted from invalid interpretations, human error. Dark Energy is a result of the misunderstood or misinterpreted galactic red shift. Galactic red-shift is not a result of universe expansion by some Dark Energy. Universe is not expanding. Space doesn't expand. Space cannot expand. It is only the matter that expands for contracts. Space is non-matter. The idea of space expansion or universe expansion is a result of a Cave Man Syndrome [4]. Galactic red-shift is due to the path electromagnetic energy loss or propagation loss. Nothing can propagate without a loss, electromagnetic waves are no exception. Since frequency of an electromagnetic wave is its electromagnetic energy, the electromagnetic propagation energy loss results in a frequency down-shift or red-shift. The larger the distance light has to travel, the larger the path loss and hence larger the red-shift. There is no Dark Energy. Dark Energy exists only in misguided human mind, not in reality.

The very idea of expanding universe or expanding space is repugnant, preposterous, wrong, and an insult to human intelligence just like religious doctrines. In fact, the very idea of expanding universe and Big-Bang is nothing more than a religious doctrine, a path leading to voodoo science just like Quantum Mechanics. If you have recurring dreams of a particle being at multiple places at the same time, space being expanding, time being relative, gravity bending light, gravity shortening time, time being a function of space, buildings being expanding and contracting by gravitational waves (human fantasy waves), being dead and alive at the same time, or virgin mother appearing in clouds with a message, it is indeed high time to seek professional help immediately by making an appointment with a good psychiatric to get your head examined; there may still be a hope of recovery. You cannot justify those dreams by wrapping them in a fake cloak of science or by misrepresenting the experimental observations. Just because something had been believed to be true for generation after generation does not mean it is true. We do not have to comply with or accept any belief system, including the concept of a creator, that has been passed down to us by generation after generation to be true or as a universal fact when we can see clearly at a first glance that cannot be true.

Quantum Mechanics, Special Relativity, General Relativity, Gravitational Waves (fantasy-waves), Big-Bang, Multi-verse, Inflation, Relative time, Space-time are voodoo science; religious-like doctrines with a sprinkling of half baked, blind to the fact, pretentious and misrepresented experimental demonstrations. Although all these ideas are unrealistic utter nonsense, they have provided a haven for running a fertile publication mill, which is all that is required for people in academia. What secures a job in academia is the number of publications, not what is in them. It is all a number game in Universities. When someone says he/she has 400 papers, you have to start to wonder.

When we calculate the speed of an outermost star in an orbiting system of stars, what we have is an estimate of the speed of the star. If the estimate does not match the real observations, it is always the estimate that could be wrong and should be under suspicion; that is why it is called an estimate. If a pair of shoe you have is larger for you, don't stuff in some foreign material to make it fit. Sooner or later, you will have to face with other issues caused by the temporary solution to the problem. Instead, just get a pair of shoes that fits. The hypothetical mysterious Dark Matter and the hypothetical mysterious Dark Energy are both outcomes of astronomical human blunders.

Mass of an object is not relative. Mass is absolute. It is the volume of an object that is relative [4]. The volume of a mass decreases with the speed while mass remains unchanged. It is the mass density that is relative, not the mass itself. Time is absolute. Time

is a human definition. Time has no universal existence outside the human mind. The concept of time has no existence in the universe. Universe exists while undergoing continuous state transitions with no concept of time. It is we who came along and defined time using the local changes of the state of the universe. If the time is relative, time will be directional since the motion of an observer is directional. If the time is relative, the speed of light cannot be independent of the observer's frame of reference due to the presence of Shear Electromagnetic (SEM) Waves, whose speed depends on the frame of reference. Time can't be directional. Speed of light is independent of the observer. As a result time can't be relative.

If there is a space-time, space-time must be unique. Space-time cannot be unique [2]. As a result, there is no space-time. If there is space-time, the speed of light cannot be a constant under warped space-time. Mass has no effect on space and space has no effect on mass. Gravity has no existence without a mass. Mass and its gravitational field of infinite span is a single entity. Mass has no existence without its infinite span of the gravitational field and vice versa. The homogeneousness of the universe in every direction is a freestanding adaptive balancing act of mutual gravitational forces between the objects and orbiting systems, not some inflationary fluke and a big-bang. The distances between orbiting systems are under continuous adjustment to balance the changing gravitational forces due to the changing masses. When the masses of objects vary, the distances between the masses also vary due to the changes in the gravitational forces. The uniformity of the universe in every direction is the state of balanced gravitational forces in every direction; it is an ongoing adaptive process. It is this adaptive gravitational adjustment of distances between objects that brings the uniformity in every direction, not some mythical big-bang followed by hypothetical inflation. The idea of Big-Bang itself is a Big-Nonsense. Since the concept of space-time itself is mythical, its derivative Big-Bang has no existence beyond human mythical imagination, just like religions.

