Energime

A Theory of Everything
Yet, Almost Nothing at All

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Introduction

Energime Principles

What does it take to make the universe? This is an age old question with many answers and philosophical approaches that span throughout the ages. From Earth, Wind and Fire to our current Standard Model the ultimate quest – whether attainable or not – is the search for the total understanding of our universe. This is a quest that compels each of us on one level or another and is manifested through imagination, through the arts, and through the sciences.

What does it take to make the universe? One approach might be as follows:

- You must have a playground in which events can play out in. You must have space.

- You must have stuff, substance, objects within this playground. You must have mass.

- You must allow these objects to move within the playground. You must have motion.

Therefore, space, mass and motion are all required components. Note, time is nowhere to be found in these fundamental basics. Yes, we use time to help us define motion as speed; yet, time itself is nothing more than a standardized motion. The measurement of time always requires motion and therefore time provides nothing more than a convenient way to compare relative motions against some standard motion – a standard motion that we define as time.

As we move to better understand these fundamental basics, we have defined space through a fundamental distance, substance through a fundamental mass, and motion as that of the speed of light. We then integrated each of these properties into a singular fundamental entity, the energime.

There are five fundamental principles of Energime Theory (E Theory) from which everything else is derived.

- All observations of the physical world are the result of combinations of a fundamental entity – the energime – that is manifested through three fundamental dimensions: mass, distance and speed. These dimensions converge to unity – and define the energime – at values of:

$$\boldsymbol{mass} = 2.19 \times 10^{-73}\, kg$$

$$\boldsymbol{distance} = 1.02 \times 10^{-34}\, m$$

$$\boldsymbol{speed} = 3.00 \times 10^{8}\, m/s$$

- The energime may exist in one of two states: as either bound energimes (matter) or as free energimes (free space/vacuum).

- All matter is in a constant state of decomposition from bound energimes to free energimes at a rate determined by the frequency of the energime: $2.97 \times 10^{-23} s^{-1}$.

- When a free energime is emitted, it expands from its source as a ring that defines an ever-increasing 3rd dimension with the passage of time. This phenomenon replaces the concept of four-dimensional space-time.

- Mass moves through space partially as a wave and partially as a particle creating a truly integrated wave-particle duality.

Chapter One

Momentum

From our earliest introductions to physics, we have all been introduced to the concept of momentum as the product of mass and velocity. While this is a straightforward definition, it falls far short of explaining the change in momentum for an object that has undergone acceleration.

The simple truth is that the conservation of momentum cannot be completely expressed as:

$$0 = m_1 \Delta v_1 - m_2 \Delta v_2$$

This equation suggests that a change in velocity can occur without a change in energy (mass). This is absolutely false. We all know this, yet we generally dismiss it because the change in mass for most "real-life" events is so small that it becomes negligible. The tendency is to assume that energy is manifested primarily through increased velocity at non-relativistic speeds and that the resulting change in momentum is the result of a change in the velocity of an object.

This is entirely false. In E Theory, energy is always manifested through its mass equivalency. When two particles collide, energy (mass) must transfer from one entity to the other. Therefore, any change in velocity is directly dependent upon a change in mass. This is an absolute and unavoidable fact. Now, some might state that this can be evaluated differently from the perspective of four-dimensional energy-momentum and that the requirement of "relativistic mass" is a naïve and outdated concept in modern physics. None-the-less, E Theory takes a new and fresh approach in developing the fundamental fabric of space and energy and fully utilizes the concept of relativistic mass.

In E Theory relativistic effects play a major role in the understanding of momentum, even at the lowest of velocities. This is rarely considered in that textbooks devote more space to determining when an event is relativistic then in truly developing an explanation of the role of relativity on momentum at any and all speeds. Even when relativity is considered, it is generally treated as an add-on adjustment that needs to be made as opposed to an essential component of momentum.

An accurate description of momentum must take into account the dependent relationship between mass and velocity, which can be determined through the relationship between relativistic mass (total mass) and rest mass (or invariant mass) as expressed through the Lorentz transformation equation as:

$$Velocity = \left[1 - \left(\frac{Mass_{Invariant}}{Mass_{Relativistic}} \right)^2 \right]^{1/2}$$

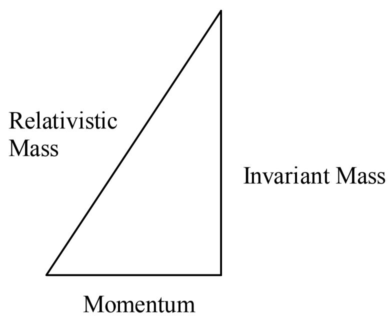
Rearranging the above expression yields:

$$(Momentum)^2 = (Mass_{Relativisitc})^2 - (Mass_{Invariant})^2$$

The above equation clarifies that momentum is solely a function of a change in mass. The change in velocity of an object is the direct result of the transfer of energy (mass) from one entity to another.
Momentum is the result of an exchange of mass, and if an elementary mass exists, it then becomes a function of the transfer of these fundamental particles (energimes) from one entity to another. Some may cringe at this idea because it seems to imply that relativistic mass gain changes the structure of matter. However, please note that E

Theory has little to say regarding the physical structure of matter. To answer the most fundamental questions regarding physical structure would require the ability to probe at the level of the energime – a level approaching $2.19 \times 10^{-73} kg$.

This relationship between momentum and mass can be diagramed through a right triangle with the hypotenuse representing relativistic mass, one leg representing invariant mass and the other leg representing momentum.



The vector representing relativistic mass is equivalent to the energy-momentum 4-vector as long as you acknowledge that the three spatial dimensions of momentum have already undergone vector addition leaving a single momentum vector. This diagram also allows for an entity with no invariant mass to possess momentum, but we shall continue to attribute that momentum to the relativistic mass of the system as opposed to claiming that it is a property of energy.

While the development of the above relationship is quite simple – utilizing only the definition of momentum as $mass \times velocity$ and the relativistic mass-velocity relationship – it does serve to highlight a troubling aspect of momentum. In an elastic collision between two objects, energy is transferred from one entity to the other while the total momentum of the system prior to the collision is equal to the momentum of the system after the collision. Both kinetic energy and momentum are conserved.

The transferred energy from the collision must also contain momentum, which should contribute toward the change in the momentum of the objects involved in the collision. However, the momentum contained in the transferred energy is insufficient to account for the total change in momentum. This is generally ignored, because we do not typically describe momentum as being transferred. Rather, we refer to the transfer of energy and the conservation of momentum. What appears to occur is that the object providing the transferred energy losses more momentum than can be accounted for through the momentum of its energy loss; but, the receiving object gains more momentum than can be accounted for through its energy gain. The end result is that the momentum of the overall system is conserved and at the end of the process all seems to be fine.

Adding energy to an invariant mass will result in a momentum described by the relationship $\sqrt{m_r^2 - m_i^2}$. This relationship was derived – in part – from the traditional definition of momentum as $mass \times velocity$. This traditional definition would suggest that the momentum contained by the transferred energy represents a fixed quantity and when this momentum is absorbed into an object at rest, that the resulting momentum would be equal to the momentum of the transferred energy. This clearly does not happen.

This begs the question, why? Momentum is conserved – we can all agree on that – but, we cannot easily explain the magnitude of the momentum shift.

There appears to be something more at play here!

Chapter Two

$\mathbf{E = mc^2}$

$E = mc^2$ is arguably the most recognizable equation in science. It is also one of the most puzzling concepts. It is open, even within the scientific community, to various interpretations. Some hold fast to the concept that $E = mc^2$ applies only to the energy content of an invariant mass (the energy content of an object at rest). Others suggest that it has a broader interpretation and represents the mass equivalence of any form of energy. Much of these discussions are buried within the use of semantics that lead to the desired outcome.

E Theory takes a much more direct and straight forward approach by utilizing an absolutely literal interpretation of $E = mc^2$. Energy is at all times nothing more – and nothing less – than the component energimes of an object moving at the speed of light. The energime was never accelerated to the speed of light; rather, its motion – by definition – exists only at the speed of c. It is therefore not subject to the infinite relativistic mass gain typically associated with masses moving at the speed of light.

Everything is made up of component energimes moving at c. Mass and Energy are – at all times – exactly the same thing. This may seem simplistic or perhaps naïve; however, stick with the premise and let's see where it leads us. Whether you wish to view the energime as having a physical significance or simply a theoretical beauty is – for now – left up to the judgment of the reader.

For those who would protest on the basis that our treatment of momentum and energy does not take into account the higher level principles of space-time and the four dimensional dynamics of the energy-momentum 4-vector, we must clarify that E Theory does not recognize time as a fundamental dimension of the physical world. Therefore 4-vectors do not apply within the framework of Energime Theory. (This is a bold new theory!)

Chapter Three

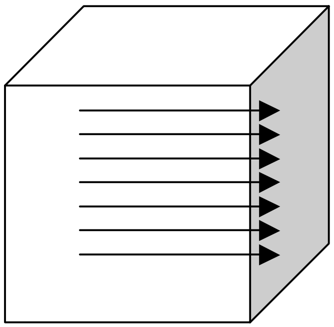
Relativistic Effects

Equipped with a new interpretation of energy – mass equivalence, E Theory is able to remove the mystery of relativistic effects and replace them with a framework that intuitively requires these effects to occur. That is, it would be odd if relativistic effects did not occur.

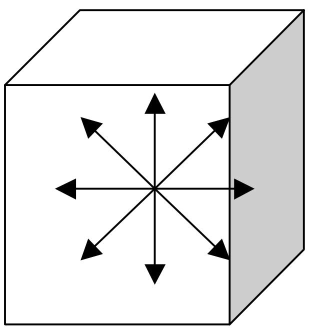
E Theory is built around the energime, a fundamental particle that moves at a constant speed of $3 \times 10^{8}\, m / s$, occupies (defines) $1.02 \times 10^{-34}\, m$, and has a fixed mass of $2.19 \times 10^{-73}\, kg$. The derivation of these values may be found in Chapters Thirteen - Fifteen.

The implication brought on by the introduction of the energime, is that matter is at all times made up of component energimes moving with a fixed speed of c. The velocity of an object is therefore not a function of increasing its speed in a particular direction, but rather the reorientation of its component energimes – already moving at c – such that the net vector of the component energimes provides a net velocity along an axis-of-motion.

The constancy of the speed of light is fundamentally more accurately expressed as the constancy of the speed of the fundamental entity (the energime). A photon becomes nothing more than a system of bound energimes all moving in perfect alignment along the axis-of-motion.



A photon – with component energimes all move along the axis-of-motion at the speed of light.

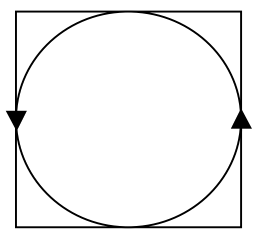


An object at rest – with component energimes all moving at the speed of light with a net velocity of zero.

In E Theory, the orientation of energimes in the universe is conserved with an overall net velocity of zero and a momentum of zero. Therefore, an object at rest can only begin to move when the orientation of the energimes is changed due to an external force resulting in the addition of energimes into the object with a net velocity along an axis-of-motion. Therefore, qualitatively an object must increase in mass as it gains velocity. Note, the invariant mass (rest mass) of the object need not change; it is the addition of new energimes (energy) that accounts for the relativistic mass gain.

Relativistic mass gain therefore becomes intuitively obvious. An object at rest must absorb additional energimes – with a non-zero velocity orientation – in order to begin moving.

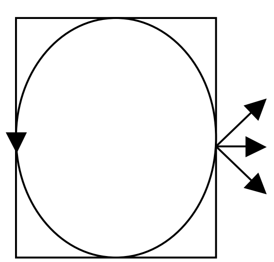
Next, consider an object whose total component energimes trace out a circle over a given period of time. The net velocity of the energimes is zero, therefore the object is at rest.



Object at rest

This object can be given three-dimensional depth by adding layers of circles on top of the diagram at intervals of $1.02 \times 10^{-34}\ meters$, representing the fundamental interval of distance.

The motion of the component energimes can be thought of as defining the dimensions of the object. Now, if the object begins to move, it must absorb additional energimes that change the orientation of all of the component energimes. Two things occur at this point: there are additional energimes in the system that increase the total path that can be traced out by the component energimes; and, a portion of this path must be allocated to the overall velocity of the object. The net effect can be visualized as the energimes moving in an elliptical path with a portion of the motion defining velocity along an axis-of-motion.



Object in motion: Dimension along the axis-of-motion decreases

In E Theory, length contraction occurs because the speed of the component energimes is fixed. Therefore the velocity of the object must come at the expense of some of the objects internal “at-rest” motion. Length contraction is required to “free up” energime motion that can be applied toward the overall velocity of the object. Consider a string of a certain length that represents the distance traveled over a given time. If you wish to show a positive overall motion, you must use a portion of the string’s distance to define the forward motion. This leaves less string to define the dimensions of the object. This results in an absolute statement: motion cannot occur without length contraction.

Time is not a fundamental dimension, but rather a function of distance/speed. The speed of the energime is constant, but as the “at-rest” path of each energime decreases, by definition, time will also decrease. Therefore, time dilation is also a direct result of an object’s component energimes needing to apply a portion of their at-rest properties toward the net velocity of the object. Time dilation is also a natural outcome of E Theory.

Simply stated, motion cannot occur without mass gain, length contraction and time dilation. By changing our interpretation of energy – mass equivalence, we have removed the strangeness of relativistic effects and replaced them with a clear understanding of why they occur.

While qualitatively this makes sense, how does E Theory fair when scrutinized at a quantitative level?

Chapter Four

Energy and Momentum

In Energime Theory, all energy – regardless of form – can be related back to the kinetic energy of the component energimes of a system, which are manifested through the constant speed of the energime.

The number of energimes transferred in a collision is related to both the net velocity squared of the impact and the fraction of energimes that are orientated along the axis-of-motion. It is interesting to note that for a photon, 100 % of the component energimes are moving along the axis-of-motion and its energy is expressed as:

$$E = mc^2$$

For objects moving at "non-relativistic" speeds the orientation of energimes along the axis-of-motion approaches 50% in both the positive and negative direction. Kinetic energy for objects with speeds $<<$ c becomes:

$$E = 1/2mv^2$$

This suggests a general form of the equation as:

$$E = Xmv^2$$

where X represents the fraction of component energimes oriented in a positive direction along the axis-of-motion and has a range of values between 0.5 and 1.0. It stands to reason that the orientation of the transferred energimes is governed by the average velocity of the transferred energimes along the axis-of-motion. That is, in order to successfully transfer, a component energime must be moving with a velocity along the axis-of-motion that is at least as great as the velocity of the particle that will be receiving it, and can be moving with a velocity no greater than the speed of light.

Therefore, the fraction of component energimes moving in a positive direction along the axis-of-motion is equivalent to the average velocity of transferred energimes and can be expressed as:

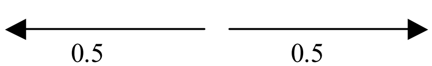
$$X = \frac{V_{particle} + 1}{2}$$

Solving for the velocity of the particle yields:

$$V_p = 2X - 1$$

When component energime motion is analyzed along the axis-of-motion the particle velocity becomes obvious.

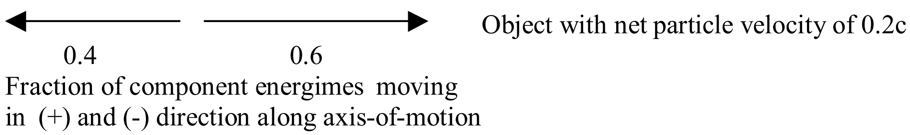
If half the energimes are moving in the positive direction and half are oriented in the negative direction along the axis-of-motion, the net result is the object will be moving with a velocity of (2)(.5) – 1; or, the object will be at rest.



Object at-rest

Fraction of component energimes moving in (+) and (-) direction along axis-of-motion

If 60% of the energimes are moving in the positive direction along the axis-of-motion and 40% are moving in the negative direction, the overall velocity of the particle will be (2)(.6) – 1 or a net velocity of 0.2c



Therefore, the velocity of a particle originally at rest can be determined by:

$$V_p = \frac{(X)(Mass_{transferred})}{Mass_{total}}$$

We now have a way to determine the momentum of the transferred energimes in a collision.

$$(X)(M_{transferred}) = (V_{particle})(M_{total})$$

This equation suggests a new way to look at momentum. Realizing that X represents an average velocity, the overall concept of momentum remains a product of mass and velocity; however, this is equivalent to suggesting that momentum is a measure of the orientation of the energimes transferred.

