

On A Heuristic Viewpoint Concerning
The Nature of Motion, Infinite Time, Infinite Distance and Infinite Space:
Sub-atomic Particle and Resonance Articulations as the basis for Motion

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By
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(Don Collins)

Abstract

I am a little worried. You see, I understand why the sky is blue and why it is that the stars shine. I know about the crimson glow of cosmic clouds bathed in artificial light; the crystallized comets, how angry meteors become meteorites and of course I know the asteroids. I know a comfortable something about the universe from its beginning to its end – at least as much as the next man knows. I am always surprised about the size of things like galaxies and I am amazed at which ways they appear to go.

The spin-quick quasars are fabulous and big black holes are everywhere.

But what...what, I ask... is the great big black thing

That dominates the night by

holding up the

sky?

Don Collins

This paper intends to merge the concepts of Quantum Electro Dynamics (QED) with the concepts of classical physics. There is a standing assumption, then, that the reader is familiar with QED and has recently reviewed current classical physical theory regarding both subjects.

This paper explores the *reason* for the practical existence of QED. I offer some simple mathematical formulas as proofs and I have selected many well known physical experiments used throughout the classical literature to make the key points of this paper's assumptions ring true through what I believe to be an obvious set of conclusions.

The process of *articulation* is the lynch pin between QED and classical physics. QED processes do not adhere to the laws concerning classical time, motion, or acceleration and distance. Neither do the first, fundamental laws of classical physics. The process of articulation is discussed more fully below.

In this paper the terms "*Universe*" or "*Observable Universe*" will apply to the visible universe. The visible universe is that fraction of the 4% of the environment we can observe around us with our present day technology. Present day technology includes but is not limited to light telescopes, radio telescopes, x-ray signal detectors, microwave signal detectors, satellites, under-ground liquid filled neutrino detectors, particle accelerators and many other even more exotic devices. The universe comprises a relatively orderly and compact system as contrasted with the *Cosmos* of which the universe is part.

The term “*Cosmos*” applies to all the material and energy that is contained within and *beyond* the observable universe and which stretches to infinity. The cosmos comprises a chaotic loosely organized system. The cosmos envelopes and includes the universe(s) or *multiverse* and all the conceivable dimensions.

The observable universe is composed of approximately 73% dark energy. Despite all our best efforts we cannot learn anything about dark energy. This elusive substance does not absorb any type of energy nor does it radiate any detectable signature. Dark energy has been detected by the effect it has on the surrounding materials that we can see or observe. Much of the same can be said for Dark matter that makes up approximately 23% of the observable universe. Dark matter was discovered because of its conspicuous absence from known cosmic observations, calculations and predictions. Dark matter is the *missing cosmic mass* that was discovered in much the same way that dark energy was. Current conjecture is that the missing dark masses and dark energies are largely made up of Higgs Bosons and their collective energetic effect on other sub-atomic particles passing through as field of Higgs Bosons.

The scope of this paper is organized around the following conceptualizations of a new cosmic model loosely referred to as the *EC model*. After reviewing standard models of the universe as well as the generalized terms of the formulas used to describe them a new infinite cosmic model formula is introduced: **EC = Me** (net energy of the cosmos is equal to the value of absolute cosmic mass times the value of absolute total cosmic energy). **EC = Me** is an *infinite* cosmic model and therefore is inherently different from all other models presented to date. The new formula is defined and discussed in detail below.

The EC model demonstrates that an infinite cosmos envelopes the finite observable universe. The EC model also demonstrates that the *reason* for the Quantum Electro Dynamic (QED) system itself is *the sum of the energy involved in the infinite number of interactions* between the *masses* and *energies* of the two separate systems that make up the infinite cosmos. The EC model also explains *how* classical physics may be joined with QED. Following are a list of the basic theorems complimentary to the focus of this paper and its intended conclusion:

EC = Me **Conceptual Outline**

Part I

- a) To demonstrate that there is an *energy of the cosmos* (EC) that exist as a net product certainly in two states, $\infty > -1$, $\infty < +1$ and probabilistically as an intermediate state $\infty \approx 0$ (but expressed herein as $>0<$).
- b) To illustrate the *quantum characteristics* of cosmic matter and the cosmic mass energy net (Me) which is the total cosmic mass multiplied by the total cosmic energy).
- c) To illustrate that all the standard models of the universe: Big Bang(s), Static, Radiation Dominated and Matter Dominated Universe (open or closed models) have to be imbedded within an infinitely sized body of cosmic material.

- d) To illustrate that classical universal structure and cosmic structure have different characteristics and that each system operates under distinct laws of physics.
- e) To demonstrate that both systems are interacting at the quantum level through the process of articulation and that QED and classical physics are interconnected in this way.
- f) To demonstrate that the infinitely dense singularity as described by Stephen Hawking had begun with an infinite mass and energy and that this infinite mass and energy have been conserved and that they exist today in an infinitely complex space.
- g) To put forward the heuristic notion that there are no degrees of freedom for any motion of any particle, wave or resonance inside the universe or in the cosmos, that time, distance and space are infinite in every direction regardless of geometry.

Part II.

- a) To contrast *movement or the classical fluid dynamic* with *articulation* as the fundamental means of change throughout the cosmos.
- b) To present the formula $EC = Me$ as the heuristic point of view from which understanding the apparent articulation of the cosmos at the quantum level will arise.
- c) To review the current, classical theoretical geometric models of the universe for contrast with the EC infinite net cosmic model.
- d) To review the relevant mathematical formulas which describe the current classical standard models of the universe.
- e) To introduce the concept of cosmic granularity and QED effects as the basis for cosmic articulation. To review and re-define the probabilities for a static model of the universe. To represent articulation is the merge point for classical physics and QED.
- f) To discuss standard formulas used to describe the current concepts of space-time and to introduce the binomial expansion formula used to calculate the dimensions of the EC infinite cosmic model.
- g) To review and re-define the concepts of the expansion of the universe.

The Particulars

*How did we wind up in this
particular universe?
Don Collins*

Consistently, upon examination of the theories behind the mathematics, we do not find effective proof for an event like the Big Bang. There is no proof of the first moments of the *notion of time*, since the big bang or what would have happened in that *time*, past 10^{-38} sec. The Big Bang, however, even with all of its logical and mathematical difficulty, should not be dismissed. The majority of physicists and astrologers believe in the Big Bang concept as the original event of the universe. And it is commonly believed that the universe is all there is. The Big Bang may have formed the observable universe but believing that this model is the final description of the cosmos is a mistake. Thinking otherwise is thinking like those in ancient times who felt that the world was flat.

There is definitely more cosmic activity going on than what we can observe. Theoretical physicists postulate that there may have been many events that have led to many different types of universes. Each event may have produced a different type of universe. But, this paper will assume in the classical way that the universe(s) we have before us and all of its dimensions, however many you wish, is the only universe we have and that it is inside a larger body of material, another structure with subtly different physical laws and that structure is called the cosmos.