Any mechanism of a clock is relative. The relativity of the mechanism of a clock is obvious when you consider the water clock used by ancient Greeks for timing of the Socrates trial. It is the displayed-time on a clock that is relative, not the time itself. In GPS, more accurate atomic clocks are used on low-orbit satellites while land receivers are equipped with cheap low accuracy electronic clocks. In order to avoid the use of low accuracy time on local land receiver clocks in the location estimation, the position of the land receiver and the time the request for the position was made are estimated using the position and the high accuracy time data from four or more satellites in the vicinity of the local land receiver.

In GPS, all the low-orbiting satellites are more or less at the same environment condition. The use of the data from satellites alone in the estimation of the location of a local receiver also eliminates any time bias due to environment difference since all the satellites in the vicinity of a land receiver are more or less in the same environment. The environment the satellites are different from the environment the local receivers are in. As a result, even when the clocks on satellites and land receivers are all of same accuracy, the time displayed on clocks on satellites will be different from the time displayed on the land receivers due to the environment bias. By using the time from clocks on satellites alone in the estimation of the location, this time bias due to the environment difference is minimized. If time itself is relative, GPS, as we know it, is not possible since the speeds of low-orbiting satellites are not constant.

Special Relativity requires for objects to be moving at constant speed on linear paths. GPS satellites are not on linear paths; they are not moving at constant speeds. As a result, Special Relativity has no place in GPS. GPS satellites are on low lying elliptical orbits under non-uniform speeds. GPS has nothing to do with Special Relativity or General Relativity. The clocks on satellites are of higher precision, high price atomic clocks. The clocks on local land receivers are of low accuracy, cheap electronics clocks. As a result, in GPS, local receiver has to avoid using the local time from low accuracy local clocks in the location estimation. Instead, the local receiver uses the data from four or more satellites alone in the vicinity to estimate its location as well as local time; it skips the use of low accuracy local land receiver clock completely. The environments of local receivers are different from the environment satellites are in. All the satellites in the vicinity of a local land receiver are more or less at the same environment. Therefore, by using the data from satellites alone, GPS also minimizes the time bias due to the effect of environment variation on the mechanism of the clocks.

It is the mechanism of a clock that is relative, not the time itself. The effect of the environment on the mechanism of a clock can be easily visualized if we think of a water clock. Water clock is not as accurate as mechanical clock or electronic clock, but it is still a clock. If a water clock is affected by the environment, so are the mechanisms of other clocks. All the clocks are affected by the environment to a varying degree depending on the mechanism used. The wide spread claim in physics that 'GPS is not possible without Special Relativity' is false, not true. It is a claim without any basis; this claim has no merit, simply preposterous. Only a person who has no idea of what GPS is could make such a claim. No one with any familiarity with the working of GPS would make that claim. If the time itself is relative, the algorithm used in GPS is simply useless. It doesn't matter how hard you try, it is not possible to use GPS to validate relative time assumption in Special Relativity, a valiant attempt. It is the assumption of relative time in Special

Relativity that is wrong. Time itself cannot be relative. It is only a display on a clock that is relative. Time and a display of a clock are not synonymous. Any measuring instrument displays the correct measurement only when the measuring instrument is in an environment that agrees with the design specification.

The claim that muons couldn't be present at the ground level unless some mythical time dilation had taken place is completely wrong, nonsense. It is true that the half-life time of muons is only a very small fraction of the time required for a muon to reach the ground level. However, half-life time says nothing about the life-time of individual muons. Not all muons have the same life-time. Half-life time is a population statistics. It does not rule out some muon having life-time many times longer than the time required to reach the ground. The presence of muons on the ground level does not require some mythical time dilation. Even though the half-life of muons is only a very small fraction of the time required muons to reach the ground, some muons have more than enough life span to reach the ground, perhaps even to take a little rest on the ground. A mythical time dilation is not required for muons to reach the ground. The use of the presence of muons on the ground to justify some mythical time dilation is simply a deception at highest level, not science. It is preposterous to use the presence of muons on the ground to justify the time dilation in Special Relativity; there is no basis for it.

The whole notion of relative-time, space-time, photons, big-bang, universe expansion and Quantum Mechanics are outdated false ancient notions that seem to have a religious overtone and a religious-cult-like following with no regard to reasoning or mathematical truth. Mathematical beauty has nothing to do with mathematical truth. The followers go to the great length in blocking any publication that goes against the religious-like ideology of the cult. The strong hold of religious-cult-like belief in physics, astronomy and astrophysics, as well as science in general, has become so strong that it has become customary for any paper questioning the Special Relativity, General Relativity, or Quantum Mechanics to be instantly rejected with no reason given irrespective of the validity of the content of the paper. As we are not allowed to question religious texts, we are also prevented questioning physics text; what is expected is the compliance to the established ideology. If you want us to believe that the time is relative, show us that the relative time is unique and non-directional; that is something impossible to show.