We already determined that energy was equivalent to the number of energimes transferred. We now see that momentum is a function of the orientation of those same transferred energimes.

$$Energy = M_{transferred}$$

$$Momentum = (X)(M_{transferred})$$

We now see how the actual value of the momentum of transferred energy can change depending on the object that absorbs the energy.

That is, an object with significant rest mass is not going to be moving as fast upon the absorption of energy as an object with less rest mass. This will decrease the value of X and actually decrease the value of the momentum associated with the transferred energy. On the other hand, if the absorbing entity has no rest mass, the value of X will be 1 and the energy and momentum will be identical.

However, this still does not address the full issue. Even if X where equal to 1 in a collision between particles (which it is not), there would be insufficient momentum contained in the transferred energy from a collision to account for the momentum of the object after it absorbs the energy.

To address this will require a deeper look into the Copenhagen Interpretation of the Heisenberg Uncertainty Principle.

Chapter Five

Conservation of Momentum, the Speed of Light and the Integrated Wave-Particle

We know that for an entity with no rest mass that energy and momentum have the same magnitude, or X = 1. However, as the invariant mass increases, energy and momentum have a different relationship with invariant mass.

The relationship between total energy and invariant mass is a scalar relationship. That is, invariant mass plus the relativistic mass gain is equal to the total energy of a system. However, invariant mass and momentum are linked through a vector relationship requiring right angle vector addition in order to express the same total energy of a system.

Recall that in E Theory, Relativity is built on the concept that an object must allocate a portion of its at-rest properties toward its motion; thereby, changing its measurement of mass, length and time. This is a result of the constant speed of mass. We cannot "add" speed to an object; we can only change the orientation of component energimes already moving at a constant speed of c.

For an object moving with a particle velocity of 0.2 c we can calculate that the positive direction vector must be 0.6 c and the negative direction vector 0.4 c. Under these conditions, X = 0.6. This will result in a relativistic effect of 1.51; or, a mass gain, a length contraction, and a time delay all impacted by a factor of 1.51. However, to achieve these relativistic effects will require a total velocity of 0.75 c. This is significantly more than the 0.2 c velocity that would result from the momentum of the transferred energy.

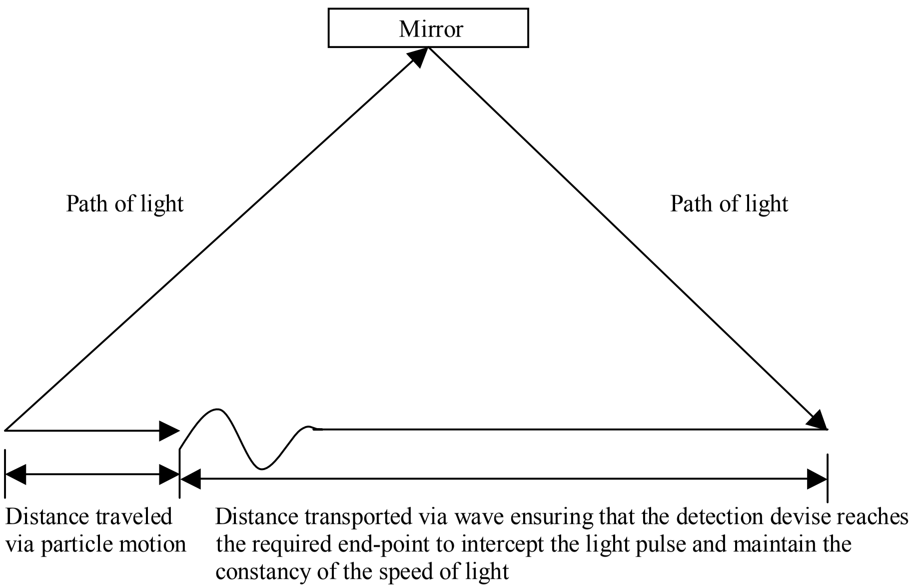
$$V_p = \frac{(X)(M_{transferred})}{M_{total}} = \frac{(0.6)(0.51kg)}{1.51kg} = 0.2c$$

This dilemma provides both a challenge and an opportunity. After all, we already knew that there was some type of problem. Back in Chapter One it was shown that the momentum of transferred energimes is also not nearly enough to provide the observed momentum of an object. Since we know the total mass of the object, it would logically follow that if we account for only a portion of the total momentum we will also be able to account for only a portion of the total velocity. But what accounts for the “missing” momentum and velocity?

In E Theory, the solution to all of this lies in the constancy of the speed of light. An object that accelerates to a new speed must increase in mass. The percentage of this mass gain is the same as the magnitude of the time dilation. This has ramifications on the constancy of the speed of light. In order to maintain the constancy of the speed of light, the total distance traveled by a pulse of light must be increased. For the example we have been discussing, the distance must be increased by a factor of 1.51. This is typically demonstrated by visualizing a pulse of light that is reflected and returned to the observer. If the observer is at-rest, the light goes straight up and back down. If the observer and mirror are in motion at a constant speed, the light follows an angular path; thereby, increasing the length of its total path.

However, the light is only measured with a constant speed if the observer reaches the appropriate end-point. That is, as the light strikes the mirror and is reflected back, will the observer be in the correct position to intercept the light pulse? Based solely upon the momentum of the transferred energy, the answer to this question is no. The observer will fall short. Any attempt to increase the velocity at which the observer is moving will result in a greater mass gain and a greater time dilation resulting in an even greater distance that must be covered in order to intercept the reflected light pulse.   There is only one phenomenon that is capable of moving energy (mass) through space without the physical transportation of the object. That phenomenon is a wave. E Theory suggests that all motion is made up of both particle and wave motion through a truly integrated wave-particle.

As shown below, the particle velocity makes up only a portion of the total distance traveled. The remaining distance is due to the wave motion of the observer or other detection devise.



E Theory suggests that all motion is due to the integrated properties of both a particle and a wave. As such, it provides the first real reason for the necessity of wave – particle duality. It replaces the Copenhagen Interpretation of the Uncertainly Principle, which drives a complete and permanent wedge between a particle and a wave. E Theory utilizes an integrated wave-particle to ensure that the constancy of the speed of light is achieved. All motion is made up of both particle and wave motion simultaneously.

Chapter Six

The First Test of Energime Theory

As suggested in Chapter Five, Energime Theory requires the presence of an Integrated Wave-Particle (IWP) that is responsible for all motion. This is a fundamental shift from our current explanation of wave-particle duality. The standard interpretation is the Copenhagen Interpretation that requires a complete separation of wave and particle properties. That is, we either observe a phenomenon to be a particle or a wave depending on how we choose to interact and observe the situation. The Copenhagen Interpretation drives a complete and total wedge between wave and particle properties. They both exist, but are never observed together.

E Theory requires an integrated wave-particle duality. This is a result of the particle velocity of an object that is determined by the transferred energimes of a collision and a wave component that transports the position of the object without the actual transport of its mass. As such, energy and momentum are determined by the particle motion with the wave serving only one function – ensuring the constancy of the speed of light by positioning the object at the correct end-point to coincide with the arrival of a reflected light beam.

The first objection to this concept will likely be to define the medium through which the wave travels. This subject is addressed in Chapter Seven.

The emphasis of this chapter will be to explore the impact of E Theory on the de Broglie wave equation. Technically, E Theory does not preclude the conventional interpretation that wave properties describe the transportation of matter and particle properties describe the interaction of an object with other matter. However, the significantly more interesting scenario is one that describes motion through a truly integrated wave-particle. In this scenario, motion is at all times due to the integrated effects of both particle and wave motion. This idea can be tested through an analysis of the de Broglie wave equation.

The de Broglie wave equation suggests that all matter possesses wave properties with a wavelength determined by the momentum of the object.

$$\lambda = \frac{h}{mv} \quad \text{or} \quad mv = \frac{h}{\lambda}$$

If the momentum is expressed simply in units of kg (by dividing by the unity value of c) we see that the momentum of the object – according to the de Broglie equation – is equivalent to the momentum of a photon with a mass determined by the ratio of (m)v/c. This can be envisioned as a photon that applies its momentum across the total mass of the object. If $v = c$, then the total mass of the object is comprised of only the photon as it moves with a speed of c. As $v < c$, the total mass of the object is greater than the mass of an equivalent photon. Therefore, if the wavelength is kept constant, as an object becomes more massive its velocity must decrease. That is, an equivalent photon must apply its momentum over a greater amount of mass resulting in a decrease in velocity.

This works perfectly if the total velocity of the object is truly wave motion as required by the Copenhagen Interpretation. However, E Theory suggests the presence of an IWP. In this case the equivalent photon does not have to transport the entire object independently, but rather benefits from a particle motion contribution. This results in a prediction that the wavelength of a particle is actually longer than that predicted by the de Broglie wave equation. E Theory suggests that this effect is measurable under certain conditions.

Quantitatively expressed, the velocity of an object can be determined by the percentage of its overall motion that is carried by a particle velocity and the percentage carried via a wave at the speed of light.

$$P + W = 1 \quad \text{or} \quad W = 1 - P$$

Where P represents the fraction of the motion transported via particle and W represents the fraction of the total motion carried by wave. E Theory suggests that all wave motion is due to the contribution of a photon; therefore, the wave motion always occurs at the speed of light. The total velocity of the object is determined by:

$$V_t = (P)(V_p) + W$$

Substituting for W yields:

$$P = \frac{1 - V_t}{1 - V_p}$$

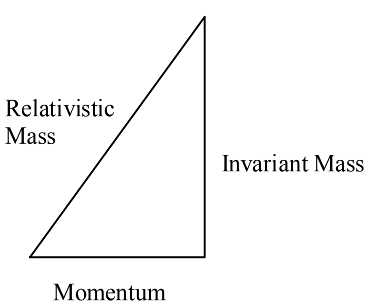
The portion of the object moving via particle decreases the extent of the wave motion and therefore lengthens the wavelength associated with the object. This is a clear distinction from the de Broglie equation that suggests that all of the motion can be expressed as a wave property.

This prediction of E Theory is not immediately obvious and can easily go undetected. At speeds less than 0.1c (those typically defined as non-relativistic) there is no measurable difference between the de Broglie wavelengths and those predicted by E Theory. As speeds approach c, the difference is also small and may be masked by relativistic effects. For example, at a speed of 0.9c, a variance of 1% in the velocity of the object will result in a variance of greater than 5% in the value of the wavelength. Other complications include the interaction of a high energy particle with the crystal lattice surface. It is in the range of “moderate” relativistic speeds that the difference becomes most significant and which provide the greatest opportunity to experimentally differentiate between de Broglie and E Theory wavelengths.

de Broglie vs. E Theory Wavelengths

Velocity	de Broglie Wavelength * (electron)	E Theory Wavelength ** (electron)	V_p	P	W	Percent Difference
0.001 c	$2.426\times10^{-9}\,m$	$2.426\times10^{-9}\,m$	$2.500\times10^{-7}\,c$	0.9990	0.0010	0
0.010 c	$2.426\times10^{-10}\,m$	$2.4326\times10^{-10}\,m$	$2.500\times10^{-5}\,c$	0.9900	0.0100	0
0.100 c	$2.414\times10^{-11}\,m$	$2.481\times10^{-11}\,m$	$2.945\times10^{-3}\,c$	0.9027	0.0973	2.8
0.300 c	$7.714\times10^{-12}\,m$	$8.175\times10^{-12}\,m$	$2.388\times10^{-2}\,c$	0.7171	0.2829	6.0
0.500 c	$4.202\times10^{-12}\,m$	$4.555\times10^{-12}\,m$	$7.179\times10^{-2}\,c$	0.5387	0.4613	8.4
0.707 c	$2.427\times10^{-12}\,m$	$2.655\times10^{-12}\,m$	0.1715 c	0.3537	0.6463	9.4
0.800 c	$1.819\times10^{-12}\,m$	$1.985\times10^{-12}\,m$	0.2504 c	0.2668	0.7332	9.1
0.900 c	$1.175\times10^{-12}\,m$	$1.266\times10^{-12}\,m$	0.3928 c	0.1647	0.8353	7.7
0.995 c	$2.436\times10^{-13}\,m$	$2.492\times10^{-13}\,m$	0.8183 c	0.0275	0.9725	2.3
	* $\lambda = \frac{h}{m_t v}$	** $\lambda = \frac{h}{m_\lambda c}$				

The greatest deviation in E Theory Wavelength from de Broglie Wavelength occurs at a velocity of 0.707c. A relationship between relativistic mass, invariant mass and momentum is already known as follows:



At non-relativistic speeds, invariant mass approaches the value of the relativistic mass. At speeds near c, relativistic mass and momentum approach the same value. Under these conditions, there is little difference between the de Broglie wavelength and the E Theory wavelength. It is only when the magnitude of momentum and invariant mass become close to each other in value that a significant deviation is seen between de Broglie wavelength and E Theory wavelength. The maximum difference occurs exactly when momentum and invariant mass are equal, which occurs at a velocity of $\sqrt{.5}c$ or, $0.707c$.

Chapter Seven

Space

The definition of space has always seemed to be a little "loose" in terms of a rigorous scientific definition. Space is the void between two objects. Space cannot exist without mass being present to define it. According to General Relativity, space and space-time are both curved by the presence of mass. Space is the void as defined by the presence of mass, yet we know that space itself is not truly void of mass. Quantum Mechanics requires there to be an unknown amount of mass associated with any given area of vacuum. What then is space?

In E Theory, space is quantitatively defined utilizing the unity properties of the energime. Distance is defined as $1.02 \times 10^{-34}\ meters / energime$ and space is defined as $1.04 \times 10^{-68}\ m^2 / energime$.

In E Theory, space is created by the decomposition of bound mass. All matter is in a constant state of decomposition into free energimes. The combined effect of this over 14.2 billion years results in a Background Energime Field (BEF) that defines space as we observe it today.

In E Theory, free energimes are emitted as rings that expand from the bound energime source that emitted them. The three spatial dimensions are defined by energime rings as opposed to points in space. This can be visualized using a two dimensional space grid in which all energime rings intercept the space grid as points. Therefore, in E Theory, most all calculations are done utilizing a 2D Space Grid (2DSG) as defined by the energime ring "points" that intersect the space grid.

In this way, free energimes define the 2DSG through a relationship that is equivalent to that of energy. That is:

$$Space = (mass)(b)^2$$

where b is the unity distance of the energime and mass is a measure of the number of energimes present. This is similar in form to the energy of free energimes:

$$Energy = (mass)(c)^2$$

where c is the unity speed of the energime.

Because b and c both represent unity there is an equivalence between space and energy. That is, a given number of free energimes define a space that is equal to their free energy. If correct, this suggests the breakdown of the Uncertainty Principle; at least with regard to the uncertainty in the mass of a vacuum. That is, a given entity of space is defined by a specific mass removing any uncertainty as to the mass associated with that amount of "vacuum." Our interpretation of the Uncertainty Principle therefore requires revision.

Chapter Eight

The Uncertainty Principle

E Theory defines a fixed value of space as being a fixed quantity of mass. This has a direct impact on the Uncertainty Principle. In E Theory, measurements are still subject to the Uncertainty Principle; however, E Theory allows us the opportunity to separate ourselves from measurement and imagine the world through the definitions of the unity values. We are able to adopt a more classical approach, not as a distant observer – this requires observation and therefore measurement – but, rather as a “distant imaginer.” E Theory allows us to imagine events that play out utilizing the absolute definitions of the unity values. For example, we need not measure a quantity of space, we know the exact mass of any imagined quantity of space. E Theory provides the latitude to begin to imagine the universe as seen through the mind of the Creator.

Chapter Nine

Planck's Constant – A Huge Number!

As shown in previous chapters, much of E Theory revolves around looking at our standard conventions in a new way. Momentum was the starting point by suggesting that much more emphasis needed to be placed on the importance of the change in mass that occurs during a collision.

$E = mc^2$ required a subtle shift away from a concept of the inter-conversion of mass to energy toward a truer equivalence between mass and energy as the exact same entity at all times. Space, much like energy, is defined through the unity value of the energime.

A similar result occurs when we look closely at Planck's Constant. Most of us learned at some point in our early introductions to physics that Planck's Constant was a small number that defined the basic quantum of energy for a given natural frequency. This quantity of course was the photon. If this small constant did not exist, Quantum Theory would disappear and a continuum of energy would be possible at any frequency. Of course, this does not occur and Planck's Constant subsequently provided the solution to the ultraviolet catastrophe with beautiful agreement to observation.