This paper proposes that the Big Bang(s) may have taken place inside the larger structure, as defined herein as the cosmos. The Big Bang concept is rarely understood. Stephen Hawking introduced the concept of a singularity. Because of the word “singularity” the general misconception has been that there was just one “Big Bang”. The most difficult thing to conceptualize about the Big Bang theory is that it happened *everywhere* at once. That means this was a really huge event or series of events that happened simultaneously.

A less difficult analogy may help conceptualize the Big Bang. Imagine that there is nothing - absolutely nothing – and nowhere for anything to be. No space, no dimensions big or small - *Nothing*.

Introduce into this most sterile environment a particle *one trillion times smaller than an electron*. And make the *assumption* that an *infinite number of particles* of all types and flavors are compressed inside this tiny object. If that single particle, that *singularity* became unstable, then instantly something would happen *everywhere*. All those infinite particles and infinite energy would become the infinite mass and infinite energy of the cosmos and would exist for an infinite time.

An electron is the lightest particle of mass that we know of that has an electric charge. The electron has an antiparticle, the positron, and both masses can be expressed as $e \pm 0.5110 \text{ MeV}/c^2$ the smallest mass besides sub-atomic particles that we know of. An electron has an infinite lifespan. But given that they can be annihilated from time to time by collisions at very high speeds with other particles and given that gamma rays may decay into a new electron – positron pair, we, at any instant have to say that electrons are *expected* to have an infinite lifespan. But in fact, any particle including baryons like the electron or photon can come and go exhibiting a shorter lifespan than expected. Special circumstances can also give birth to or destroy an electron; the event horizon of a black hole for instance is a known location where electrons and positrons can do quite unexpected things, like *move away* from the event horizon. This is counter intuitive but I hear it happens every day.

This paper reviews, in part, what work has already been done on the once very popular static state model of the universe. The static model of the universe fills in with new galaxies as the cubic area of the universe increases. The static model proposes a homogenous distribution of matter and energy throughout the universe. When the distribution of matter is measured on average this is true. However on a finite scale that relates to QED systems that concept of the distribution of matter is not true.

The intention of this paper is to maintain that there has always been an infinite cosmic structure and that matter and energy were always present in infinite quantities and always will be. So the focus of this writing is to determine a new model in which the observable universe is embedded in a larger cosmic structure that is truly infinite in every direction.

The first question after the introduction of the Big Bang theory was “Where did the Big Bang happen?” The most informed answers turn out to be only more theories the most popular of which is that the Big Bang happened everywhere at once.

The simple truth is that whether the universe began with or without the Big Bang, it began with an infinite number of particles and an infinite amount of energy. The cosmos now must have the same infinite mass and infinite energy dispersed throughout the infinite cosmos. The laws of conservation of energy and conservation of mass tell us this is so.

I refer to an infinitely sized cosmos because I have a lot of trouble fitting an infinite number of particles and their related infinite energy into a finite space (i.e. the observable universe alone). It just doesn't make sense. But, if time, distance and acceleration make sense to you then any fantasy about reality will do for you. But be warned, *time*, *distance* and *acceleration* are just sign posts on the road up ahead that leads to the Twilight Zone.

If we accept the idea of the singularity as described so elegantly by Stephen Hawking then we have to accept the idea that the observable universe may be all that we have, accept all the dimensional ideas, about fifteen of them altogether, and we would have to accept that an infinite number of particles and their related infinite energy are now crowded together in a limited, finite space. We are forced to accept other principles as well, for instance, we would have to accept *acceleration* and *limited distance* and *limited time*. That scenario would lead to the conclusion that the universe has some geometrical shape, a border where *beyond* does not exist and some undefined arrow of time. I am not prepared to do that. God bless you Mr. Feynman for explaining the facts of life to us. It is reasonable to assume that there is a larger body of matter surrounding the universe because an infinite amount of matter and energy needs an infinite space in which to exist.

The purpose of this paper is to introduce the concept of $EC = Me$ to analyze and explore the persisting accuracy of the Static Model of the Cosmos in a vital new way. In this paper I will contrast and compare the present day Standard Model of the Cosmos with other well known, standard models for the universe: Matter dominated, radiation dominated, the standard model and a *new* heuristic proposal, a *Static Cosmic Model under auspices of* $EC = Me$. This formula is a *new representation* of a very old and ordinary description of motion. Inherent in the $EC=Me$ solution is the concept of *articulation*. To understand how articulation creates the effective illusion of motion we need to look at what is now known about QED and classical physics. The new heuristic formula relates motion to a

specific effect of net cosmic energy (EC) and an infinite quantum mass energy (Me) and explores the possible trigonometric ratios of each model to the other.

The left hand side of the equation “**EC**” is the quantitative net *energy of the cosmos* that is the sum of all potential and kinetic energy and all dark energy (dark energy comprises 73% of the Cosmos) that is available *now* (where now is any given *instant*) to make *all things* happen in the Cosmos. This energy is available in three states, *more energy, less energy, and a quantity of energy that is out of the question*. One way or another these energy states can be generally expressed as $\infty > -1$, $>0 <$, $\infty < +1$. No units of measurement have been assigned to EC because infinite cosmic energy can exist as more or less infinite energy. Energy in the mid point of transition between kinetic and potential states, or *energy completely at rest* is neither potential nor kinetic and is the energy defined as “energy that is out of the question”. This is not the same as the rest energy of a particle or wave equal to mc^2 .

The right hand side of the equation “**Me**”, mass times energy, is the quantitative sum of all matter inside and outside the observable universe and all related energy in the cosmos. Me is the abbreviated form of

$$\begin{array}{l} \text{Formula 1.} \qquad |M| + |Am| + |Dm| + |Qp| \\ \qquad \qquad \qquad \text{or} \\ \text{Formula 1(a).} \qquad |M| + |Am| + |Dm| + |Qr| \end{array}$$

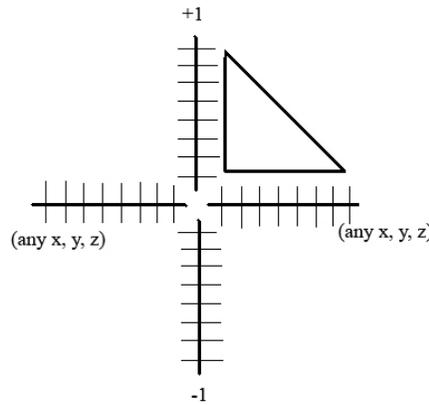
...where M = matter, Am = Antimatter, Dm = Dark Matter, and Qp = Quantum Particles in a matter dominated model of the Cosmos and Qr = Quantum resonances and is substituted for Qp in an energy dominated model of the Cosmos.

The radiation dominated standard model is analyzed later for contrast and comparison. Infinite quantities are assigned as values on this side of the formula. The interacting variants of matter and energy are considered to be available in three states, more matter, less matter, energy that is out of the question. These matter and energy states can be generally expressed as $\infty > -1$, $>0 <$, $\infty < +1$. In the fine mathematical models of the EC = Me static cosmos these solutions are limits to the states of matter expressed on the right hand side of the equation.