Quantum Mechanics is no different from a religious doctrine. You are expected to believe it without a question. Quantum Mechanics is based on a false notion of particles behaving as waves; total nonsense. Particles do not behave as waves irrespective their size. Behavior of microscopic particles is not spooky. Moving charge particles generate electromagnetic waves. Misrepresentation of these electromagnetic waves as particles behaving as waves is the foundation of Quantum Mechanics, a double-slit blunder, a human blunder. No particle can be in multiple states concurrently except in the minds of voodoo practitioners and sorcerers. A particle can be in multiple states concurrently only in religiously misguided human minds, not in science or nature [3]. Quantum Mechanics is a theory of human insanity, not a reality; it is a fantasy theory built on deception and heavily protected religiously by fake justifications. Just because people use Quantum Mechanics to explain the lasers and semi-conductors do not mean their development have anything to do with Quantum Mechanics. The development of transistors or lasers had nothing to do with Quantum Mechanics just like atomic bomb has nothing to do with $e=mc^2$ or GPS has nothing to do with Special Relativity. In fact, the invalid relationship $e=mc^2$ has nothing to do with atoms. This relationship had resulted from a mistake in the representation of the path of light relative to a moving train [2,4,5]. If a light pulse is released from a bottom of a moving train vertically, the path light pulse takes relative to the train is not vertical, $e\neq mc^2$. Electromagnetic energy and mechanical energy are not the same. Electromagnetic energy has no mass equivalent irrespective of the speed of the mass.

Light is not relative. Light is always a wave, never a particle. Particles are not waves. Wave particle duality is a result of the misrepresentation of the double-slit experiment [3]. A propagating wave is not a probability distribution of a particle. Wave propagation is a natural process. Probability on the other hand is a human generated concept designed to extract possible human interpretations in the absence of complete human understanding of reality. Throwing dies is neither science nor reality. Nature doesn't throw dies to make a decision.

The Mass of an object does not change with the speed. Irrespective of the speed you travel, your mass remains constant. Of course, your mass will change due to continuous mass loss and mass gain just like any other planet or a star, but your mass will not change due to the speed you travel. Mass remains invariant against the speed, Mass density increases as the speed increases due to the volume contraction with the speed. If you start moving faster and faster, as you approach the speed of light, your mass density approaches infinity while the mass remains unchanged. Your motion has no effect on your time or aging. You, in motion, are as young as anybody at stand still. As an object approaches the speed of light, mass density of the object approaches infinity due to volume contraction. The volume of an object approaches zero as the object approaches the speed of light. In other words, if you manage to reach the speed of light, which is indeed not possible for a mass to achieve, you will be transformed into a black hole as you approach the speed of light. As you approach the speed of light, your mass remains the same, but your mass density becomes unbounded or

approaches infinity.

Electromagnetic energy and mechanical energy are not the same. Electromagnetic energy has no association with a mass and hence electromagnetic energy has no gravity. Mechanical energy has no existence in the absence of a mass. It is only the mechanical energy that is associated with gravity since the Mechanical energy has no existence without a mass. There is no gravity without the presence of a physical mass. Unlike the mechanical energy, electromagnetic energy is not associated with a physical presence of a mass and hence no gravity. Mass and energy are not one and the same. Universe is not expanding. Space cannot expand or contract. It is physical matter that expands or contracts. There is no Dark Matter or Dark Energy.

The non existence of any effect of Dark Matter or Dark Energy on the solar system is convincing evidence against the claim that 'the dark matter and dark energy dominate the universe'. If the universe is dominated by Dark Matter and Dark Energy, they should have an effect on all the gravitational orbiting systems independent of their size, not just on stars/galactic orbit systems. Dark Matter and Dark Energy exist only in misguided human mind, not in nature. Dark Matter and Dark Energy have taken religious overture; everybody say they are there, but no one has seen them, just like the mythical concept of GOD. Welcome to the era of Physics in a religious realm. Widely acclaimed mathematically elegant concept of space-time is utter nonsense; unreality enveloped in mathematical elegance is not going to reveal the reality. It is the mathematical reality that exposes the reality itself, not the mathematical unreality enveloped in mathematical beauty. If you envision gravity through space-time, ask this question 'how can the space and time make a fabric that can be curved by a mass?' If you are preaching space-time, at least you should try to show that space-time is unique; you can't. What we are witnessing is the derailing of Physics from the scientific track of Newton and Maxwell to mystique, voodoo religious abyss of darkness.

The Dark Matter and Dark Energy are an outcome of sciencing in the Dark, nothing more than human blunders of overconfidence. Lightweight Keplerism or approximate Newtonism has no place in heavyweight orbit systems. It is the Newtonism with the inclusion of the mutual interactions of the orbiting object that is universal. Time varying Eccentricity Vector defines the universal Gravitational Orbit Dynamics (GOD).

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