However, small vs. large is a completely relative term. E Theory removes the need for units and reduces all measurement to counting the number of energimes. In this scenario, Planck's Constant becomes a huge number with significance on a universal scale. The beauty of this should not be lost. The entity defining the basic quantum in the micro-world is the same constant that defines the size of our visible universe! How?

$$mc = \frac{h}{\lambda}$$

This equation defines the momentum of a photon and also serves to define its wavelength.

When analyzed with the energime, we are able to make the statement that the momentum of a single energime is unity. That is, at a mass of $2.19 \times 10^{-73} kg$ the wavelength of an energime will be $1.01 \times 10^{31} m$. Since the momentum of the energime is unity:

$$1 = \frac{h}{1.01 \times 10^{31} meters}$$

Therefore, h can be expressed as $1.01 \times 10^{31} m$, or – in other words – h is equivalent to the wavelength of the energime. Because the energime is the smallest quantum in the physical world, our visible universe would have no purpose in being any larger in any given direction than that needed to accommodate the wavelength of the energime. Utilizing a particle in a box type scenario, the universe need be no bigger than the wavelength of the energime. Since all other matter and energy is defined through multiples of the energime, all matter fits perfectly into a universe with a magnitude of $10^{31} m$. Realizing that the unity distance of the energime is $1.01 \times 10^{-34} m$, leaves the following value of h in energimes:

$$h = radius_{universe} = 1.01 \times 10^{31} m = 9.90 \times 10^{64} energimes$$

While this dimensional analysis takes some getting use to, keep in mind that h serves only as a proportionality constant in the relationship mc = h/lambda. If the unity values of the energime are correct – and the verdict is still out on this – then the momentum of a single energime is 1 and it is therefore not only legitimate, but in this form of the equation, mandatory that h be expressed in units of meters.

Extending this to the next level, the total number of energimes in the universe is therefore in the magnitude of:

$$\pi\left(10^{65}\right)^2 = \pi 10^{130} energimes_{universal}$$

The linear dimension is not cubed, realizing that the free energimes take the form of a ring that continuously expands outward from its emitting source. Therefore an additional – 3^{rd} – dimension is defined by the ring property of the free energime allowing the total number of energimes in the universe to define the 2DSG. That is not to say that all free energimes align with their rings in the same orientation, but it does take advantage of the ability to manipulate the energime field in any fashion we wish for the purposes of calculations as long as the overall mass and momentum of the universe remain constant.

This is what allows for the 2DSG, defined by energimes in two dimensions with an additional – 3^{rd} – dimension defined by the energime ring. This is not a totally radical idea. Recent theories developed from String Theory have suggested an illusionary third dimension defined by strings of various “thicknesses” in the outer edge of space. In such theory’s gravity does not exist in the two-dimensional framework. This is where E Theory differs, it is through the 2DSG that all forces play out through the singular backdrop of the BEF.

Chapter Ten

Forces

There are perhaps three distinct, yet related, forms of force. First is the contact force. In E Theory, contact forces result in the transfer of energimes from one entity to another resulting in a change in the orientation of the component energimes. Contact forces always result in a change in the object's mass and a change in the orientation of the energimes such that the object's motion is altered along the axis-of-motion.

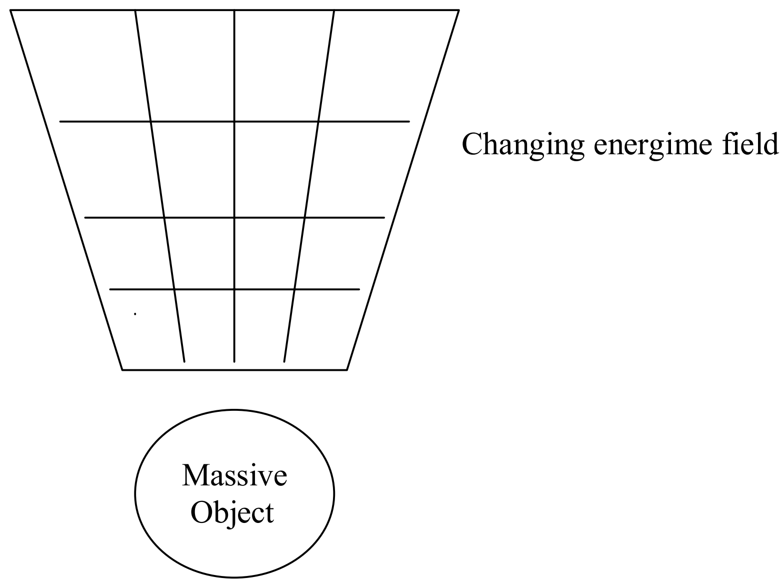
A second type of force is that caused by a field. In E Theory, force fields are due to a change in the density of free energimes as compared to the BEF. Force fields appear to change the distribution of an object's mass between rest mass and relativistic energy resulting in a change in the orientation of the energimes along an axis-of-motion. In actuality, there is little difference between a contact force and a field force resulting in the E Theory version of the Equivalence Principle. This discussion will be further explored in Chapter Seventeen.

A third form of force represents the forces and/or interactions that determine the composition of matter. The weak nuclear force is such a force and represents the fourth known force. E Theory suggests that other such forces are present but beyond our ability to detect at this time. Remember that physical composition – at its most basic level – is the result of the combination of energimes. Therefore understanding the composition of matter will require the ability to probe at a level near $2.19 \times 10^{-73} kg$. As such, E Theory predicts the continued identification of new particles and suggests that at some point internal structure will be found within the electron. The particle zoo of "fundamental" particles already identified is only the beginning and is far from fundamental.

Chapter Eleven

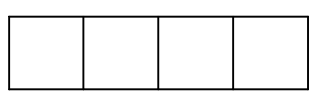
Gravity

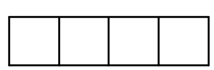
E Theory states that all bound matter is in the process of decomposing to free energimes. This suggests that the BEF is distorted near a massive object that alters the local concentration of free energimes; or, the Local Energime Field (LEF). This results in a condition that is essentially equivalent to the curvature of space and space-time in General Relativity. However, E Theory does not recognize time as a fundamental dimension and therefore does not recognize four-dimensional space-time as a fundamental expression of nature. In E Theory, gravity plays out through the 2DSG. Perhaps better stated, E Theory replaces the contribution of time in General Relativity by the contribution of the energime ring. The passage of time is equivalent to the magnitude of the energime ring. This allows us to analyze the effects of gravity utilizing the 2DSG. This is described in more detail in Chapter Nineteen.



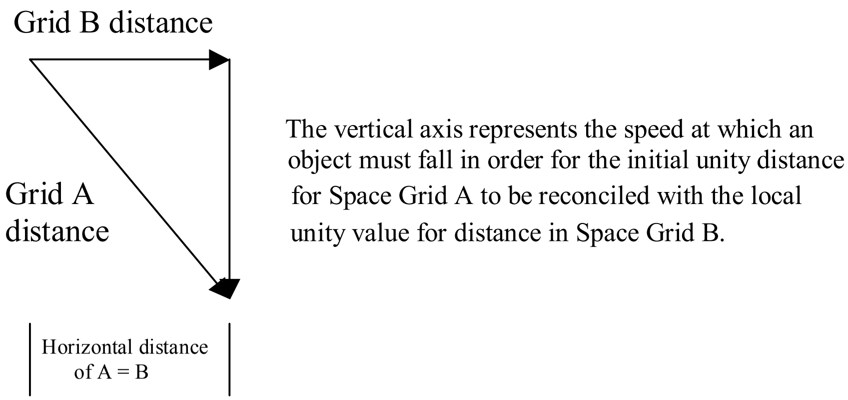
As the concentration of energimes increases, the unity value of distance, speed and mass decreases relative to the BEF. An object falls through a changing energime field in order to establish unity values that are consistent with the local conditions.

This can be diagramed by considering an object originating in Space Grid A that is transposed onto a Space Grid B with different unity values.

Space Grid A 

Space Grid B 

If we look at the unity value for distance, we have two distinctly different lengths that need to be reconciled.



In E Theory, gravity is the result of changing unity values caused by the increased energime concentration of a gravitating mass. While local observers in both Grid A and Grid B would continue to define the unity distance to be $1.02 \times 10^{-34} m$, the unity distance in Grid B relative to Grid A is less. Because the energime is manifested through three dimensions, it follows that the unity value for speed and mass must also decrease proportionally in Grid B relative to Grid A.

The impact of a gravitating mass at a given distance can be quantitatively expressed by:

$$LEF = \frac{BEF}{BEF + (a)\left({}^{Mass}\!/\!_{Distance}\right)}$$

Where *LEF* represents the value of the Local Energime Field relative to the BEF and (*a*) represents a proportionality constant that relates mass/distance to the BEF. The BEF is equal to the number of energimes per unit distance, which by definition is equal to unity.

Therefore,

$$LEF = \frac{1}{1 + (a)\left(Mass / Distance\right)}$$

The value of (a) can be determined by realizing that only a portion of the total mass of an object will have been emitted as free energimes. The entire mass will decompose over the period of one full wavelength of the energime. Therefore the concentration of free energimes emitted by the mass at any given radius from the mass will be determined by the $mass/\lambda_{energime}$; however, we have already shown that the energime wavelength is equal to (h).

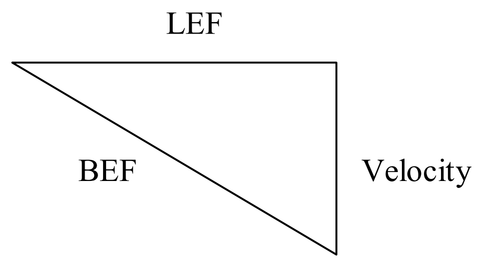
With regard to the distance, at any given radius, the density of the free energime mass emitted from the gravitating source will be spread out across a circle on the 2DSG and therefore its density will be decreased by a factor of 2π of the distance of the object from the gravitating mass. When combining the adjustments for both the mass and the distance, the resulting value of (a) is:

$$a = \frac{1}{2\pi h}$$

and

$$LEF = \frac{1}{1 + \left(\frac{1}{2\pi h}\right)\left(\frac{Mass}{Distance}\right)}$$

The free fall velocity of an object in a gravitational field is related to the BEF and the LEF through a right triangle in exactly the same way as Grid A and Grid B were related.



Solving for the free fall velocity yields:

$$v = \sqrt{1 - \left[\frac{1}{1 + M/_{2\pi hD}} \right]^2}$$

See Appendices A – C for more information on gravitational velocities.

Chapter Twelve

Objects Falling from Less than Infinity

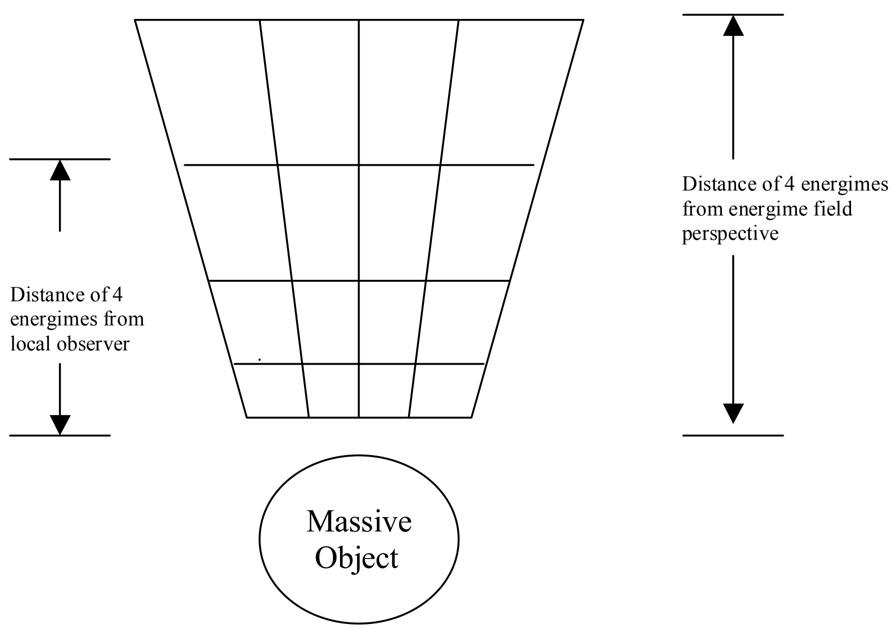
In Chapter Eleven, a relationship was developed for determining the free fall velocity of any object falling from infinity. In this chapter we will explore what happens to objects not starting at infinity. At first glance, we would anticipate that the relationship should be the same, just making an adjustment for the value of the LEF from where the object begins its free-fall.

This would suggest the following relationship:

$$LEF = \frac{1 + \left(\frac{1}{2\pi h}\right)\left(\frac{M}{D_i}\right)}{1 + \left(\frac{1}{2\pi h}\right)\left(\frac{M}{D_f}\right)}$$

Where D_i and D_f represent the initial distance from where the free fall begins to the final distance at which the velocity is being determined. In other words, this provides a local field strength at the final distance relative to the field strength at the initial location. However, an additional adjustment is required. Free energimes are emitted at a constant rate per unit area on the 2DSG and move outward in a straight path. These free energimes define space and are therefore not subject to local variations; rather, they define the local variations by their concentration.

The problem comes in determining the initial distance from the perspective of the observer at the final distance. We have accounted for the horizontal change in the unity value, but this value also "stretches" vertically as you move away from the local observer.



The local observer uses a local definition of distance and is unaware of the additional "stretch." This results in an additional factor of LEF that needs to be added to the equation as follows:

$$LEF = \frac{1 + (LEF)\left(\frac{1}{2\pi h}\right)\left(\frac{M}{D_i}\right)}{1 + \left(\frac{1}{2\pi h}\right)\left(\frac{M}{D_f}\right)}$$

Solving for LEF provides:

$$LEF = \frac{1}{1 + \left(\frac{M}{2\pi h}\right)\left(\frac{1}{D_f} - \frac{1}{D_i}\right)}$$

Therefore, the velocity of any object in free-fall is determined by:

$$v = \sqrt{1 - \left[\frac{1}{1 + \left(\frac{M}{2\pi h}\right)\left(\frac{1}{D_f} - \frac{1}{D_i}\right)}\right]^2}$$

Chapter Thirteen

The Relationship Between G and h

As derived in the previous chapter, the following equation provides the velocity for any object in free fall.

$$v = \sqrt{1 - \left[\frac{1}{1 + \left(\frac{M}{2\pi h} \right) \left(\frac{1}{D_f} - \frac{1}{D_i} \right)} \right]^2}$$

This equation also points the way toward a significant realization regarding the relationship between the Gravitational Constant and Planck's Constant. In analyzing the units, it cannot go unnoticed that the Gravitational Constant has the units of m/kg after adjusting for the unity value of c squared. These are not only the correct units, but in fact equal in magnitude to the calculated proportionality constant of 1/2pih. We now have a quantifiable relationship between the Gravitational Constant and Planck's Constant. That is,

$$G = \frac{1}{2\pi h}$$

This is significant, because it does not rely on the arbitrary Planck Unit definition that the values of G, h and c are all unity. It also provides another graphic representation of the meaning of these constants. We have already suggested that h represents the ultimate radius of our visible universe. If so, G becomes the inverse of the circumference of the ultimate universe. When one realizes that the ultimate energime count at the outer edge of the universe is 2pih, it follows that G becomes the proportionality constant required to define the BEF as unity.

Therefore, the free fall velocity can also be stated as:

$$v = \sqrt{1 - \left[\frac{1}{1 + G\left(\frac{M}{D_f} - \frac{M}{D_i} \right)} \right]^2}$$

Chapter Fourteen

Planck Values

Planck values are determined through a system of measurement that defines the universal constants of G, c and h to be unity. These are referred to as "natural units" and often claimed to have universal appeal in that any intelligent life anywhere in the universe would arrive at the same values for the "natural" values of entities such as mass, length, time, density and others.

However, Planck values require that the decision be made to assign unity to the universal constants. E Theory makes the claim that each of these values has its own inherent unitless number that is equivalent to the number of energimes associated with the entity. As such, not only can the Planck values be expressed in unitless numbers, but any and all measurements reduce to the pure counting of energimes.

In E Theory, it is completely arbitrary to assign unity values to anything. The true fundamental values are apparent to intelligent life anywhere in the universe without the need to accept an arbitrary definition of unity. That is, unity cannot be assigned; it is exactly what it is. G, c and h all have a natural value equal to the number of energimes associated with them.