The solutions to EC are net energies of the cosmos expressed as $\infty > -1$, $>0 <$, $\infty < +1$ in the Figure below. Note there is no zero point on any axis. The triangle represents all the possible solutions of EC and can be designated in any quadrant of the graph. In the Figure below, showing any x, y (z) the triangle has been set for example in the positive quadrant, assuming that any x, y, z extended from >0 to $+1$. Axis z has been omitted for clarity. Z would be the axis perpendicular to and intersecting the (any x, y, z) axis at any point between $>0 <$ and $+1$ or -1 . No axial point exists at zero and there is no EC solution or any derivative of the EC solution at zero. There are no axial lines intersecting at zero and it is not necessary to represent any particular axial in the example below as exactly x, y or z. The (Figure 5) showing a one dimension potential well is presented later for clarification of this concept. The triangle representing solutions for EC could have been placed in any quadrant for this example to relate to this text. In fact, the graph could be represented as a sphere with any radii on the sphere extending toward the center but never reaching the center. The solution, then, would be any area

inside the sphere that is limited at the surface of the sphere but never reaches the center which could be represented as point zero.

Figure 1



This graph represents the condition at the ECEH boundary of $\infty > -1, > 0 <, \infty < +1$ as both ∞ and zero = 1 in any real number system. *No units of measurement of the energy or matter have been assigned because infinite net energy of the cosmos, **Me**, can exist as more or less infinite matter and energy.*

Dark Matter, itself, has given away no clue under observation as to what it is. The pass through effect related to the EC event horizon (ECEH) hopefully will provide a valid theory beyond the best guess that WIMPS make up the majority of dark matter. The scientific community has related the effects of Dark Matter to the effects of Gravity and Gravity itself has come under a great deal of suspicion as it has never been observed as a wave or as a particle.

Yet, many of our calculations rely on the use of the gravitational constant. This affects our concepts and calculations of distance and time. The scientific community has so far only evolved through all our scientific discoveries and efforts, a highly analytical, very practical mathematical dream that describes very little of the observable universe. With all our observational skills we as a technologically advanced community have failed to detail at least 99% of the cosmos. Sometimes I wonder if we really know anything at all. We are like children. We are pretty good at smashing things apart but not very good at all at putting things together. No pun intended. It is the chaos of the cosmos that creates order in the universe.

Logically, there must be a net energy to the cosmos that has a miniscule variant as described above. This net energy is relative to the existence or non-existence of particles. In order for the cosmos to *work* there must always be an odd particle (or anti-particle) held apart from the entire system. Any singularity would have to have something in its environment to radiate to or receive radiation from. And if the cosmos were an equally balanced system there would be no dimensions, no space, no time or change from which we would be able to derive motion.

Infinite Time, Distance and Space

*To be or
Not to be or
Simply out of the question!
Don Collins*

It is difficult to remember how I first came to feel that there was no time. I think after I learned that the planet Mars has a different day than we experience here on earth, called the Sol, that I instinctively knew something was wrong with the concept of time. I was in my late twenties before I realized that the rotation of our planet Earth was slowing down little by little and our time keepers had to adjust our most sensitive clocks by a second or so every so often to make sure our measures of *time* were kept in step with nature.

I remember my Dad teaching my older brother, George, the formula $R \times T = D$ (Rate multiplied by Time is equal to Distance). I always remembered that formula myself, and then one day I had an epiphany about infinity. If numbers run to infinity and infinity is truly incomprehensible, I thought, then there was no way distance, measured in numbers, was really comprehensible. If that is so, then how does that affect our concepts about time? Time also, must be truly incomprehensible. I was confused by the practicality of the matter of time and did not until very recently understand the significance of my feelings.

In my opinion Albert Einstein was not correct in introducing his cosmological constant λ and I am sure that Stephen Hawking made a mistake in introducing his cosmological constant to explain the inconsistencies in the mathematical representations that he used to describe the earliest stages of his Big Bang theory and his description of the *singularity*. Both Einstein and Hawkins were most probably initially correct in their greatest works. They both had their greatest doubts about their work and introduced each of their constants to satisfy their collegial interests.

Isaac Newton summarized the basic, classical ideas of physics in his work, *The Principia*. It is Newton's conservation theory that helps me to design a practical re-definition of the current models used to describe the universe. The current static model assumes that new galaxies are condensed in between old ones as the universe expands. But this idea is not consistent with the observations of universal expansion that we see today. The interaction between the universe and the cosmos is the reason for the observed expansion, and the development of new galaxies is in fact the affectation of QED.

Newton clearly vouched for a classical static universe. This paper talks in definite terms about the validity of this model with some revisions in the basic theory. The basic fault in the model of the static universe in Newton's time was that a static universe was composed of all matter that was always everywhere and that's the way things were deemed to be, infinitely. This was the man who purportedly wrote the principia in a year and a half. Willem de Sitter vouched for a static universe and so did many other significant physical scientists.

If everything (all matter and all energy) is everywhere - infinitely, then I submit that space is absolutely full, jammed packed, so to speak, with the absolute order of all types of things. Everything, then, is packed into the cosmos "shoulder to shoulder" and there is *no degree of freedom* for any thing

to *move*. This statement is based on the conjecture that an infinite amount of things need an infinite amount of space in which to order themselves and therefore to exist – or not!

And for something within such an *EC defined* cosmos to *move* in the classical sense would be like introducing a new color into the rainbow. In fact, the introduction of a *brand new wavelength* into the electromagnetic spectrum is absolutely what it would take for something to *move* in the classical sense of our notion of motion.

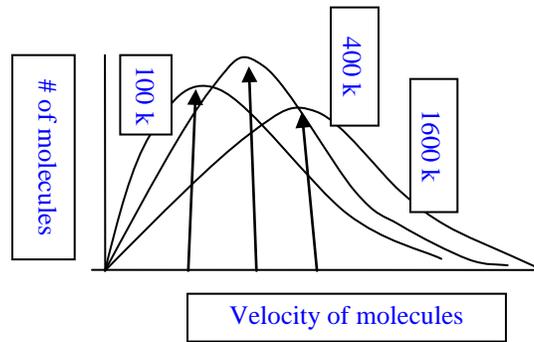
An electron appears to be “standing still” whenever or however we measure it because *it is in fact standing still at the instant it is measured*. The sooner we realize this phenomenon is a real observation that may be always counted on, and it is not the result of the act of measurement, the better. The effect we call *motion* is in fact a result of instantaneous Quantum Electrodynamics. Electrons and other particles do not defy measurement. Science does not have to yield to the Heisenberg uncertainty principle. The positions of the particles may vary when we try to measure them but not because of what we have classically defined as motion. The positions of particles vary upon measurement because of a myriad of quantum effects. Quantum effects give us *articulation of matter* not the effect of *motion*.

There are an infinite number of particles making up the infinite number of objects around us. In the observable universe we think of 10^{80} particles as making up everything. Ho, Hum! The universe and the cosmos are static, but everything in it is changing position (but not moving!) at the quantum level because of the quantum effects. The cosmos is not moving but it is *articulate*. That is, sub-atomic particles *change position* every hundred billion, billion, billionth of a second or so. The effect of all these quantum transactions gives us a *sense* or *illusion of motion* throughout our observable realm.