In E Theory, all motion is composed of the orientation of component energimes. Therefore, anywhere in the universe the speed of the energime to the local observer would be clearly obvious as c. This observation serves to definitively define the unity speed of the energime as c.

E Theory recognizes only three fundamental manifestations of the energime: speed, mass and distance. As such, the unity speed is c. We now need to find a way to determine unity values for mass and distance. We are not allowed to assume unity as a value for G and h and therefore must adopt a more rigorous strategy.

We know from E Theory that $G = \frac{1}{2\pi h}$. We therefore can calculate the unity value of distance to be $1.02 \times 10^{-34}\, m$. This differs from the accepted Planck distance by a factor of 2π and is a number that is so incredible small that its variance from the accepted Planck distance has almost no significant meaning. However, this is not the case for the unity value of mass. The Planck Mass has always been somewhat mystifying due to is large value. Other Planck values such as distance and time, can be seen as fundamental values of which all other measurement of distance and time are multiples of the Planck Values. This is not the case for Planck Mass which is – for example – 10^{19} times larger than that of the proton.

Planck Mass has taken on other significance as the "boundary" between Quantum Theory and General Relativity. However, its value is confusing only because of the assumption that h = unity. E Theory defines h to be the ultimate radius of the visible universe and has already established its value at $9.90 \times 10^{64}\, energimes$.

E Theory has a radically different approach to the fundamental or the "natural" unity of mass. It is an extension of the concept that all fields originate from a disturbance to the BEF. That is, space serves as the only field necessary to define and explain all force fields.

In E Theory, the difference between gravity and other forces is simply in the entity being emitted by the bound mass. Gravity is due to the decomposition of bound mass into free energimes – or space.

However, if a larger mass were emitted it would have a smaller wavelength making its impact more concentrated. Of course, if this is all that occurred, bound mass would decompose significantly faster than proposed by E Theory. Therefore, force fields other than gravity result from the emission of a larger number of free energimes (space) followed by the recombination of the energimes as bound mass (matter). The result is both a concentration of space followed by a partial void of space resulting in a field capable of producing both attractive and repulsive force. This provides a framework for not only calculating the unity value of mass, but for understanding the underlying fabric of the electrostatic force and ultimately the electromagnetic field.

Chapter Fifteen

Unity Values, the Electrostatic Field and the Mass of the Energime

Quantitatively, the equation for the free fall velocity of an object in gravity can be modified to represent other forces by simply changing the value of the constant:

$$v = \sqrt{1 - \left[\frac{1}{1 + K\left(\frac{M}{D_f} - \frac{M}{D_i} \right)} \right]^2}$$

Where K represents a proportionality constant for the given force field and would be equal to:

$$K = \frac{1}{2\pi\lambda}$$

Where λ is the wavelength of the force transmitting particle. As the mass of the particle increases, so does the strength of the force that it propagates.

However, if a more massive force transmitting particle is all that is required to change force, there would be an infinite number of forces.

Therefore, there must be a way of determining “stable” conditions that produce “stable” forces. These stable forces would be transmitted by stable masses that would dominate the composition of the universe. Thus far we have the free energime that defines space. The electrostatic force should therefore be associated with the stable electron and there is the strong nuclear force that acts upon the stable proton.

Gravity is the weakest of all forces and has been shown to be the result of the decomposition of bound mass to free space. This is the lower limit on force and its force transmitting particle is the energime – the smallest particle that defines the ultimate radius of the visible universe. We have already shown that K = G for the gravitational field.

It turns out the K = Coulomb’s Constant of $9 \times 10^{9} \frac{kg \cdot m^{3}}{s^{2} \cdot C^{2}}$ for the electrostatic field as long as you equate $9.1 \times 10^{-31} kg = e^{-} = 1.6 \times 10^{-19} C$. This results in a constant that is 4.2×10^{42} times larger than G and suggests a mass for the energime as follows:

$$(G)(4\pi\varepsilon_{\circ})\frac{(Mass_{electron})^{2}}{(Charge_{electron})^{2}} = \frac{Mass_{energime}}{Mass_{electron}}$$

Therefore,

$Mass_{energime} =$

$$\frac{\left(6.67 \times 10^{-11} \frac{N \cdot m^{2}}{kg^{2}}\right)(4\pi)\left(8.85 \times 10^{-12} \frac{C^{2}}{N \cdot m^{2}}\right)\left(9.11 \times 10^{-31} kg\right)^{3}}{\left(1.6 \times 10^{-19} C\right)^{2}}$$

Yielding,

$$Mass_{energime} = 2.19 \times 10^{-73}\ kg$$

This mass represents the fundamental unit of mass with all other masses being multiples of the energime mass. That is not to say that the Planck Mass has no significance, but rather that it does not represent the "natural" unit of mass. Rather, the Planck Mass represents the largest allowable energy of a single photon. The energime mass represents the lower limit on the energy of a photon.

The unity value for the mass of the energime is somewhat different from the values of unity distance and unity speed. The latter two can be derived completely from known physical constants and can be considered to be absolute values within the limits of the constants that they are derived from. The unity value of mass is based on the equivalence between the electron mass and its charge. E Theory requires the electron to be a composite mass made up at some level through the combination of energimes and; therefore, the decomposition of the electron to free space may not be complete. Remember that E Theory does not treat the electron as a fundamental particle. It would be naïve to assume that no other physical structure existed between the electron itself and its component energimes. Therefore, the unity mass of the energime should be viewed as the upper limit on the fundamental mass. It serves as a good approximation as opposed to an absolute value.

Now, back to the analysis of the electrostatic force. What makes the electron a stable force carrying particle? A logical follow-up question becomes; is there an upper limit to a force that can propagate across the universe? The answer – yes.

The force transmitting particle must be able to decompose to free energimes and recombine within one wavelength. In order to do so, it must have access to – or be able to "reach" – sufficient free energimes to recombine within its wavelength. Therefore, within the 2DSG, the particle would have a reach of λ^2. However, not all the energimes within this region are available – that is, a portion of the free energime rings cutting through the 2DSG are responsible for defining matter along the 3rd dimension. The percentage of unavailable energimes would be equal to the percentage of total free energime decomposition along a dimension over the life of the current universe (14.2 billion years as suggested by E Theory).

This argument is developed in Chapter Thirty-Four; however, for the focus of this chapter, we shall state that 5.32×10^{-5} of all bound matter has decomposed to free energimes defining the current state of the 2DSG. Along one dimension, this equates to a ratio of ${}^{1}\!/_{137}$.
Therefore the free energimes available over the wavelength of the force transmitting particle becomes:

$$\frac{\lambda^2}{137}$$

This value must be equal to the mass of the force transmitting particle providing the following:

$$Mass = \frac{\lambda^2}{137}$$

The solution of this equation provides a mass of $9.11 \times 10^{-31}\, kg$, suggesting that the electron is a stable force transmitting particle in the present universe.

The transition from electrostatic force to magnetic forces requires only an application of Relativity Theory thus providing a clean transition from the electrostatic force described by E Theory to the full electromagnetic field.

Chapter Sixteen

Strong Nuclear Force

Carrying the arguments from Chapter Fifteen forward, a question can be raised as to whether there are other stable forces predicted by E Theory. A force larger than the electrostatic force would be so strong that it would be unable to propagate throughout the universe. Rather, it would be limited by its wavelength and would need to recombine from the very same energimes that it had decomposed from. Could such a force be stable? First, no matter how strong you made the force a portion of it would always leak out representing the portion of the wave that could be recombined from free energimes. The only way around this would be if the force operated within the average footprint of the electrostatic force. In this way, the electrostatic force would utilize all available free energimes leaving a stronger force no option other than to establish its own space grid and then recombine entirely from its own decomposed energimes.

This force would not be subject to the 137 factor in that its created space grid along with all of its decomposed energimes would be available for its recombination. The force would result from a concentrated LEF due to the decomposition of the mass and a resulting concentration of free energimes within its own created 2DSG that is 137 times greater than the BEF. This force would not be made up of a single entity but rather through the combination of particles. These basic particles would need to satisfy the condition that they were able to self-regenerate completely from their own decomposed energimes within a single wavelength. This would result in a significant force that would be limited in range to the wavelength of the total mass of a photon with an equivalent mass. This force, relative to the BEF would always be attractive, but within its wavelength would be relatively constant and not decrease with distance by the typical inverse-square rate associated with gravity and electromagnetic forces. Qualitatively, the above description reflects the properties of the strong nuclear force.

A quantitative analysis yields the following.

The wavelength of a Self-Regenerating Mass (SRM) is determined by:

$$\lambda_{SRM} = \frac{h}{mc}$$

However, by definition of a SRM,
$m = \lambda^2$

Therefore,

$$\lambda_{SRM} = \left(h/c\right)^{1/3} = \left[\left(\frac{2.21\times 10^{-42}\, kg\cdot m}{2.19\times 10^{-73}\, kg}\right)\left(1.02\times 10^{-34}\, m\right)^2\right]^{1/3}$$
$$= 4.72\times 10^{-13}\, m$$

The average footprint of the electron is:

$$\frac{\lambda^2_{electron}}{2} =$$

$$\frac{(137)(electron_{mass})}{2} = \frac{(137)\left(9.11\times 10^{-31}\, kg\right)\left(1.02\times 10^{-34}\, m\right)^2}{(2)\left(2.19\times 10^{-73}\, kg\right)}$$

$$= 2.96\times 10^{-24}\, m^2$$

The proton must therefore decompose into sufficient free energimes to account for a force that is 137 times that of the electromagnetic force. Several factors must be taken into account for this to occur. First, the electromagnetic force completely consumes all available energimes leaving a complete void. The proton must therefore establish its own 2DSG (requiring an additional mass by a factor of 1/137) and then increase its concentration by a factor of 137 thereby establishing its unique LEF. Because the electron and the SRM are defined by different wavelengths, an adjustment must also be made to ensure that the full reach of the LEF extends across the average footprint of the electron. Quantitatively, this can be expressed as follows:

$$\left(1+\frac{1}{137}\right)(137)(electron_{mass})\left[\frac{\lambda^2_{electron}}{(2)\left(\lambda^2_{SRM}\right)}\right]$$

$$=(138)\left(9.11\times10^{-31}\,kg\right)\left[\frac{2.96\times10^{-24}\,m^2}{2.23\times10^{-25}\,m^2}\right]=1.67\times10^{-27}\,kg$$

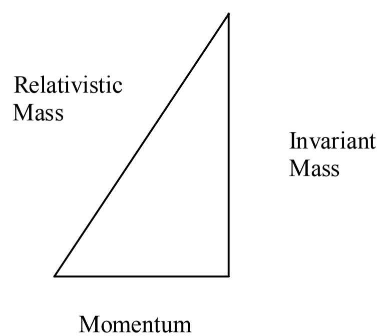
The mass of the E Theory proton is within 8 parts per 10,000 in agreement with the 2002 CODATA value established for the proton. E Theory therefore predicts the mass of the proton as a stable particle responsible for a strong attractive force that is limited in range to within a single wavelength of a photon having a mass equal to the composite mass of the proton. This is important for several reasons. First, it completes the E Theory model of fundamental forces by demonstrating that the only field required to propagate force is space. Second, it confirms the assumption that an equivalence (if not absolute, at least within several significant figures) exists between the mass and charge of the electron.

Therefore, E Theory suggests that the dominant force transmitting structures of the universe are the energime ($2.19\times10^{-73}\,kg$), the electron ($9.11 \times 10^{-31} kg$) and the proton ($1.67 \times 10^{-27} kg$). The stability of the neutron goes beyond the scope of this publication requiring an understanding of the structure of matter. The neutron is not a force propagating particle and therefore cannot be defined through the process used for the energime, electron and proton. Understanding the stable mass of the neutron will require an understanding of the interactions (weak nuclear "force") required to form matter out of other matter (the radioactive decomposition of a neutron into a proton and high speed electron) and ultimately out of its component energimes. E Theory treats this as a separate process and, as covered in earlier chapters, suggests that the weak nuclear "force" represents only one of perhaps many such interactions required to explain the composition of matter from its fundamental building blocks of energimes with masses of $2.19 \times 10^{-73} kg$. Therefore, as with many good theories, as current issues are resolved new questions emerge.

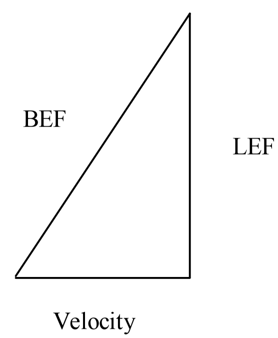
Chapter Seventeen

Equivalence

Before we complete any discussion on forces we must return to gravity and explore both the Equivalence Principle and General Relativity. In E Theory, the equivalence principle is clearly demonstrated by comparing an object subjected to a contact force to an object in a gravitational field. Both of these conditions can be illustrated as right triangles as follows:



Dividing each of the above quantities by the total relativistic mass of the object provides the following:



A force field and a force-by-contact are different manifestations of the same thing. When a collision occurs resulting in the transfer of mass, the resulting object begins to move and interacts differently with its local energime field. We had already discussed relativistic effects as being caused by a portion of the objects at-rest motion being allocated toward the overall motion along an axis-of-motion. However, what was not discussed in Chapter Three was how the colliding object obtained its initial motion.

The answer is that the object's energy initially came from a force field. The force field came first with the result being motion in a field-free space. In this sense, kinetic energy can be thought of as the "stored" or potential energy of a field just as easily as we consider – by convention – that the gravitational energy is the potential energy of a system that was in motion.

Why is this important? Because if a force field and a contact force are equivalent; then, an object held motionless experiencing a field, is equivalent to an object subject to a contact force in a field free environment. Likewise, an object in free-fall – unaware of any force field – will view its local surroundings as if they are in a force-free frame of reference moving at a constant speed.

This is Einstein's Equivalence Principle stated in terms of E Theory.

A second consequence of Equivalence is that an object in motion will interact with space in an equivalent fashion to an object that has gained its speed by falling through a field. That is, if an object gains a velocity of X by falling through a gravitational field from point A to point B, then an object moving with a velocity X in a field-free environment will interact with space just as Point A would view Point B. Therefore, an increase in the mass of an object – via collision – results in an induced change in the energime field such that the energime field is in complete agreement with the local definition of the unity values. This can be viewed as an energime field moving through an object. The field itself must allocate a portion of its “at-rest” motion to “move” through the object and therefore undergoes a contraction identical to the contraction of the mass moving through the field.

When an object is placed in a field – where the energime field actually does change – the result is an induced change in the mass of the object so that it obtains a motion along the orientation of the force field. An observer does not see an increase in mass; however, the object does incur an actual net gain of energimes. The mass does not appear to change because in the concentrated energime field the unity mass of the energime must also decrease along with the decreased unity distance. Therefore, the object has more energimes but at a reduced mass, resulting in a constant mass to the observer.

This is the E Theory version of Equivalence. An object in a field incurs an increase in energimes creating a motion along the line of the force. An object that increases in energimes due to a contact force, incurs a change in its interaction with the energime field such that the field appears to be more concentrated. These two situations are equivalent and consistent with Einstein’s Principle of Equivalence.

Chapter Eighteen

The Three Postulates of Motion

The Introduction of this book provided five basic properties of E Theory. We are now ready to provide three basic Postulates of Motion:

1. A changing energime field induces motion; and, motion induces a changing energime field

2. Motion occurs through an outwardly expanding energime ring

3. Momentum is always in the direction of a changing energime field gradient which defines the axis-of-motion

Chapter Nineteen

A Role for Time

E Theory seems to diminish the role of time by stripping it of its status as a fundamental dimension. Yet, time plays such a critical aspect in our lives and in our understanding of the physical world. This appears to create a disconnect; although, one that is not entirely unexpected. After all, time has always been elusive. Entire journals and books have been devoted to “understanding” time and its various implications throughout the ages. Up until this point, time has been defined in E Theory as the ratio of distance/speed. While technically correct, this seems to be a rather hollow explanation for such a “real” experience.

While on the subject of weaker aspects of E Theory, we may as well visit the concept of the energime ring. This is a key aspect of E Theory yet – perhaps for many – a difficult concept to take seriously. The energime ring works perfectly as a theoretical application in describing the magnitude of a gravitational force, but is it really a reflection of reality?