How Quantum theory developed is significant to the heuristic nature of this paper. After Newton described the basic classical ideas of physics, Lord Kelvin (1824-1907) was able to clarify the differences between the theory of relativity and quantum theory. Exactly, he proposed that there were two different worlds. One that followed classical Newtonian laws, relativity, and a vaguer sub-atomic world that had quite different physical rules and was counter intuitive to everything learned about the physical world before and that set everyone in the scientific community up on their toes. This is demonstrably similar to the difference I am trying to express herein between the structures and natures of the universe and the cosmos.

Next, James Maxwell (1831-79) developed his keen insights making his contribution - the Maxwell distribution. The average gas in one mole contains about 6×10^{23} molecules. He could not use Newton's laws to calculate the motion of all those molecules so he ingeniously introduced a new theory concerning the mean squared velocity of molecules in a gas. The Maxwell distribution graph was the first real step in understanding particles, in this case molecules. His experiments showed that the number of molecules increased in velocity with increasing heat. The famous distribution graph is represented immediately below.

Figure 2



The basic formulas from which these processes were deduced are listed below:

Newton's first law of inertia, the second law of force $F = ma$, James Prescott Joule's (1818-1869) equivalence of mechanical energy to work done, $Work = F \times d$, Kinetic Energy, $KE = \frac{1}{2}mv^2$ acceleration $a = \frac{v_1 - v_0}{t}$, displacement $d = v_0t + \frac{1}{2}at^2$ and $G = \frac{m_1m_2}{d^2}$, and a few variations on the same things, such as $PE = weight \times Height$ for potential energy. The geometric solutions for the volumes needed to finish the calculations were well known since the time of the works of Euclid and the Pythagoreans.

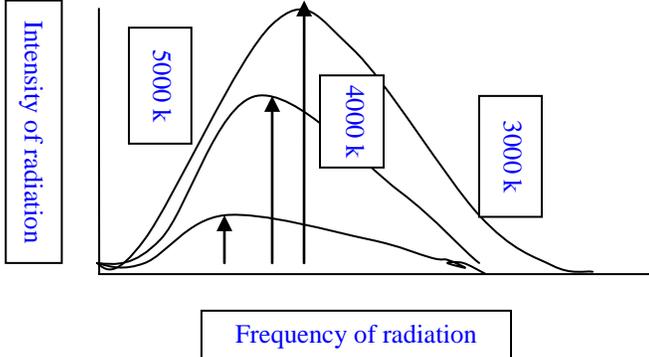
These are the same formulas that will verify the purposes of this paper. Also, Ludwig Boltzmann (1844-1906) gives the orthodox description of any collection of entities: the theorem of the equipartition of energy. He pointed out that the "energy of a system will be shared equally among all degrees of freedom if the system reaches thermal equilibrium. This was a new interpretation of the second law of thermodynamics and it is noted as $Entropy = S = k \log W$ where k is a constant called Boltzmann's constant and W is the probability that a particular arrangement of atoms will occur. Boltzmann also introduced the notion of fluctuations, "a small probability exists that all of the molecules of a system of *confined* gas might appear for just an instant in just one small corner of the system (i.e. a corner in a cubicle or point in a spherical holding the gas). This possibility must exist if the probabilistic interpretation of the entropy is to be allowed. This is called *an energy fluctuation*. Now, thinking outside the box...Stephen Hawking's singularity may have been such an energy fluctuation. The condensation of gas to make a star is another immediate example of this effect. The condensation of particles to form a planet is yet another. In other words, all the objects in the 4% we can see and interact within the visible universe are all other examples. These objects include us.

So, right away, I'm thinking, well if that is true for any system, then how does it apply to say, a universe? How would it apply to a universe that is imbedded in an infinitely sized cosmos? Probabilistically, then, the Big Bang could have happened in a static cosmos. All the objects in the system could have all been incorporated at some instant into a singularity. It also turns out that Boltzmann hit upon something in statistical mechanics that is relevant to the model of the cosmos that I am introducing here.

From about 1900 until 1930 a virtual war raged in the physics communities between the concepts of classical physics and quantum physics. Enter Albert Einstein, Max Planck and Neils Bohr. Planck

said, "Measurements made on the radiation escaping from a small hole in a closed heated oven, a cavity, shows that the intensity of the radiation varies very strongly with the frequency of the radiation". The dominant frequency shifts to a higher value as the temperature is increased as shown in the graph below:

Figure 3



Black Body radiation curves and Maxwell velocity distribution curves are very similar. One of the big problems for physicists in the late 1890's arose from this similarity. A close study of Maxwell's ideal gas and corresponding data for high end radiation (ultraviolet) seemed to say that the radiation from a cup of hot tea could give you sunburn. The general name for the problem was the ultraviolet catastrophe. Rapidly, Lord Raleigh (1842-1919) and James Jeans (1877-1946) worked with the substitution of waves for particles and found nothing but more catastrophes in the works. Max Planck, though, found that the second law of thermodynamics went deeper than anyone previously thought. He predicted a radiation law that would be independent of special bodies and substances. Planck thought of oscillators in the wall of the cavity vibrating back and forth under thermal agitation. Planck assumed that all possible electromagnetic frequencies would be present. He also expected the average frequency to increase at higher temperatures as heating the wall of the cavity caused the oscillators to vibrate faster and faster until thermal equilibrium was reached. He wound up by trial and error with a formula that worked in linking the measurements of both systems and solved the ultraviolet quandrum: (we have to think like this to join QED and Classical Physics!)

Formula 2
$$E = \frac{C_1 f^s}{e \times p(-c_2 f / T) - 1}$$

The constants C1 and C2 are numbers chosen by Planck to make the equation fit the experiments. The result was a curve that dropped off in energy for radiating bodies and populations everywhere were from then on able to live without the fear of being sunburned to a crisp by a hot cup of tea :).

Planck had his own dilemmas with his formula but finally discovered that by limiting the energy to finite pieces where at the end of every piece, energy was allowed to drop to >0, he was able to derive the constant we respect and know as *h*, or Planck's constant. This told the scientific community that energy radiated in discrete units named *quanta*. That is the short story of how quantum theory was born. Then came Neils Bohr (1906-1962) who correctly interpreted Balmer's formula and discovered the angular momentum of quanta, or bits of energy that were just the right size to justify the work on atomic structure begun by Neils Bohr. Line spectra were studied more and more and the

more we looked the more we saw. New quanta were discovered and eventually the mechanics, electrical properties and basic dynamics were brought to light – so to speak.

Standard Models Of the Universe

Which way did that Galaxy go?

Don Collins

Hey you...you move, you glow, you die...

Don Collins

Standard space-time geometry for the standard model of the universe is expressed by the metric:

Formula 3
$$ds^2 = -dt + a^2(t) \left[dx^2 + \sin^2 x (d\theta^2 + \sin^2 \theta d\phi^2) \right]$$

Where does it all begin? We just don't know. We don't know what happened in the first 10^{-38} sec of the Big Bang. That is why the concept of the big bang remains a theory. We don't know where everything began according to this theory and we only suspect where it might end. That is if there is any end at all. We have developed very little factual material on the subject, because we just can't measure, or fathom, infinity. Remember that these models and assumptions presented in this section are not the models and assumptions upon which EC=Me is based. These models and assumptions are being presented as points of familiar origin from which I hope to drag the reader into sharing with me a new expression of and understanding of the cosmos.

Formula 4

EC=Me

The EC=Me model does not involve geometry, gravity, time or distance. It only seeks to determine the qualitative nature of the interactions between a set of universal systems making up the cosmos, no matter the origins or ends. The EC=Me model has everything to do with the ideas and formulas for Kinetic and Potential energy, and Work. Quantum Electro Dynamic theory applies in total. QED is the physiological correlative of EC=Me. The EC=Me net value *energizes* the connection between classical physics and all quantum theories. Below are the classical and standard models of the universe as the scientific community now deals with the available data. These models do involve classical physics and these formulas do involve geometry, gravity, time and distance.

The EC=Me model *resolves* that the connection between classical physics and QED is *articulation*. Articulation is a new interpretation of motion. This interpretation is all important in resolving that the two systems, classical physics and QED are really only one open system. EC is a constant like G (gravity), e (electron spin factors), h (Plank's length), c (the speed of light) or, mpr (mass of a proton at rest).

Assumptions

*'Twas the night before Christmas
And all through the house
Not a lepton was stirring...
Not even a mouse!
Don Collins*

The *principles of equivalence* are at the forefront of this discussion. The Big Bang theoretically resulted from a singularity that contained an infinite number of particles and an infinite amount of energy. It follows that the cosmos today must also contain an infinite number of particles, or an infinite mix of particles and an infinite amount of energy. I call the singularity the *primary cosmic state*. The short dissertation above on the development of quantum theory led, of course, indirectly to the discovery of the universal microwave background detection (COBE survey map) which lends proof to the Big Bang concept. The focus here doesn't deal with the Big Bang pro or con. However it should be noted that the mean temperature throughout the universe as measured by the COBE survey is 2 degrees Kelvin. That temperature most probably is the heat energy generated by articulation throughout the cosmos. My conjecture here is about interactions between the universe and the cosmos and is based on several assumptions.

Assumption 1: Newton's laws of conservation energy (momentum) and matter (mass) are true on an infinite cosmic scale. It is not logical that an infinite number of particles and infinite amounts of energy presumably created in the big bang now occupy a finite space.

Assumption 2: Cosmic energy; radiation, dark energy, gamma ray bursts, x-rays – all cosmic energy, is responsible for the activity of everything in and outside of the Observable universe.

Note 1: In this paper, everything that is observable or detectable is considered under the umbrella of "observable universe", and everything outside the scope of that radius is considered "cosmic" which of course includes the observable universe with all of its known and theoretical dimensions and possibilities.

Assumption 3: All energy, cosmic energy, including dark energy is coincidentally potential **and** kinetic energy. It is therefore represented as a net energy, EC.

Assumption 4: All cosmic matter is composed of subatomic particles that are the building blocks of all heavier materials.

Assumption 5: The observable universe appears to expand exponentially according to the binomial factor $(a + b)^N$ that builds the series:

$$(a + b)^n = a^n + na^{n-1}b + \frac{n(n-1)}{2!} \cdot a^{n-2}b^2 + \frac{n(n-1)(n-2)}{3!} a^{n-3}b^3 + \dots + nab^{n-1} + b^n$$

Formula 5

...where a = radius of universe, b = growth rate of universe and n = acceleration factor (variables of +1, 0, -1) at intervals in the infinite series above. And any discussion of classical acceleration is mute by the new definition of motion... $EC = Me$. It is better to say that $(a + b)^N$ is the rate of QED processes integrating the material of the universe into the material of the cosmos and *vice-versa*, than to say the universe is simply expanding.

Assumption 6: The EC Event Horizon ECEH can be approximated to the imaginary surface of the infinite cosmos with a **radius** = ∞ = **a**.

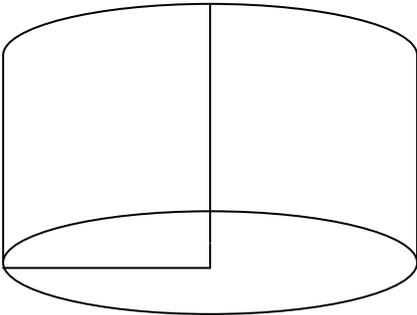
In the Cosmos with radius a , The ECEH is assumed to be spherical and the surface area would be calculated by the simplicity, $4\pi a^2$ and when $EC = |X|$ then $EC = \frac{3}{4}\pi a^3$. This assumption considers cosmic geometry. The focus of this paper *does not* consider cosmic geometry. In a truly infinite space there is no geometry. However, certain of the examples and comparisons that contrast and compare classical physical models with QED models are easier to discuss by adding Assumptions 4 and 5.

The ECEH is of undetermined depth. Like dark matter, the ECEH is everywhere, all around us in every direction in the cosmos. The ECEH is the element of this discussion that ties together classical physics and QED. It is also assumed for discussion to be spherical, again so that a context for comparison and contrast may be developed. This spherical dimension for the Cosmos will be useful in contrasting and comparing the matter dominated Cosmos, the radiation dominated Cosmos, the Standard model and the EC=ME model, introduced here. A system of QED reactions can be tested in the laboratory, while string theory or M theory cannot, therefore I have made no attempt to compare and contrast the two models.

Assumption 7: For any curved, three dimensional spaces including the curves of individual loops, strings, partial waves, quantum or sub-quantum particle interactions that may roil on the surface area of the cosmos, then:

Formula 6
 $EC = 2 \pi a h$

Figure 4



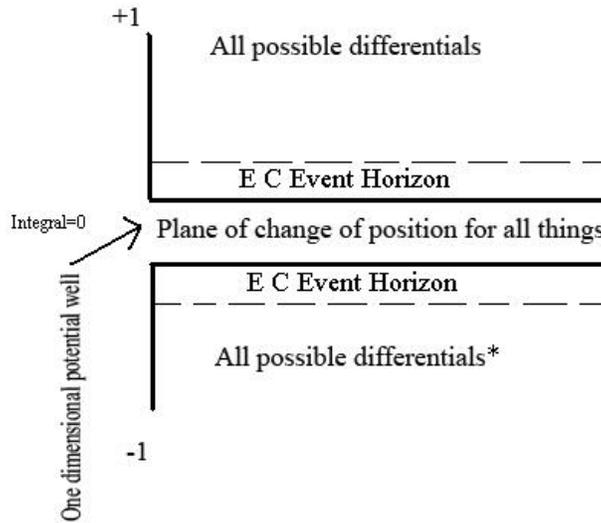
... with a natural trigonometric relationship:

$\sin^2 x + \cos^2 x = 1$ that corresponds with $EC = |x|$ in any case of variable $\infty (-1, >0, +1)$ where the values for any solution for $EC = |x|$ is a real number where each solution is a limit and $0 = |1|$ by pure definition of 0 in the real number system.