It turns out that both of these questions are fundamental linked to each other. A deeper analysis of time also results in a quantitative description of the energime ring. Put simply, time defines the energime ring. As time goes by, the concentration of the BEF increases as more free energimes are emitted. This change in the BEF must induce motion (Postulate 1). However, this motion cannot have any momentum in that we experience no specific changing energime field gradient (Postulate 3). That is, as additional free energimes are emitted the BEF changes uniformly within the entire 2DSG. If you will, the energime field gradient in this case lies along the axis of time which is not recognized in E Theory. Even if one wished to define an axis of time, we would fall through time at the rate of time and therefore the dimension is entirely unrecognizable to us. Therefore, the only solution to motion without momentum is through the formation of an energime ring that expands outwardly in all directions along the 2DSG (Postulate 2). As such, the passage of time is manifested through the creation and expansion of energime rings.

E Theory has integrated the flow of time within one of the three spatial dimensions. The flow of time is equivalent to a changing BEF.

Therefore, time defines the energime ring and subsequently an entire spatial dimension! Time is real, but rather than assigning it a unique dimension, E Theory has embedded time within an existing spatial dimension. The 3rd dimension is defined by the energime ring, or by a different name – time. Time, while not a fundamental dimension, is a beautiful thing.

Chapter Twenty

The Relationship Between E Theory and Newtonian Gravity

General Relativity and Newtonian gravity are in complete agreement with regard to the effects of the Equivalence Principle. However, the theories differ in their treatment of the curvature of space itself. Newtonian gravity utilized a flat space while General Relativity plays out within the curvature of space.

This begs the question, what is the relationship between E Theory and Newtonian gravity? It has already been shown (Appendix C) that both theories seem to provide the same gravitation effects on a free falling body; however, is there a more rigorous mathematical relationship that can be developed linking the two concepts? The answer is yes, but – interestingly – only through the application of an Integrated Wave-Particle (IWP). A changing energime field induces motion. We have already shown that the energime ring itself is the result of a changing energime field through the passage of time. This same concept must be applicable to the gravitational effects caused within the 2DSG by local fluctuations in the energime field. However, in this case, a clear energime field gradient is established and the motion will result with a momentum in the direction of the energime field gradient.

We know that when this occurs, the actual mass of an object falling through a gravitational field remains constant. In classical physics we would simply state that the total energy content of the objects remains constant as the gravitational potential energy is converted to kinetic energy as the object falls. However, E Theory requires that motion results from the addition of mass with a net velocity along the axis-of-motion, or in this case the energime field gradient. (This would be the kinetic energy portion.) Since the object experiences no mass gain, E Theory must also explain some type of mass loss to offset the mass gain required to generate the motion. (This would be the potential energy portion.) We also know that the unity values – by definition – must all change together. An increase in the concentration of free energimes results in a change in length, speed and mass. The mass portion decreases because we interact only with the portion of the energime ring that intercepts the 2DSG. Therefore an energime ring from an object falling in a gravitational field must expand just enough to provide a mass (potential energy) loss that balances the mass (kinetic energy) gain necessary to generate its motion.

If this is the case, what happens to an energime ring as it expands within a changing energime field gradient? The ring must expand from some initial value, representing its at rest properties, to the point on the 2DSG representing a more concentrated LEF. The distance it must travel should in some way be related to the extent to which the ring expands. However, keep in mind that this is a dynamic process. Any rest object with which this would be compared to is also undergoing an energime ring expansion due to the passage of time. It is therefore not the distance traveled but rather the distance traveled over time (or velocity) added to its initial size that should be proportional to some constant value for the energime ring of an object at rest within the BEF.

This indeed can be shown; however, it is not the velocity of the overall object, but rather the particle velocity of the object that is related to the LEF. This implies that an object moves through space partially as a particle (whose energime ring must expand) and partially as a wave (which would transport the object without the physical transport – or expansion – of its energime ring). This development provides significant support to the argument for the existence of IWPs. The portion of the energime ring that expands is for that portion of the motion that is truly particle in nature. The wave phenomenon moves the object from point to point without any requirement of expanding its energime ring. This works perfectly for objects with low velocities (x values near 0.5).

$$LEF = \frac{a}{a + V_{particle}}$$

Where the value of a = x.

As the velocity of the particle increases an additional adjustment must be made to take into account the “stretching” effect of an increasing LEF. Quantitatively, this will be equal to:

$$\frac{1}{LEF} = \frac{x}{1 - x}$$

Resulting in a relationship between the LEF and the Particle Velocity at any speed as follows:

$$LEF = \frac{x}{x + \frac{x}{1 - x}\left(V_p\right)} = \frac{1}{1 + \frac{V_p}{1 - x}}$$

However, we also know that:

$$LEF = \frac{1}{1 + G\left(\frac{M}{D}\right)}$$

Therefore,

$$\frac{1}{1 + G\left(\frac{M}{D}\right)} = LEF = \frac{1}{1 + \frac{V_p}{1 - x}}$$

Suggesting the following relationship,

$$\frac{V_p}{1-x} = G\left(\frac{M}{D}\right)$$

Putting this in the more familiar terms of the total velocity as opposed to particle velocity can be accomplished by realizing that

$$V_p = (xV_T)^2$$

Resulting in

$$\frac{(xV_T)^2}{1-x} = G\left(\frac{M}{D}\right)$$

Further realizing that

$$\frac{1}{LEF} = \frac{x}{1-x}$$

Yields,

$$\frac{x}{LEF}(V_T)^2 = G\left(\frac{M}{D}\right)$$

We know that for an object that accelerates from rest that

$$V^2 = 2ad$$

And by setting d = D suggests that

$$\frac{2x}{LEF}(a) = G\left(\frac{M}{D^2}\right)$$

Realizing that at low speeds $x = 0.5$ and $LEF = 1.0$ allows us to multiply both sides by a given mass to yield

$$F = G\frac{M_1 M_2}{D^2}$$

E Theory – just as General Relativity – is in exact agreement with Newtonian gravity for free falling objects in a gravitational field. It has also previously been shown to be in agreement with the Equivalence Principle. The question then becomes, how does E Theory compare to the other conditions and requirements of General Relativity?

Chapter Twenty-One

A Quick Review of Gravity

Before putting E Theory to the test, a quick review of gravitation theories may be in order. Newtonian gravity is clearly a classical theory of gravity. Originally, the concept of an “action” was used to explain why masses placed at a distance would “act” on each other through a force. One of the weaknesses of Newtonian gravity – acknowledged by Newton himself – was that this “action” occurred over any distance suggesting the existence of a faster than light “action-at-a-distance” between two distantly placed masses. With time the concept of “action” was replaced with the concept of a “field” which better helped in visualizing the nature of gravitational force. However, one of the unanswered questions was whether or not light itself would be influenced by this gravitational field. The development of a corpuscular nature of light suggested that gravity should impact light.

The challenge then was two-fold: Is the path of light indeed influenced by gravity? And, to what extent is its “straight-line” path altered in a gravitational field?

Newtonian gravity was straight forward, if light was impacted, it would be influenced in exactly the same way as other matter moving in the gravitational field. Newtonian gravity provided only one possible outcome for the effect of gravity on light.

Einstein’s revelation of the Equivalence Principle provided the opportunity to examine gravity in a different way. Simply put, an object in free fall in a gravitational field should experience (within its immediate surroundings) an inertial frame of reference in which all the laws of physics (for an inertial frame) should hold up. Therefore, light is observed by this free fall individual to move in a straight line. Yet, a distant observer would need to see this path as having curved to allow for the effects of free fall. Since light travels at a very fast speed, this curvature would be very small, but none-the-less required. Therefore, it is perhaps not a “force” but rather a small curvature of space-time and space itself that allow for an observed bending of light in a gravitational field. In most modern gravitational theories, there are two components: the bending of space-time (this contribution is consistent with the Equivalence Principle and equal to the calculated gravitational effects of Newtonian gravity); and, a second contribution due to the actual bending of space itself.

Chapter Twenty-Two

The Traditional Tests of Gravitational Theories

The predictions of E Theory are in agreement with the predictions of General Relativity. E Theory differs from General Relativity by suggesting a different fundamental "fabric" for the nature of space and the motion of matter through that space. However, on some level, an equivalence (or near equivalence) exists between these two theories allowing E Theory to be in agreement with General Relativity for non-relativistic circumstances. However, E Theory and General Relativity begin to separate at relativistic speeds and result in significantly different interpretations of Black Holes.

The Slowing of Time in a Gravitational Field

The slowing of time in a gravitational field is due to the gravitational redshift. The magnitude of the effect is identical to that predicted by the Equivalence Principle. In E Theory, the gravitational redshift is caused by the change in the unity values near a gravitating mass. Quantitatively, it is equal to the LEF. We know from General Relativity that at non-relativistic speeds the gravitational effect on wavelength can be expressed as:

$$\frac{\lambda}{\lambda_o} = 1 - \frac{GM}{c^2 R}$$

Where, λ is the original wavelength, λ_o is the shifted wavelength, G is the gravitational constant, M is the mass of the gravitating object and R is the distance from the mass for which the wavelength is being measured.

At non-relativistic speeds the above value approaches the value of the LEF as determined by:

$$LEF = \frac{1}{1 + \frac{GM}{c^2 R}}$$

However, this is more a test of the Equivalence Principle and not a direct test of any particular theory of gravity. Gravitational theories require and additional factor – generally described as an additional bending of space itself. In General Relativity, the contribution due to the Equivalence Principle is identical to an additional contribution due to the bending of space. There are; however, other theories of gravity – most notably the Brans-Dicke theory – that suggest slightly different effects from the bending of space. Therefore, tests such as the bending of light near a massive object and the time delay of light as it grazes a large mass are better tests of specific gravitational theories.

The Time Delay of a Light Pulse Grazing a Gravitating Mass

The time delay of a light pulse as it grazes a large mass is also a required outcome of E Theory. E Theory is in agreement with General Relativity; however, E theory requires that the contribution of the Equivalence Principle be exactly ½ of the total time delay. In this sense, E Theory is more rigorous than General Relativity. In E Theory, gravitational effects play out on the 2DSG and are based on the value of the LEF. As such, the bending of space is treated as a changing LEF within a gravitational gradient.

As the LEF changes both the unity value of distance and speed change in identical ways. Because both are defined by the unity values, they must be measured as unity within the LEF. This is important because it leads to the result that the contribution of the distance change and the speed change must be identical and therefore both represent exactly ½ of the observed delay. Note, the extra time delay is not caused by the bending of space. It is, according to E Theory, the change in distance itself and the change in speed itself equally contributing to the overall time delay.

Therefore if the time is measured to record the echo of a light pulse that is bounced off of a distant planet at a great distance from the sun, the time will be noted for the passage of the light through a nearly constant LEF. When this same experiment is conducted with the pulse of light grazing the sun on its path to the distant planet and back, the light will have passed through a gravitational gradient represented by a changing LEF that is more concentrated near the sun. The result of this is a slowing of the light pulse due to two factors: the overall decrease in the unity value of distance near the sun, and the decrease in the unity value for the speed of light. The result is obvious: the light pulse travels a greater distance at a reduced speed resulting in a time delay that is exactly ½ due to the unity value of distance and ½ due to the unity value of speed within each point of the gravitational gradient along the path of the light. We have already shown that E Theory is in agreement with Newtonian gravity and therefore is in agreement with the contribution of the Equivalence Principle. Doubling this effect will provide the exact value of the delay.

The Bending of Light Near a Massive Object

The argument is very similar for the bending of light near a massive object. Once again, we have already established that the E Theory free fall of an object in a gravitational field is equivalent to Newtonian gravity and therefore in agreement with the Equivalence Principle. However, just as with the time delay, the bending of light is exactly twice that predicted by the Equivalence Principle.

General Relativity treats the additional bending as an actual bending of space itself. In E Theory, as an object moves past a large mass it enters an area with a changing energime field. As the unity value of length changes, the object falls “bends” such that the different unity values are brought into compliance with each other. This is what is seen by the observer on the gravitating mass as the free fall effects of gravity. However, all of the unity values – by definition – must change together. Therefore the speed of light also changes as it moves horizontally through the gravitational gradient resulting in an additional bending of the path that is exactly equal to the contribution made by the changing value of the unity length. As with time delay, because both effects are the result of the changing unity values, they must be exactly the same in the magnitude of their contribution to the overall bending. Once again, E Theory requires that the contribution of the Equivalence Principle be exactly ½ of the overall bending, and the change in the unity value of the speed of light is responsible for exactly the other ½ of the bending.

The Perihelion Shift of Mercury's Orbit

The perihelion Shift of Mercury's orbit is based on the same effects described above only played out through an orbiting mass as opposed to one that grazes the sun and passes through its gravitational field. Therefore, the total agreement between E Theory and General Relativity for the bending of light and the time delay of light grazing the sun also suggest agreement with the measured perihelion shift in the orbit of Mercury around the sun.

Chapter Twenty-Three

General Relativity and E Theory Gravity

In General Relativity, the full relativistic expression for gravitational redshift is given by:

$$\frac{\lambda}{\lambda_o} = \sqrt{1 - \frac{2GM}{c^2 R}}$$

Using the above equation, the gravitational redshift (z) for a photon passing through two distances in space can be found through the ratio of the wavelengths as follows:

$$1 + z = \sqrt{\frac{1 - \frac{2GM}{c^2 R_2}}{1 - \frac{2GM}{c^2 R_1}}}$$

Where R_1 represents the radius for the emission of the photon and R_2 is the point of detection.

In E Theory, the redshift between two distances is related to the LEF as follows:

$$LEF = \frac{1}{1 + GM\left[\frac{1}{R_1} - \frac{1}{R_2}\right]} = \frac{1}{1+z}$$

These equations yield very similar results (see Appendix D) until you approach the Schwarzschild radius, which is defined by General Relativity as:

$$R = \frac{2GM}{c^2}$$

At the Schwarzschild radius, you reach a situation where the redshift becomes infinite. This represents the event horizon that once you cross over you have become permanently under the influence of the gravitational field of a Black Hole. Mathematically, once your value of R_1 becomes less than the Schwarzschild radius, the redshift is undefinable for any value of R_2. This is the point where General Relativity breaks down and – according to current thought – some form of quantum gravity is required to fully describe what occurs within the event horizon. There is no inconsistency with General Relativity because no communication occurs to the "outside" world from within the Black Hole. It is rather a limit to General Relativity and represents the point at which General Relativity is no longer adequate to describe the events within the Black Hole.

This is not the case in E Theory. That is, the mathematics of the LEF never breaks down as the distance from the Black Hole is decreased. The redshift never becomes infinite and it never becomes undefinable.

This raises the question, if E Theory allows the light to pass so easily into the Black Hole, what prevents it from taking the reverse path out? Where is the Black Hole in E Theory?

Chapter Twenty-Four

Black Holes

General Relativity predicts the existence of Black Holes through the Schwarzschild solution of the Einstein field equations. Simply stated, for any mass there exists a radius at which nothing – including light – that falls within this radius can every pass back outside of this radius. Therefore, the Schwarzschild Radius defines both the point at which a mass becomes a Black Hole as well as defines the Event Horizon for which nothing can pass back through. The Schwarzschild radius for a singularity is given by:

$$R = \frac{2GM}{c^2}$$

Or, more simply states as:

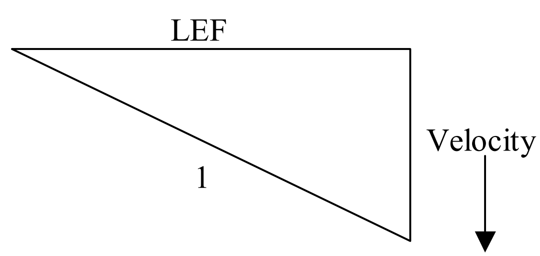
$$R = 2GM$$

It is generally believed that when a collapsing star forms a Black Hole, it will compress under its own gravitational force to that of a singularity. However, in E Theory this is unlikely. The gravitational force is due to the emission of free energimes and the concentration of free energimes increases along with the increased concentration of mass. Remember that in E Theory it is the emission of free space that provides the fabric of gravity. In E Theory, a singularity was a special condition that existed prior to the emission of the first free energime. It is highly improbable that a singularity can be formed through the intense gravity of a collapsing star which is also generating an intense amount of space in the same region of this concentrated mass. Space defined by a much smaller unity value, but none-the-less space.