Formula 7

$$\int_{>-1}^{<+1} |x| \text{ where } x \neq 0$$

Figure 5



Assumption 8: The cosmos, except for the calculations of idealized solutions are used for example only and *does not have* a true fluid dynamic. The apparent motion throughout the cosmos is not a result of fluid motion or of any motion of any kind. QED affects *articulation* in the cosmos. A series of articulation events on ECEH emit the illusion of motion. The catalyst in an articulated system of single frame of the system of articulation is *pressure*.

The cosmos is not classically static, except for in the case of Einstein’s constant, λ , where his use of λ is consistent with the related analytical works of Willem de Witter and Newton’s “immovable” characterization of the universe.

Some of these assumptions are classical and are being made merely to orient the reader to familiar material that will allow the reader to grasp the simplicity of the new ideas inherent in $EC = Me$. The concepts presented in the assumptions are common to most writings about the universe, and analyses of its structure and content. They help to preserve the idea of continuity from the old ideas to the new. Really, the basic formulas presented in the above section describing the birth of quantum theory are all the reader needs to know in order to understand $EC=Me$.

In the simplest verbal terms the EC model of the cosmos and the reluctantly embedded universe are characteristically the same but structurally different. This matter is treated more carefully in the

section that deals with the density of the universe as contrasted with the density of the cosmos lying beyond the ECEH (*net* Energy of the Cosmic Event Horizon).

Discussion

*Sometimes I feel like I am sliding through the cosmos
On a sheet of lightening one mile wide and one mile long...
Sideways at the speed of thought...
Don Collins 1966*

Quantum Electro Dynamics define the effect of the Universal and Cosmic structures upon one another as more Cosmic material becomes involved with Universal material. The quantum process of this involvement of Cosmic material becoming part of the Universal material is classically referred to as “the expansion of the universe”. A comfortable presentation of the EC=Me idea in mathematical formulas would be just too complicated for anyone at all. Such a system of formulas would all count to infinity because they would have to describe the infinite number of QED transactions against a background that has no comparable scale of randomness (i.e. classical physics).

For instance, again, for orientation’s sake, Einstein’s field equation (doubled for convenience):

Formula 8 $2G = 16\pi T$

...has its whole force concentrated in its *OO* or *ii* component, namely *the initial value equation*

Formula 9 $\frac{6}{a^2} \left(\frac{da}{dt}\right)^2 + \frac{6}{a^2} = 16\pi\rho$

where the two terms on the left receive separate names: the “second variant” of the “extrinsic curvature” of a “space-like slice” (here a three sphere) at the given instant itself. The formula is time dependent and defines motion to appear simple.

Maxwell derived the original equation:

Formula 10 $\nu \cdot \varepsilon = 4\pi$

after study we find that the purpose of the equations is to imply that the total amount of mass-energy of the universe *changes* from instant to instant in accordance with the work done by pressure during the expansion of the universe (pressure against what?) but we are talking about Maxwell who preceded Einstein, so I won’t criticize anything at all, at this time:

Formula 10 $d [\text{density of mass energy} \times \text{volume}] = - \text{pressure} \times d(\text{volume})$

...where the density of mass-energy remained a constant:

Formula 11 $\rho \cdot 2\pi^2 a^3 = M$

which was then converted according to convention (peer pressure) to a more convenient quantity **A(max)** (radius of universe at the phase of maximum universal expansion – one standard model of the universe at the time) defined by:

Formula 12
$$a_{\max} = 4m/3\pi$$

and the decisive component of the Einstein field equation in the terms of this notation then becomes:

Formula 13
$$\frac{6}{a^2} \left(\frac{da}{dt}\right)^2 + \frac{6}{a^2} = 16\pi\rho$$

or, remembering that the standard model of the universe at that time considered that the universe was in an expansion state only temporarily, and it was generally accepted that it would reach a limit A(max) and then due to the tug of gravity begin to reverse direction and collapse back into another Big Bang scenario...

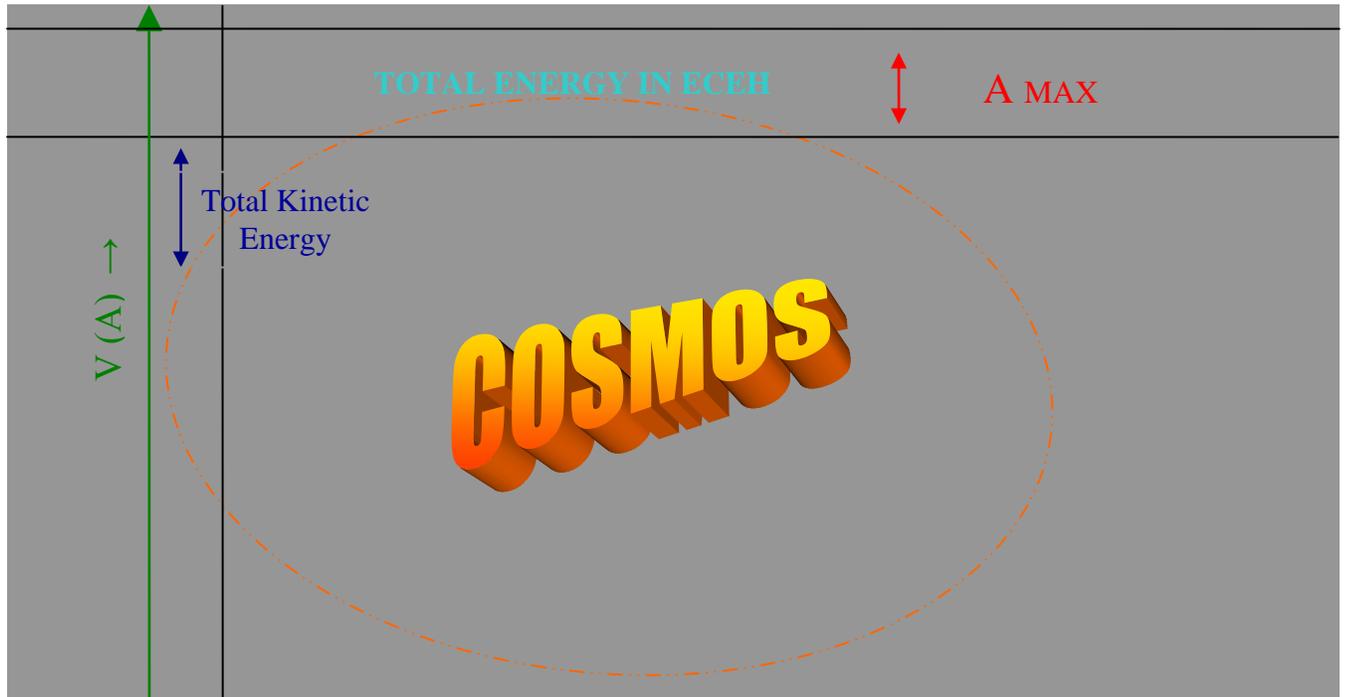
Formula 14
$$\left(\frac{da}{dt}\right)^2 - \frac{a(\max)}{a} = -1$$

The first term in the top equation has the qualitative character of “kinetic energy” in an elementary problem in Newtonian mechanics. The second term has the qualitative character of a “potential energy”;

Formula 15
$$V(a) = -\frac{a(\max)}{a}$$

...resulting from an inverse square of Newtonian force.

Figure 6



where a is the radius of the universe in the formula above the graph and is equal to “-1” or the right hand side with the total energy as in the Newtonian problem. The qualitative characteristics of the dynamics manifest upon an inspection of the diagram above. Values of the radius of the universe, (a) greater than A_{max} are not possible (except: when $EC = Me = -1$), because the potential energy would exceed the total energy in the system and the Kinetic energy of expansion would have to become negative, which is impossible. In this graphic example the velocity of the expansion decreases as the expansion proceeds. The expansion velocity falls to zero at the “turning point” (a) = A_{max} . Thereafter this model of the universe as a system dictates a reversal or contraction of the current expansion. Unfortunately, the mathematics “bunch up” the realities they represent, such as some distant galaxies and some exotic materials scattered about the universe, and it seems that some of these things in the Universe are older than the Big Bang calculations currently allow.

Immediately observable today is the present rate of expansion of the universe, based on the Hubble constant, H_0 with every distance increasing at a rate directly proportional to the negative of that distance.

Formula 16

velocity of recession of a galaxy / distance to a galaxy = $H_0 \sim 55$ km/sec

The Hubble constant, H_0 is one of the most important recent discoveries and has helped a great deal in the analysis of the different theoretical models. The old standard model which is explored in this paper helped the scientific community to realize what the model presented above describes: that one in which scientists expected that the universe would expand up to a maximum diameter and then be contracted back to a singularity perhaps as part of an endless cycle of expansion and contraction. That model had some serious problems that eventually undermined the whole of the theory. It turned out that there was an inequality between Hubble, or *extrapolated* time and the actual time it would take all matter to collapse back into a singularity.

The Old Standard Model

*There is more than one reason for everything,
And everything seems to be reasonable...*

Don Collins

This is a good point in the paper to take a serious look at two basic models of the Universe, the standard Matter Dominated model and the standard Radiation Dominated model. Thanks again to the immense work in the book *Gravitation* for these formulas and observations.

Formulas (17, 17a, 18, 18a, 19, 19a)

**Inequality between Ho
or extrapolated time**

	$H^{-1} \geq 1.5t$ Matter Dominated	$H^{-1} \geq 2t$ Radiation Dominated
Type of Standard Model		
Basis		
Density of Mass Energy	$P_m = \frac{3}{\pi a^2 \max(1 - \cos n)^3}$	$P_r = \frac{3}{8\pi a^2 \max(\sin^4 n)}$
This density expressed In terms of H expansion rate	$P_m = \frac{3H^2}{8\pi} \cdot \frac{2}{1 + \cos n}$	$P_r = \frac{3H^2}{8\pi} \cdot \frac{1}{\cos^e n}$
Inequality satisfied by density	$P_m = \frac{3H^2}{8\pi}$	$P_m = \frac{3H^2}{8\pi}$

The concept of time is overwhelmed in these two older standard models. The new standard model allows for calculations of an “open” universe that is infinitely expanding. However, as we shall see, this model, whether considered as a matter or radiation dominated model, has its own breaking points.

This is where EC = Me contrasts sharply with other theoretical models. The EC = Me static model of the cosmos suggests that particular material far out in the cosmos can instantly appear anywhere inside or outside the observable universe and particular material inside the universe can instantly appear anywhere, including the area outside or inside the observable universe:

Formulas (20, 20a)

$$EC = M + Am + D,+Qp \text{ for the matter dominated model}$$

Or,

$$EC = |M + Am + Dm + Qr| \text{ for the radiation dominated model}$$

There are no distance limits to QED interactions. The dynamic effects of QED, allow for the concept of motion as described in the EC = Me model. This model is based on a changing granular structure for all things. I am saying that the Cosmos is not *moving*. But it is *articulate* and that it does undergo *change*, and objects within it change position every few hundred billion,

billion billionths of a second (every 10^{-45} seconds), or so. But I am *not* saying that things move smoothly from one place to another as described by the classical notion of motion.

A good example of what this means and of how things really happen in the Cosmos would be to contrast and compare an old fashioned 38 rpm record with a strip of moving projector film and then compare the latter to a movie encoded digitally on a CD. The old fashioned record is like our first picture of the solar system containing only limited information that gave us a basic idea of what actually happened somewhere else (i.e. big bang = recording studio) and that information could not be changed or updated, unlike the record's immediate successor, the magnetic tape. The magnetic tape made it very easy to change the information when the need arose. We could erase the tape and tape over it to change it.

The moving projector film added more dimensions to recorded information (i.e. modern observational technologies). Reality is composed of *still picture frames* that make up a *movie*. The picture frames pass through the projector at a rate that is faster than our mind's ability to distinguish one complete image from another. Each image only changes slightly, one frame to another. The result is the illusion of motion. The information was still unchangeable until the media changed again. A digital CD can carry pictures and sound and can be rewritten at will without changes to the primary source code. Since the digits, 0's and 1's, can be rearranged easily, we can get all sorts of information from the digital recording that may not have been expected when the original recording was made. Still, each segment of 0's and 1's represent a frame, and a similar effect to projector film arises when we read and view the full sequence of segments containing 0's and 1's. But even with the newer technology, digital CD equipment, we are still dealing only with more technologically advanced *still frames*.

This paper carries this reasoning further. The point is that frames of projector film pass through our eyes view at a rate of 28 or so frames per second in comparison to what we view as *reality*. Our everyday reality passes our eye view in frames composed of quadrillions of particles, coming and going from view (existence) at a rate of several hundred billion, billion, billion "frames" per second. So, things change so quickly that we have developed this sense or *notion* of motion in our minds. And, unlike movie frames, the frames of reality never "pass" before our eyes as *some of the material is always there*. There is no "black line" or completely empty space between *frames* in reality. Particle accelerators are catching up to reality. This is the technology that will prove the link between quantum dynamics and classical physics once the right equipment comes on line and the data is interpreted correctly.

We are stuck, biologically, in a Newtonian sense of motion, but reality is composed of quadrillions of particles that leave existence at one position in space and pop back into existence almost instantaneously, sometimes nearby and sometimes at very great distances. Sometimes the particles pop into existence before they pop out of existence delineating the arrow of *time*. Quantum Electro Dynamics explains this effect very well and I will touch upon the QED phenomenon and its effects, but just briefly. I know graduate students in physics who have difficulty with this part of physical theory. QED is just too broad to be justly discussed in this paper. It is not necessary to understand either classical physics or QED to appreciate and enjoy the point of this paper.

While the borders of the observable universe appear to be *moving* away from us at enormous velocities – the recession velocity of some very distant galaxies is greater than the speed of light - borders are not actually *moving* as described by classical theories of motion, but rather, borders are the effect of matter and energy *articulating* through QED interactions of sub-atomic matter and virtually empty space at an increasingly enormous rate. It is in this way that virtually empty space (the birthplace of proteonic matter) and sub-atomic particles are incorporated by swapping places. This illuminates our present conjecture about *the notion of motion*. The inequalities between the spherical standard models of the cosmos that are described later in this paper allow us better to conceptualize the meaning here.