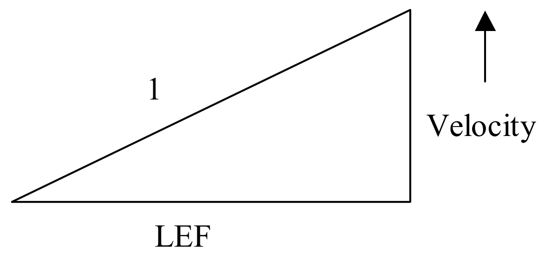
Therefore, E Theory would more likely relate to the Schwarzschild radius of a uniformly dense mass. The solution of the Schwarzschild metric for a uniformly dense mass is:

$$\frac{GM}{R} < \frac{4}{9}$$

E Theory suggests that gravity is due to a changing LEF resulting from the emission of free energimes from a gravitating mass. It was shown in Chapter Eleven that the velocity of an object falling from infinity can be determined through a right triangle as follows:

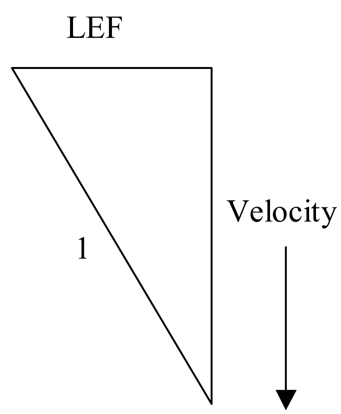


If the moving object above is brought to rest, it will reside within the LEF. The local observer will continue to measure the speed of light to be c, but will reside in an energime field that is more concentrated than that of the BEF. Now, assume this individual wishes to leave (or escape) this concentrated energime field and overcome its gravitational force. The first reaction is that it would simply be the mirror image of the above diagram reflected on the axis of the LEF, or:

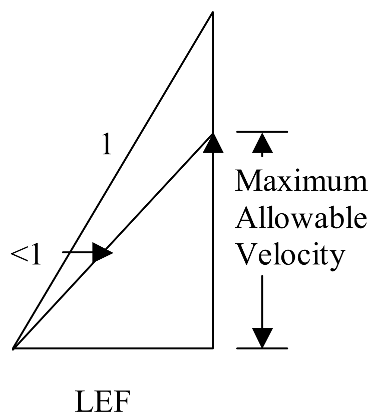


In this case, when the object has returned to the BEF (or unity) its velocity will be reduced to zero and it will once again experience an at-rest energime field that is equal to the BEF. All is well in this scenario because the initial velocity required to return to the BEF was less than c. However, when the initial return velocity must be c, we will have reached a point, or limit, regarding the objects ability to move outward into less dense energime fields and we limit the ability of the object to return to the BEF. The object, in this condition, is never able to overcome the gravity of the LEF.

Below is a more severe change in the LEF



In this case, when we attempt to apply the mirror image (representing the return trip) we run into an immediate problem.



Note, the object was brought to rest in the LEF and in this local energime concentration measures the speed of light to be c. The unity distance and the unity speed are identical in the LEF. Therefore, the initial velocity vector can be no greater than the LEF. We are unable to return to the BEF and are forever bound by the gravitation field of the LEF. Specifically, when does this occur? The E Theory radius of a Black Hole occurs when the BEF is defined by an LEF and initial velocity that are equal. This occurs at a LEF value of $\sqrt{0.5}$ or 0.707.

The LEF is defined as:

$$LEF = \frac{1}{1 + \frac{GM}{D}}$$

Therefore, for an LEF = 0.707, the following must be true:

$$\frac{GM}{D} = 0.414 < \frac{4}{9}$$

This is consistent with the Schwarzschild radius of a uniformly dense mass. However, the E Theory calculations are done with significantly streamlined mathematics based on the simplistic (and perhaps powerful) conceptual model of the energime.

E Theory also provides a significantly different interpretation of the "event horizon." In General Relativity we are "forced" to limit all communication at the Schwarzschild Radius. That is, if information were able to come out of the Black Hole, it would be inconsistent with General Relativity. The "event horizon" provides a tidy way to clean up a mathematical breakdown – "out of sight, out of mind." We do not have this immediate problem with E Theory Black Holes. In E Theory, the radius of a Black Hole is much more in line with normal gravitational events. There is nothing mysterious about a Black Hole, it is simply gravity – with an extremely concentrated LEF – that is strong enough to prevent even light from escaping. The radius of the Black Hole represents not so much an "event horizon" as it does a surface for which light can never escape. Because we have no mathematical breakdown in E Theory, we can allow the light to pass back out of the defining radius of the Black Hole. We are simply stating that the light can never overcome the gravitational effects of the Black Hole. An event horizon does exist in E Theory, but it is at a greater distance than that of the defining radius of the Black Hole. As the mass of the Black Hole increases, the distance between the E Theory Event Horizon and the defining radius of the Black Hole become closer together. This suggests the possibility that Black Holes are actually more massive than predicted by General Relativity.

Chapter Twenty-Five

What is the Planck Mass?

E Theory suggests that the unity mass is $2.19\times 10^{-73}\,kg$. This differs significantly from the Planck Mass of $2.19\times 10^{-8}\,kg$. Traditionally, the Planck Mass has been thought of as a transition point between General Relativity and Quantum Mechanics. A mass that would define a Black Hole by establishing equality between the Compton wavelength and the Schwarzschild radius at a value equal to the Planck distance. It represents a point where classical General Relativity must begin to transform into a Quantum Theory of gravity. However, this is only the case if we are limited by a mathematical breakdown of the gravitational redshift. E Theory has proposed a different outcome by suggesting that gravitational redshift is determined by the LEF for which no mathematical breakdown occurs.

In E Theory, gravity (as is everything else) is defined by a basic quantum, the energime. E Theory gravity is a quantum theory of gravity. In this theory, the energime provides a lower limit to the acceptable values of a photon. There can be no photon smaller than that of a single energime. At the Planck Mass the Compton wavelength is unity resulting in an upper limit to the mass of a photon. A single photon can therefore be no larger than that of the Planck Mass.

E Theory has suggested that a photon can go all the way into a Black Hole without every triggering a mathematical breakdown. The question becomes, how far is “all the way?” One answer is that a single energime at the outer edge of the universe will be blue shifted as it falls into a Black Hole up to the value of the Planck Mass, which will occur at a distance of the unity value. At the smallest possible meaning of distance, the photon will achieve its maximum allowable energy!

If correct, and the Planck Mass represents the mass of the largest allowable single photon and the unity mass provides the lower limit on the mass of a photon … the question becomes – what lies in between?

Chapter Twenty-Six

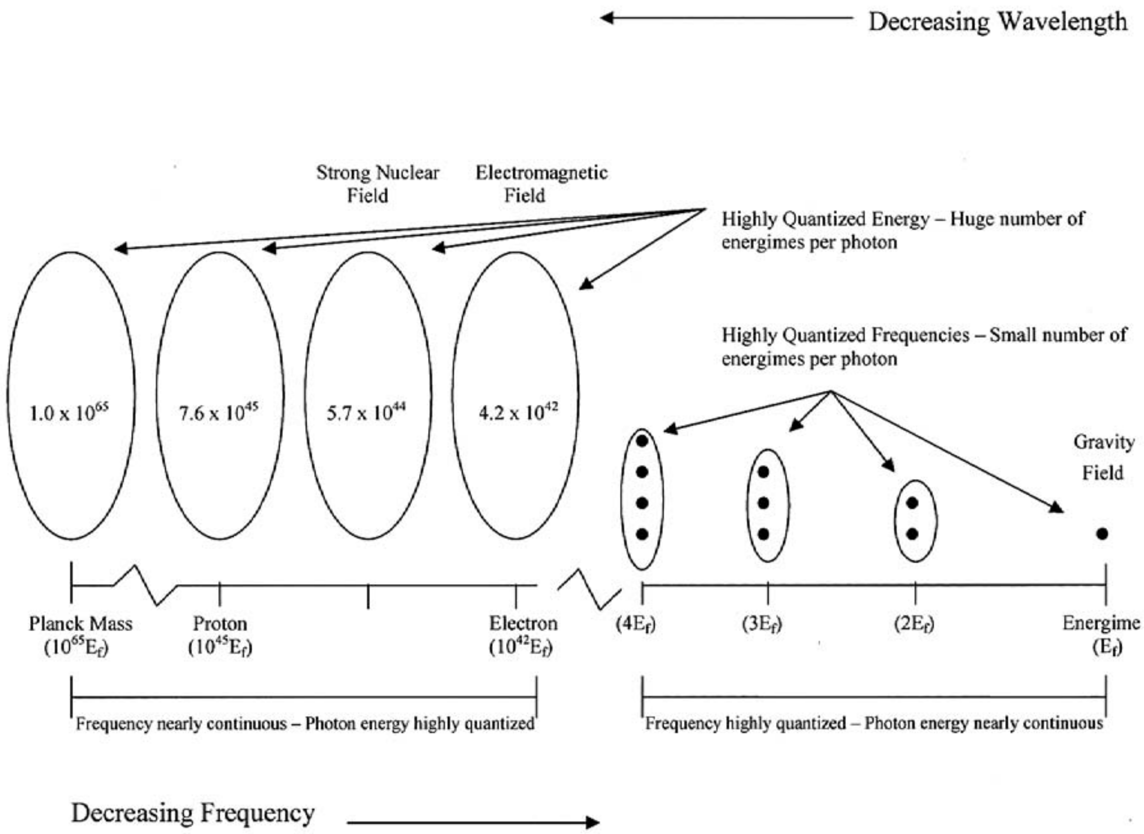
Quantum Energy

Max Planck introduced Quantum Theory with his explanation of the ultraviolet catastrophe. Einstein later incorporated the concept of quantized energy into the concept of the photon. From these beginnings, the concept of the quantum was born out of rather simple statements that were supported by experimental evidence.

This basic concept states that at any given natural frequency, the allowable energy levels are given by hv, where this energy represents the energy of a photon with the given frequency. However, little discussion is given to the possibility that allowable frequencies are also quantized. E Theory states that frequency is not continuous but quantized. We suggested in the last chapter that there exists an upper and lower limit to the range of allowable frequencies such that the Planck Mass represents the upper limit to the energy of a single photon and a single energime represents the lower limit.

We are now stating that all frequencies within this range are further quantized in intervals defined by the energime. This can be illustrated as follows:

Diagram of Quantized Frequencies and Photon Energies



Chapter Twenty-Seven

The Energime Ring

The use of the term "energime ring" within E Theory needs to be clarified. Just as E Theory utilizes the 2DSG and energime rings to define the spatial dimensions of the physical world, it was never implied that "reality" was composed of a 2DSG with all energime rings aligned to define the 3rd dimension. Rather, this was an allowable manipulation of the physical fabric of the universe to simplify calculations. In "reality" energime rings are oriented in any conceivable way. We have just chosen to re-orient them – without changing the overall mass or momentum of the universe – so that calculations become more manageable.

This same argument extends to the energime ring itself. There is no physical requirement in E Theory that the energime be in the shape of a ring. In reality, the energime may be reflected, refracted, twisted and reshaped in many ways as long as the overall energime continues to expand with a changing BEF and/or under the influence of a changing LEF gradient. With this clarification, we are ready to embark on a review of quantum weirdness, objectivity and local causality.

Chapter Twenty-Eight

Quantum Weirdness

The possibility of hidden variables and deeper answers to the puzzling aspects of Quantum Mechanics (QM) still remain. While the voices are quieter, it is interesting that this year Science Magazine included the question of the completeness of Quantum Theory in the top list of its unanswered questions in science.

Clearly, QM is a strong theory with a remarkable track record. It is however, subject to criticism on several counts. Many 'proofs" of QM require that the principles of QM be applied in the analysis of the outcomes. This objection has been raised many times, yet seems to be ignored because of the strong influence of QM. As an example, when a pulse of light goes through a beam splitter we are all "programmed" to respond that there is a 50/50 probability of the pulse being reflected vs. going through the splitter. This; however, is a QM requirement. Classical physics would state that while ½ go through and ½ are reflected, that there may exist hidden variables that control the behavior of a given photon passing through. Hidden variables are generally dismissed because no strong arguments can be made for the nature of these "hidden" variables. E Theory; however, suggests that the physical composition of matter is made up of component energimes with a mass of $2.19 \times 10^{-73} kg$. When applying the principles of E Theory, it would be highly unlikely if hidden variables did not exist. That is, it is unlikely that there is no interesting physics occurring between the levels we can currently probe and the level of the ultimate building block of matter.

This is all I will mention in this Chapter. Those that believe the issue of hidden variables is still open will agree. Those that disregard these arguments have heard them before and are unlikely to change.

Therefore, the remainder of this Chapter will take a different approach.

Quantum Weirdness, as it is often referred to, is generally – in one way or another – a result of the observations of the two-hole experiment. Quantum Weirdness is solved in Quantum Theory through the Copenhagen Interpretation of the Heisenberg Uncertainty Principle. We can set up an experiment to observe either a wave or a particle, and what we observe is either a wave or a particle depending on the manner in which we conduct the measurement. There is never a contradiction because we are restricted to one system or the other with no opportunity for overlap.

We have currently raised an entire generation – or perhaps two – of scientists that fully embrace the probabilistic nature of QM and who endorse the practice of never asking "why." In fact, it may be a fair statement to say that many of today's modern physicists are quite passionate about quantum weirdness and enjoy the opportunity to state that "it must be so" because this is what our observations and mathematics require. This is an argument amazingly close to the 17th century chemists and their embarrassing use of Phlogiston as a required outcome of observation and mathematics.

The arguments of QM are quite simple. We must divorce ourselves from classical views of physics and when we fail to do so, the "problems" that occur with QM are always due to the lingering effects of individuals trying to view the world through classical principles. This was the downfall of Einstein himself, as he could not let go of the classical view and rejected the concept of QM as a fundamentally complete theory with the famous statement "God does not play dice …" It is believed that if we are to succeed in science, we must let go of this classical baggage, we must stop asking why the micro-world behaves as it does, and simply restrict our scientific endeavors to developing models that are mathematically consistent with our observations. The irony in this is that all of quantum weirdness stems from our steadfast hold on classical views of a particle and a wave. That is, Quantum Weirdness occurs because we insist on utilizing the classical concept of a “particle,” and the classical concept of a “wave.” We use the Copenhagen Interpretation to make sure that these two purely classical concepts never come into direct contact. We therefore never have a contradiction, yet we create a world full of quantum weirdness.

If we allow for the possibility of the existence of a “non-classical” IWP, then much – if not all – of quantum weirdness immediately disappears. E Theory, through its interpretation of the Uncertainty Principle, allows us to imagine how a particle passes through a double slit.

We know by the Postulates of Motion that motion occurs through energime rings. The momentum of a moving object is in its line-of-motion. This allows an IWP to pass through a double slit as a completely objective event – both as a particle (momentum) and as a wave (energime ring). It should be noted that the IWP is not being introduced as a wild concoction in order to avoid – at all cost – the results of Quantum Mechanics. Rather, the IWP was introduced through the development of a quantum theory of gravity. It is from the gravity side of the house that the IWP was born. The fact that it now has applications within QM is most interesting.

Chapter Twenty-Nine

Objectivity and Local Causality

E Theory suggests that space is composed of energime rings that cut through the 2DSG. The energime ring itself represents unity – that is – it is a single entity in the form of a ring as opposed to a classical point. The energime ring is a real phenomenon resulting in its objectivity separate from measurement. We can imagine the energime ring and allow it to play out in consistent ways without the need to establish its objectivity through measurement.

As a singular entity, the energime ring also reshapes the meaning of local causality. All points on the energime ring represent the same space redefining the meaning of "local" to include the entire energime ring as opposed to a "point" in space.

As such, E Theory allows for both objectivity and local causality to exist at all times. This approach will clearly impact the very foundation of Quantum Weirdness – the two-hole experiment.

Chapter Thirty

The Two-Hole Experiment

In E Theory, only one possible explanation describes the event that occurs at the sight of a two-hole barrier. This event vastly changes our interpretation of a quantum event. An objective event occurs when a photon or high energy particle passes through a double slit. This event cannot be altered by any future measurement or apparatus. There are no "after-the-fact" influences found upon the measurement of this event at a later point in time. The objective event that occurs is the passage of an Integrated Wave Particle (IWP) through the slits.

All motion is the result of a field generating an IWP with momentum along the axis-of-motion determined through the linear direction of the force. As such, an IWP possesses both a ring along with a point of momentum. The point of momentum passes through only one slit of the two-hole barrier; however, an energime ring associated with that momentum passes through both slits.

In the Two-Hole experiment; if the object is "measured" it will pass through as a particle. In E Theory, if the object is measured, its momentum is changed and its symmetry with its energime ring is broken and a new ring is established that is associated with the new momentum of the object. This results in a particle pattern because there is no interference with its previous energime ring. (Whether its previous energime ring "lives on" or "collapses" is of no particular interest at this point in the discussion). If we look only at hole two and do not see a particle, we know that it passed through hole one.

However, because it is the momentum of an object that interacts with the momentum of other objects, there is no "impact" and its symmetry with the energime ring is not broken. Therefore, in this case it continues to behave as a wave even though we know which hole it passed through. The Quantum Mechanics explanation for this is that we must actually measure something in order to provide it with objectivity. "Knowing" something with out a direct "measurement" does not count in QM. However, E Theory has broken away from the strict interpretation of objectivity through measurement. We are allowed to "know" how the universe behaves by imagining the effects of the unity values of the energime. We no longer are required to measure something for it to be objective. We only need to better understand what is occurring. In E Theory, what is occurring is a completely objective event through the passage of an Integrated Wave-Particle.

Therefore, by allowing for the possibility of an IWP, the weirdness and strangeness of the two-hole experiment disappears … just as the strangeness of relativistic effects vanished by allowing for a new interpretation of mass-energy equivalence.

Chapter Thirty-One

Wheeler Delayed Choice Experiment

In Quantum Mechanics, the Wheeler Delayed Choice Experiment has served to continue to demonstrate the strange nature of the quantum micro-world. In this experiment the measurement apparatus is changed after the passage of a photon or other particle through a double slit. Therefore, any "hidden variables" would need to have manifested their behavior prior to establishing the final detection apparatus. If we set up the apparatus to verify "which path" information, the result is that of a particle. If – after the photon has passed through the double slits – we change the apparatus with a detection screen that is designed to detect a wave, we now observe a wave type interference pattern. The Quantum Theory explanation is that objectivity does not materialize until a measurement is made and that "hidden variables" cannot be utilized to explain quantum effects because they would have needed to manifest their properties at the time the event at the double slit occurred. Through this experiment, the weirdness of QM is demonstrated by claiming that what occurs at the slits can be altered after the fact by changing the method in which the photon is measured (as either a wave or a particle). This serves as strong evidence that objectivity does not exist until the time of measurement.

According to Quantum Theory, the "event" exists in a quantum state in which all events are represented through a probability that does not become real or "objective" until such time as it is forced to reveal itself through measurement. This again is all the result of utilizing a purely classical interpretation of a wave and a particle. In QM we are torn by the possibility that two distinctly different events may have occurred in the past. We completely separate them through the Copenhagen Interpretation of the Heisenberg Uncertainty Principle and then we are left with the baggage of quantum weirdness that follows when we find out that even after the fact we can "change" the event that occurred based upon the way we choose to trigger objectivity. Just as with the Two-Hole experiment, all of the quantum weirdness of the Wheeler Delayed Choice Experiment vanishes when the event at the slits is due to the passage of an IWP. There is no contradiction, there are no two possible events, there is no need for a Copenhagen Interpretation to completely separate wave from particle. Instead there is an integration of wave and particle and a single objective event – an event that is completely objective even prior to its measurement. Therefore, its future measurement cannot play a role in altering the objective nature of the IWP. All we can do in the future is determine in which way the IWP is allowed to interact with itself.

Again, replacing the classical definitions of a wave and particle with a truly integrated wave-particle has eliminated any need for quantum weirdness. The momentum of the IWP passed through either one slit or the other; however, the integrated wave portion passes through both slits allowing the IWP to interact with itself at a later point in time. If we prevent the momentum from interacting with the IWP, we will always see a particle. If we allow for the interaction of momentum with its energime ring at a later point in time, we will always see a wave pattern.

Chapter Thirty-Two

Delayed Quantum Eraser Experiments

Quantum Eraser Experiments occur when “which path” information is established and then “erased”. In E Theory, the establishment of “which path” information destroys the symmetry between the momentum and energime ring such that the event is measured as a particle, as opposed to wave interference. If the “which path” information can be “erased” the wave interference returns.

To add to the mystery of Quantum Mechanics, delayed quantum eraser experiments have suggested that you can delay the choice in establishing objectivity until after the time of detection of a particle on a detecting screen. In these experiments, entangled photons are used to establish “which path” information that impacts the measurement of their entangled “twin” particle. Through the use of mirrors and 50/50 beam splitters it is possible to eliminate or “erase” the which path information even after a “signal” particle has been registered at a certain position at a primary detector. When “which path” information is maintained, a particle pattern between the coincident measurements of the signal and idler photons is established. When the “which path” information is lost, the pattern of the coincident events switches to a wave type interference pattern. Further evidence yet of the peculiar nature of the micro-world. This leads to such bazaar statements as “claiming that an event was either wave or particle at the time of detection may well be a premature conclusion of the past.”

The implication of E Theory on Quantum Eraser Experiments is significantly broader than the scope of this book. However, it is safe to state that when applying E Theory, the concept that a "delayed choice" is made after the detection of an event has little meaning. This again implies that what has happened in the past will impact our measurement in the future depending on how we measure it (even if the "delayed choice" occurs after a registered event has occurred).

E Theory simply states that all past events were objective as IWPs. When "which path" information is available through the entangled idler photon we know that the momentum of the IWP has been isolated from its larger energime ring. It therefore dictates the behavior of a particle. When "no clear path" information is re-established (quantum eraser), E Theory simply states that the energime ring established through an objective event in the past, is now allowed to interact with itself providing interference (and perhaps other interactions) that govern the outcomes that will be observed. There is no delayed choice that impacts the events of the past, just the way in which we interact with the outcome of that past "objective" event.

Chapter Thirty-Three

The Unification of Quantum Theory and Gravity

E Theory has provided a Quantum Theory of gravity and defined the meaning of both the unity mass and the Planck Mass. Through the use of IWPs, the "which path" or "no clear path" determination utilized in quantum mechanics to determine the likelihood of past events is replaced with an objective IWP. When "which path" information is known, E Theory suggests that the momentum of the IWP is isolated from its energime ring. When "no clear path" is established, E Theory suggests that an objective event from the past is allowed to interact with itself through space and time as defined by its energime ring. The event was always objective, we are simply allowing that event to interact with itself in different ways resulting in different outcomes based upon the interference (and perhaps other "hidden" interactions) between the momentum of an IWP and its larger energime ring – space and time.

The implications of this model are well beyond the scope of this book. It is our intent to suggest the possibility of an IWP. E Theory will impact Quantum eraser experiments, Bell's Inequality, Quantum Encryption and a host of quantum outcomes. These events do not change with E Theory – but just as relativistic effects become more understandable – quantum effects may make more sense when viewed within the model of the IWP. It will take the broader scientific community to determine the ramifications and likelihood of such a phenomenon.

It should also be noted that E Theory – while eliminating quantum weirdness – has altered quantum theory very little and thereby represents no major disruptions to the vast accomplishments of the theory overall. That is, E Theory requires the quantumization of frequencies, but at the level of even sub-atomic particles, the quantumization is so small as to appear continuous. Therefore Quantum Theory as born out of the ultraviolet catastrophe remains intact – minus the need for quantum weirdness.

E Theory gravity, becomes an integrated aspect of quantum energy and provides the much sought after quantum nature of gravity. E Theory gravity eliminates the mathematical breakdown of General Relativity at the Schwarzschild Radius and provides a new description of Black Holes while providing consistent results with GR for non-relativistic gravitational effects. While all the puzzles may not be solved. E Theory provides a unification of Gravity and Quantum Theory through one consistent theory – E Theory.

Chapter Thirty-Four

The Age of the Universe

One of the beautiful, and powerful, outcomes of E Theory is that it provides a simple framework for the development of the universe and perhaps provides the ultimate testing ground for E Theory. E Theory requires no initial conditions nor does it tolerate any mechanisms for adjusting various parameters. The universe simple starts from any arbitrary collection of bound mass that decomposes into space at a rate relative to the frequency of the energime. The conversion of bound mass to free space is either in agreement with observation, or E Theory is incorrect.

In Chapter Fifteen, the magnitude of the electrostatic force was determined partially by a statement that only 1/137 of the space on the 2DSG was actually available for the recombination of the electron. Along two-dimensions, the magnitude of decomposed space is equal to

$$\left(1/137\right)^2 = 5.32\times10^{-5}$$

The question then becomes, how old would the universe need to be in order to have undergone enough decomposition such that 5.32×10^{-5} of all the initially bound mass has been released as space? E Theory states that the energime is the smallest possible photon. As such, we know the energime moves at a constant speed of c and has an observed wavelength equal to $1.01\times10^{31}\,m$. This results in an observed frequency of the energime of $2.97 \times 10^{-23} s^{-1}$. The rate at which bound mass decomposes to space is therefore related to the observed frequency of the energime.

As space is emitted, light is able to move through the ever increasing area defined by the 2DSG. However, as light reaches a given observer, it must be noted that only ½ of the space released since the emission of the light pulse was actually transversed by the light pulse as it reaches any given destination. The free energime field is therefore larger than what any observer is able to see. A light pulse emitted in the earliest moments of the universe will only travel through ½ of all of free energimes emitted along its dimension of travel. When considered for the entire 2DSG, it follows that the area of the 2DSG must be four times greater than what we are able to see as "observed" space. Therefore, the actual rate of energime decomposition (required to fuel the expansion of the universe as we see it) must be four times greater than what we actually observe, or:

$$(4)\left(2.97 \times 10^{-23}\right)s^{-1} = 1.19 \times 10^{-22}\ energimes/second$$

It follows that the age of the universe can be determined by the time required to achieve a level of decomposition equal to 5.32×10^{-5} of all initially bound energimes. The interesting thing to note is that this calculation is not impacted by the initial size of the universe, but only by the rate of decomposition such that:

$$Age_{Universe} = \frac{5.32 \times 10^{-5}\ energimes}{1.19 \times 10^{-22}\ energimes/second} = 4.47 \times 10^{17}\ s$$

$$= 14.2\ Billion\ Years$$

Therefore, E Theory suggests a specific age of the universe of 14.2 billion years based upon the value of the inverse fine structure number of 137. In other words, if the age of our current universe were to vary from the 14.2 billion years, the current value of the inverse fine structure number would also need to change. Since the inverse fine structure number is known rather accurately, E Theory suggests that the age of the universe is known to that same level of accuracy. E Theory also suggests that the inverse fine structure number is not a time invariant constant, but changes with the age of the universe. It obviously must do so in tandem with other physical constants such that there appears to be no change to the value. More on this in Chapter Thirty-Seven.

Looking at this from a different perspective …. Because E Theory brings the Uncertainty Principle into question, it also allows us the flexibility of returning to a more classical perspective of being able to view the universe from the perspective of a "distant imaginer."

As such, the "beginning" would look something like the following. Consider a flat surface of any size you wish with randomly placed bound mass distributed throughout. Since it is random with no initial conditions or parameters, it follows that the bound mass would – by every probability – be evenly distributed across this surface.

The surface being viewed represents – for lack of better terminology – a sub-space. That is, it does not represent space to the local inhabitant because no free energimes exist at this point. Therefore, while we imagine the bound mass distributed evenly across this sub-space it represents – to the local observer – nothing more than a singularity. The entirety of bound mass exists as a "point" representing the ultimate singularity.

What is the nature of the sub-space? It may well be the heat death remnants of the previous universe. Now, completely motionless spread across the space of the previous universe; stagnant until the "birth" of a new energime representing a unique mass and frequency for a new universe. Enough of this level of speculation … back to our own universe.

Calculations have little meaning until the emission of the first free energime marking the beginning of space and the beginning of the measurement of time for our universe. The rate of free energime emission has already been established as four times the rate of the "observed" frequency for the energime. As space is generated, motion becomes possible as a result of local fluctuations in the energime field. Gravity, becomes a local influence; however, note that in E Theory gravity creates no universal bending of the 2DSG. The space grid is completely flat. Gravity itself – through the emission of free energimes – becomes the fuel for generating the expansion of the universe. Gravity itself is "dark energy".

In E Theory, motion is induced by a changing energime field and motion likewise induces a change in the energime field. (This is a version of the E Theory Equivalence Principle). On a universal scale, as the BEF becomes more concentrated, through the emission of free energimes, motion must occur. However, as previously developed in Chapter Nineteen, this motion has no directionality and therefore can have no momentum. This results in the movement of the energime outward in a ring. Uniform motion of a singular entity in a ring with no established momentum. The energime ring, in connection with the 2DSG, becomes the definition of space and gravity itself generates its expansion. This continues until we reach our current time, 14.2 billion years after the emission of the first free energime.

Chapter Thirty-Five

Our Visible Universe

E Theory is silent on the overall mass of the non-visible universe. It is possible that it is a fixed amount of mass and space, or that it is infinite in mass and space. However, when it comes to the visible universe it is clear that it is finite in size and scope. Our visible universe can be no larger that that defined by the wavelength of the energime, "Our" universal 2DSG has a ultimate size of πh^2 or

$$(\pi)\left(9.89\times10^{64}\,energimes\right)^2 = 3.07\times10^{130}\,energimes$$

Or,

$$\left(3.07\times10^{130}\,energimes\right)\left(1.02\times10^{-34}\,m\right)^2 = 3.19\times10^{62}\,m^2$$

Representing a total mass of

$$\left(3.07\times10^{130}\,energimes\right)\left(2.19\times10^{-73}\,kg\right) = 6.72\times10^{57}\,kg$$

This represents our "heat death" universe, but not our current universe at 14.2 billion years. Our current 2DSG depends somewhat on how we define "visible." Remember that a light pulse passed through only ½ of the emitted energimes emitted during the time of its emission to the time of its detection. This makes the 2DSG four times larger than what we observe it to be. However, by the conventional definition of "visible," E Theory defines the 2DSG to be limited by the 2DSG actually observed as opposed to the 2DSG actually required to provide an adequate framework for the motion of a photon through distance.

As such, at 14.2 billion years, our 2DSG as defined by the speed of light is

$$\left[\left(4.47\times10^{17}\ s\right)\left(3.00\times10^{8}\ m/s\right)\right]^2 = 1.80\times10^{52}\ m^2$$

Representing a total free-energime (space) of

$$\frac{1.80\times10^{52}\ m^2}{\left(1.02\times10^{-34}\ m\right)^2}\left(2.19\times10^{-73}\ kg\right) = 3.79\times10^{47}\ kg$$

And, a total bound-energime (matter) of

$$(137)^2\left(3.79\times10^{47}\ kg\right) = 7.11\times10^{51}\ kg$$

Chapter Thirty-Six

Expansion of the Universe

If E Theory principles are correct, they should in fact have powerful ramifications regarding the development of the universe. E Theory suggests a universe that is 14.2 billion years old. At this age, E Theory predicts a strength of the electromagnetic field that is in alignment with the inverse fine structure number, 137. We know from E Theory Gravity, that the difference between the LEF and the BEF has ramifications on motion. This concept can be applied to the development of the universe in that with time, the BEF becomes more dense as increased free energimes are emitted. This suggests that the meaning of time is two-fold. On one hand, there are the 14.2 billion years that we measure (estimate) the universe to be. Using this "time" we believe that 14.2 billion "clicks" of an annual clock have occurred since the first free energime was emitted. However, we know from E Theory Gravity, that a less dense energime field has a faster passage of time. Therefore, there is a second measurement of time, that of an individual that has been traveling through time along with the development of the universe. In E Theory these are very different.

For example, if we were able to go back in time 14.2 billion clicks on our annual watch, we would not be at the "beginning." If fact, we would be no where near the beginning of time – the emission of the first free energime. That is because as you go back, time "clicks" more quickly.

In E Theory, the universe is technically infinitely old. This makes calculations somewhat difficult and – for the most part – we are really only interested in the development of the universe since the creation of space; since the emission of the first free-energime. This represents nearly an infinite amount of time that has passed for the observer "along for the ride" that has observed the universe unfold over the 14.2 billion years that we measure. It is the different meanings of the passage of time that is ultimately responsible for the observed acceleration of the expansion of the universe.

Current models of universal acceleration are structured much differently than the model that will be proposed by E Theory. Current thinking is that there exists gravity as well as some unknown "dark energy" that acts as an anti-gravity. In the early universe (after the inflationary period) gravity was winning the war between these forces. However, with time, as gravity weakens at an inverse square rate to distance, the "dark energy" which may be represented by a more constant force, is able to take over and dominate resulting in an acceleration in the expansion rate of the universe. This is all imbedded with various parameters. Is space flat on a universal scale? What is the total mass of the universe (visible mass and "dark matter")? What is the nature of the cosmological constant (dark energy)?

All of this disappears in E Theory. Gravity, while having a universal reach, is balanced by the random distribution of bound mass on the initial sub-space grid. While gravity has a universal reach, it has no net universal impact. Gravity is the result of the emission of free energimes defining space such that gravity itself provides the fuel for the expansion of space. The unity values of the energime speak for themselves and determine the development of the universe with no need for initial conditions or variable parameters. It goes something like this:

The expansion of the universe occurs at a constant rate (but appears to us to be accelerating). Free energimes are emitted defining the BEF. As the BEF becomes more concentrated, time slows down allowing for sufficient free energimes to be emitted to define a constant rate of expansion. That is, as the linear dimension increases by x, the number of free energimes must increase by x squared. Free energimes are emitted at a constant rate that is independent of the BEF. The emission of free energimes defines the BEF, but is not governed by the BEF. The slowing of time as the BEF increases in density allows for sufficient free energimes to be emitted to sustain a constant expansion of the universe. Why then do we see an acceleration of this expansion? The answer to this lies in the dual meaning of time. We have our 14.2 billion years vs. the nearly infinite passage of time for the observer that has gone "along for the ride" with the development of the universe.

A constant rate of expansion is defined by the Hubble Time. This is the inverse of the Hubble Constant. We determine the rate of expansion for distant objects based upon their redshift (or *z* value, which is the redshift minus 1). We determine their distance in various ways, but for distant objects we generally utilize the concept of a standard candle whose brightness will determine relative distance. Type Ia Supernova provide us with an excellent standard candle. The rate of recession is determined in a way similar to the Doppler effect, however, we incorporate relativistic effects for objects far off. (This has always been puzzling since we view the universe as stretching and therefore there is no motion for which to justify relativistic calculations.) None-the-less we determine the extent of "stretching" by the *z* value as follows:

$$z = \sqrt{\frac{1+V}{1-V}} - 1$$

In 1998, it was discovered that light from distant Type Ia Supernova appears to be 20 - 25% further away (dimmer) then the Standard Model would suggest. This is based on a comparison of *z* values to the relative intensities of light. This implies a universe undergoing an accelerating expansion. The conclusion is that "dark energy" has overtaken gravity.

E Theory suggests that light was traveling faster in the past because time was moving faster in the past. The local observer from the past would need to observe the speed of light to be a constant, yet, based on our measure of time, the speed would have had to have been faster than our current value of the speed of light. There is a difference between how much the universe has stretched, and our ability to see back into the universe. If light was traveling at a faster rate in the past, we can actually see further back into the universe then we think we can based on a constant speed of c. Remember, we have no way of knowing absolute distances, but rather we only know relative distances via the use of standard candles. That is, we can state that an object is twice as far away as another, but we cannot state how far that is.

Where does this leave us? Assume that we view a pulse of light that was emitted 7.1 billion years ago (by our watch). Both current thinking and E Theory agree that if the universe were to be experiencing a constant rate of expansion that the pulse should be seen by us as receding at a speed of 0.5c. It was emitted half way across the universe at half the development of the universe. Since the outer edge of the visible universe is receding at c, at ½ the universe, the light pulse would be receding at 0.5 c. This leaves a value of *z*, as calculated by current convention, of:

$$z = \sqrt{\frac{1+0.5}{1-0.5}} - 1 = 0.73$$

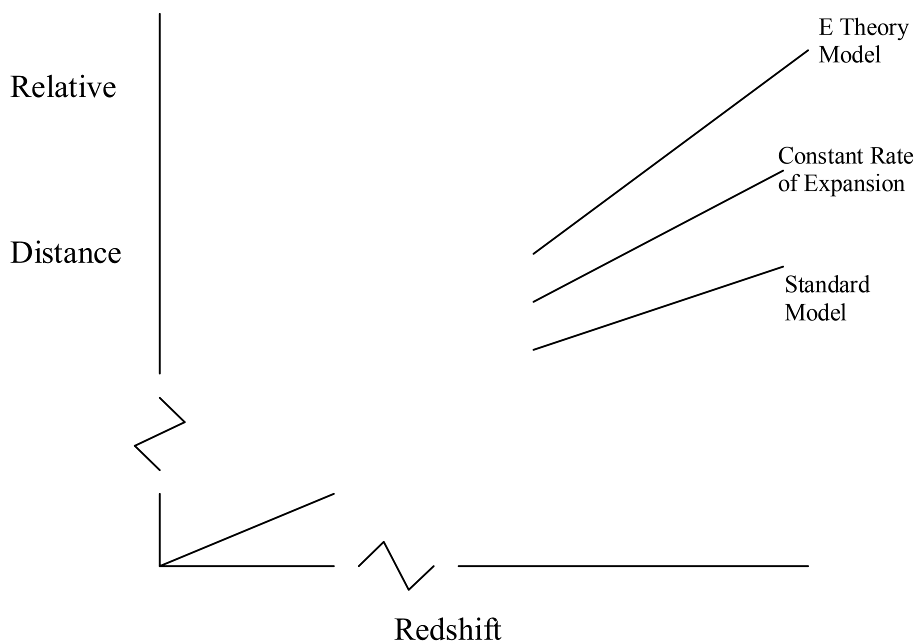
E Theory takes a different approach. The observer "along for the ride" would actually have seen much more time go by. At ½ the development of the universe time would have been moving at a rate that is twice our current rate. The individual starts out with a time moving twice as fast and ends up in our current time frame with a clock that completely matches our rate. Over the period of the trip, the individual experiences a total of 1.5 more time than we account for using our 14.2 billion year watch. This individual will also see the speed of light to be constant over the entire trip suggesting that a pulse of light also traveled 1.5 times further than we would believe it had traveled using our local watch.

The stretch of the universe (receding at a constant rate) would double as the age of the universe doubled (as we measure it). Therefore the value of its stretch is equal to its size at 7.1 billion years. If we arbitrarily assign ½ of the radius of the universe at 7.1 billion years to be equal to 1, we then have a stretch of 1 and a total distance traveled – prior to the stretch – of 1.5

The E Theory value of z does not incorporate relativistic effects because no motion is involved in the "stretching" of space. The E Theory *z* value is the non-relativistic redshift minus 1. Therefore the E Theory value for z is:

$$z = \frac{Distance\,Traveled + Stretch}{Distance\,Traveled} - 1 = \frac{1.5 + 1}{1.5} - 1 = 0.667$$

This value is slightly different than the 0.73 determined through conventional reasoning. Light, with an intensity that we believe should be seen at a z value of 0.73 is really seen at 0.667 – or with a z value 6% less than we would have expected for a constant rate of expansion. Since intensity is related to distance squared, this equates to a difference of 12% from a constantly expanding universe. However, the standard model calls for a slowing in the expansion rate. The E Theory value is therefore within the roughly 20% - 25% dimmer intensity observed in 1998 with the finding that the expansion rate of the universe is accelerating


Relative
Distance
E Theory
Model
Constant Rate
of Expansion
Standard
Model
Redshift

Chapter Thirty-Seven

137

In may be somewhat fitting that the final chapter of content is devoted to one of the single largest mysteries in modern science. The strange value of the unitless inverse fine structure number: 137. E Theory is able to provide an explanation for this apparently "awkward" constant. The inverse fine structure number is a unitless number, just as all other values can be described as unitless numbers by applying the unity values of the energime. Its unique value – 137 – is simply a mark in time for this point in the development of the universe. In the final analysis, 137 is simply a number of energimes – nothing more, nothing less, nothing profound or insightful. It represents a number that provides the ratio of bound energimes to free energimes along a single dimension of the universe.

E Theory would suggest that in approximately 30 trillion years the inverse fine structure number will have a value of 3.14. Its value as pi will be a complete coincidence. (Better to resolve this issue now – imagine the confusion in a world where the inverse-fine structure number has a completely coincidental value of pi!)

However, if this is correct, there must be an explanation as to why the inverse fine structure number appears to be a time invariant universal constant – unchanging with time. How does E Theory account for this?

The question becomes, how do we really know if something changes with time? If we see a world governed by universal constants and are unable to find any inconsistencies, does this ensure that our constants are not changing with time? The answer to this is no. It is always possible that changes are occurring in tandem in such a way as to "hide" the true phenomenon which may be occurring.

Our Standard Model is the Big Bang suggesting that the universe is cooling as it ages. As the universe "stretches," its temperature cools as the energy density thins out over a greater distance.

However, based on the principles of E Theory, there is no justification for the cooling of the universe with time. In E Theory there is no "stretching" of space. Rather, new space is created through the release of free energimes. Yes, the distance between objects increases with time, and this creates a "recessional" redshift, but it does not change the energy density of the universe and therefore does not suggest its cooling over time. Recall that in Chapter Seven an equivalence was established between energy and space:

$$Energy = mc^2 \text{ and } Space = mb^2$$

Where c is the speed of light and b is the unity value of distance. Therefore as space is added to the universe – through the emission of free energimes – an equal amount of energy is added.

According to E Theory, the early universe witnessed an electromagnetic force evolve from gravity with the weakest of energies. As time went by, the electromagnetic force grew in strength as the fine structure number increased accordingly.

As such, the intensely dense and hot beginnings of the universe may be our interpretation of an earlier universe based on a constant fine structure number. We observe no inconsistencies therefore we have no reason to question its value as a time invariant universal constant. But, perhaps our observations reflect a world that did not exist. The universe may well have been born out of a cold environment suggesting a much different value of the fine structure number in the past – just as E Theory predicts the fine structure number will continue to change into the future.

When applying this model, the expansion of the universe is fueled through the emission of free energimes defining both energy and space. As more space is created, more free energimes are present representing increased levels of energy proportional to the increased size of the universe. In this model, the temperature of the universe may very well be a constant.

Perhaps the “Big Bang” is little more than the subtle emission of the first free energime!

Chapter Thirty-Eight

Conclusion

Some days I wake up feeling unsure over the apparent naivety and simplicity of E Theory.

Others are working on such complex levels with powerful mathematics working to hone in on the final pieces of the Standard Model. While we all believe that the best theories are those with a simple elegance and powerful applications, we are also led to accept that the apparent reality of nature is increasingly complex. After all, general concepts represent a broad stroke of the brush and can easily be explained in general terms through basic mathematics and guiding principles. But, the price we pay for exploring deeper levels of reality is the need to comprehend increasingly complex patterns that are only understandable through higher level mathematics.

However, why shouldn’t the most fundamental aspects of the physical world be the most simplistic and pure? Is this not the goal? Is this not what we really all strive for – what we really hope for – even in the apparent face of increasing complexity?

Other days I wake up and revel in the beauty, power and simplicity of a theory based on a singular entity – the energime – manifesting itself as mass, distance and speed.

The IWPD Research Center unabatedly awaits your reaction, thoughts and response!

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Appendix A: Making the Units Work

In the equation;

$$LEF = \frac{1}{1+\left(\frac{1}{2\pi h}\right)\left(\frac{Mass}{Distance}\right)}$$

the units do not cancel as currently written. The BEF, by definition, is equal to unity and the LEF must be a unitless number. The denominator has units of $1/m^2$ (after applying the unity value of the speed of light).

Therefore, a proportionality constant (representing unity) with units of m^2 must be utilized. The value of this constant is:

$$1.04\times 10^{-68}\, m^2$$

This provides the first suggestion that the unity value of distance is equal to:

$$1.02\times 10^{-34}\, m$$

Appendix B: Placeholding Nines

The value of $\left(\frac{1}{2\pi}\right)\left(\frac{M}{D}\right)$ is extremely close to zero for most "normal" gravitational calculations. The temptation is to round the BEF to several significant figures and to complete the calculations yielding a LEF value of one and a velocity of zero in almost all situations.

The error in this is that the BEF is defined as unity and therefore exactly equal to 1. That is, its value is 1.0000000 ….. with as many zeros as one needs to add. This produces a value of the LEF that begins with a series of 9's followed by the number of significant figures used to calculate the value of the additional energimes from the gravitating mass.

As a matter of convenience, an exponential notation is used to indicate the number of nine's in the sequence. This allows an efficient way to determine the very small velocity of an object relative to the extremely fast speed of light.

For example:

$$1-2.345\times10^{-17} = .99999999999999992345 = .9^{16}2345$$

Appendix C: Various Free Fall Velocities in a Gravitational Field (Newtonian vs. E Theory)

Mass (kg)	Distance (*f*)	Distance (*i*)	Newtonian Velocity (m/s)	LEF	E Theory Velocity (m/s)
10^{20}	10^{5}	∞	3.653×10^{2}	$.9^{12}2576$	3.653×10^{2}
10^{30}	10^{10}	∞	1.155×10^{5}	$.9^{7}2576$	1.155×10^{5}
10^{40}	10^{15}	∞	3.633×10^{7}	$.992631$	3.633×10^{7}
10^{30}	1×10^{15}	2×10^{15}	2.583×10^{2}	$.9^{12}6288$	2.583×10^{2}
10^{30}	1×10^{10}	5×10^{10}	1.033×10^{5}	$.9^{7}4060$	1.033×10^{5}
10^{35}	1×10^{10}	1×10^{11}	3.448×10^{7}	$.993363$	3.448×10^{7}
10^{10}	1	5	1.033	$.9^{17}7030$	1.033
10^{50}	1×10^{24}	2×10^{24}	7.949×10^{7}	$.96421$	7.949×10^{7}
1	3×10^{-4}	5×10^{-4}	4.218×10^{-4}	$.9^{24}0104$	4.218×10^{-4}
10^{75}	1×10^{47}	3×10^{47}	2.955×10^{8}	$.1681$	2.955×10^{8}

$$.999999991234 = .9^{8}1234$$

$$v = \sqrt{1-\left[\frac{1}{1+\left(\frac{M}{2\pi h}\right)\left(\frac{1}{D_f}-\frac{1}{D_i}\right)}\right]^{2}}$$

Appendix D: A Comparison of Redshifts (General Relativity vs. E Theory)

Mass (kg)	R_1 *(m)*	R_2 *(m)*	*General Relativity (z)*	*E Theory (z)*	*% Difference*
2×10^{30}	1×10^{9}	2×10^{9}	7.40×10^{-7}	7.40×10^{-7}	0.00
1×10^{31}	2×10^{8}	5×10^{8}	2.23×10^{-5}	2.22×10^{-5}	0.45
2×10^{31}	5×10^{6}	1×10^{7}	1.50×10^{-3}	1.48×10^{-3}	1.33
1×10^{31}	2×10^{5}	1×10^{5}	4.25×10^{-2}	3.71×10^{-2}	12.7
5×10^{33}	1×10^{4}	5×10^{4}	*Undefined*	2.96×10^{2}	- - -
1×10^{34}	3×10^{3}	7×10^{3}	*Undefined*	1.41×10^{3}	- - -
1×10^{34}	1×10^{3}	∞	*Undefined*	7.41×10^{3}	- - -

General Relativity values are calculated using:

$$z = \sqrt{\frac{1-\frac{2GM}{c^2 R_2}}{1-\frac{2GM}{c^2 R_1}}} - 1$$

E Theory values are calculated using:

$$LEF = \frac{1}{1+GM\left[\frac{1}{R_2}-\frac{1}{R_1}\right]} = \frac{1}{1+z}$$

Or,

$$z = \frac{GM}{c^2}\left[\frac{1}{R_2}-\frac{1}{R_1}\right]$$

Appendix E: Values of Select Physical Constants

Entity	Value (conventional)	Value (in energimes)
Speed of Light	$3.00 \times 10^{8}\, m/s$	1.00
Gravitational Constant	$6.67 \times 10^{-11} \frac{m^3}{kg \cdot s^2}$	1.59×10^{-66}
Planck's Constant	$6.63 \times 10^{-34} \frac{kg \cdot m^2}{s}$	9.9×10^{64}
Electron Charge	$1.60 \times 10^{-19}\, C$	4.16×10^{42}
Electron Rest Mass	$9.11 \times 10^{-31}\, kg$	4.16×10^{42}
Proton Rest Mass	$1.67 \times 10^{-27}\, kg$	7.63×10^{45}
Permittivity Constant	$8.85 \times 10^{-12} \frac{C^2}{N \cdot m^2}$	1.20×10^{22}
Permeability Constant	$4\pi \times 10^{-7} \frac{N}{A^2}$	8.32×10^{-23}
Standard Gravitational Acceleration	$9.81 \frac{m}{s^2}$	1.07×10^{18}
Mass of Earth	$5.98 \times 10^{24}\, kg$	2.73×10^{97}
Mass of Sun	$1.99 \times 10^{30}\, kg$	9.09×10^{102}
Radius of Sun	$7 \times 10^{8}\, m$	7×10^{42}
Inverse Fine Structure Constant	137	137

Additional Information and References

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