Summarizing, the universe has uniform density and mass energy everywhere and is the same *on average*. The cosmos characteristically, at the QED level is the same as the universe, however on an infinitely larger and less organized scale. The major difference is that the universe has organized energy, space and material and the cosmos is just a loose collection of smaller (sub-atomic), less dense particles and random *variations* of energy.

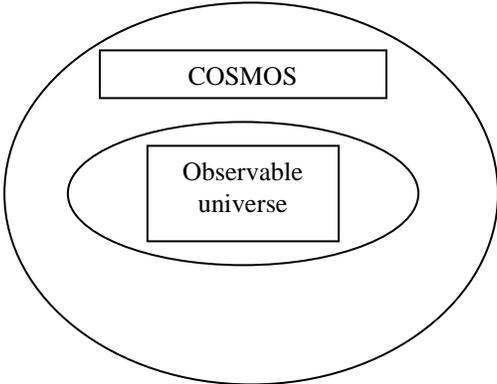
The geometry of the cosmos (when we must speak of it in the EC = Me model) is homogenous and isotropic and the curvature of space everywhere is the same, always was so and always will be so. In a closed model of the universe, that is embedded in the cosmos (except for Einstein’s geometric theory of gravity) includes not only his field equation:

Formula 21 $G = 8\Pi T$

...but also his boundary condition of closure would be imposed on any solution of EC=Me. *This contrast is for analytical purposes only*. EC = Me is neither an open or closed model, but rather a model of infinite scale without any important dimension or geometry.

A three sphere satisfies the following requirements: homogeneity, isotropy and closure (that must be considered for the imbedded model to be understood) and may be presented as:

Figure 7



Here is the basic idea. The Figure describes the observable universe as it is embedded in the cosmos. There is no definitive “border” between the two concepts. The *border* would be the ECEH with the characteristics outlined in this paper. The ECEH exists everywhere, in both entities. The

Cosmos contains sub-atomic particles or pieces of sub-atomic particles, radiation and virtually empty space. Virtually empty space is a hotbed of proteomic particle activity.

The Observable universe is composed of approximately 4% of visible matter, 23% Dark Matter and, 73% Dark Energy. Clearly at present 96% of the Observable Universe cannot be observed. Therefore we know very little of it. The 4% that we can observe cannot sensibly be categorized yet. The area outside the Observable universe is thoughtfully “out of the question”. But it cannot remain so for much longer. The activity 14.5 or 15 billion light years out and away from here is simply classified as a *phenomenon* we don’t understand. However, the process of articulation allows the human mind to *sense* the characteristics of an infinite environment. Because of the nature of QED we do not have to go to the end of the universe or the distant reaches of the cosmos. They come to us.

The reason for this phenomenon is dealt with later, by example, toward the end this paper. There are many observable characteristics within our reality that tell us that there are some problems with reality. These characteristics avail themselves upon close examination of anti-matter, symmetry, super symmetry, the lack of a proposed directional arrow for the concept of time, the relativistic nature of space-time, the observation and refraction of light and the reversal of time in some QED transactions.

For instance, the mysteries observed as Gamma Ray bursts at the edge of the observable universe, some questions about the red shift itself, the recession velocity of the most distant galaxies, the determination that galaxies and the Observable Universe itself *are not* rotating and other new views of things tell us that everything may not have its roots locally, but at the edge or border of “it all” (de Sitter space and related phenomenon)...and is the natural generalization of the metric on a circle and a 2-shpere:

Table 1

spheres of selected dimensions	visualized as embedded in Euclidian Space of 1 higher dimension	transformation from Cartesian to polar coordinates	metric on S^n as polar coordinates
---------------------------------------	--	---	--

Formulas 22, 23 and 24

S1	$x^2 + y^2 = a^2$	$x = a \cos \phi$ $y = a \sin \phi$	$ds^2 = a^2 d\phi^2$
S2	$x^2 + y^2 + z^2 = a^2$	$x = \sin \phi \cos \phi$ $y = \sin \phi \sin \phi$ $z = a \cos \phi$	$ds^2 = a^2 (d\theta^2 + \sin^2 \theta d\phi^2)$
S3	$x^2 + y^2 + z^2 + w^2 = a^2$	$x = a \sin x \sin \phi \cos \phi$ $y = a \sin x \sin \phi \sin \phi$ $z = a \sin x \cos \phi$ $w = a \cos \phi$	$ds^2 = a^2 [dx^2 + \sin^2 x (d\theta^2 + \sin^2 \theta d\phi^2)]$

The following argument here is that when any sphere S^n is visualized as embedded in a Euclidian space of one higher dimension:

Formula 25

$$x^2 + y^2 = a^2$$

or, as stated earlier

(Formula 5)

$$(a + b)^N$$

for $S^{n!}$ any excursion off the sphere is physically meaningless and is forbidden. Each of the three spheres suggests a complete geometry. But the mathematical orientations give at least three distinctly qualified spheres, each of a single higher dimension, and their individual characteristic trigonometric relationships. These are familiar and we can build on these descriptions to develop a new theory about what is going on at the borders of these spheres.

I have already pointed out in the assumptions that the ECEH is quite a different matter, having no fixed density, depth, geometry, diameter or circumference. There is no surface area, really, to ECEH. And quantum excursions occur from the inside and from the surface of the observable universe which can be described as S1, S2 or S3 deep into the infinite surroundings of the cosmos. QED excursions not only from the surfaces of each sphere are not just possible because the value of a boundary of a boundary is zero; they migrate from one sphere to the other without regard for the mathematics involved. The *QED excursions* then, are the link(s) between classical physics and quantum physics. The mission of such a voyaging particle, wave or mixed energy state is to become either articulated matter or articulated energy, each mission or voyage to be as long or as short as may be necessary to accomplish the needed solution in EC=Me.

So these provided and well understood examples of spherical universes, that are limited to the conditions of finite mathematical expressions, make sense to use in the explanation and construction of the EC = Me model of the cosmos. EC=Me is the *anything goes* model.

There is no claim in this paper about this new model that the model itself is either radiation or matter dominated. Many atomic (i.e. leptons) and sub-atomic particles (i.e. quarks) exhibit properties of both mass (matter) and radiation (energy). *When* we are lucky enough to find such particles with present day technology, we are actually detecting in what state particles are found as mass or radiation energy at the ECEH.

I will carefully examine the QED models of mass and energy as they are the most important, inherent inclusions of reality that affect the EC = Me model. It is here that $E = MC^\infty$ as described for EC=Me and the ECEH that the relationship between particle and classical physics becomes clear.

Clouds of sub-atomic particles, quarks, gluons, neutrinos, resonances and other exotic materials fill the Universe and the Cosmos in which this paper supposes the Universe is imbedded in. This paper proposes that the Universe is growing by involving, through Quantum Electro Dynamic Reactions the free sub-atomic particles in *whatever* form they may be found, *whenever, wherever*, with the virtual space of the larger Cosmos. Virtual space, remember, is a hotbed of proteonic activity This is an interesting consideration that may illuminate a new detail of Dark Matter and reveal something similar about Dark Energy.

EC = Me is a tool to be used in developing new ideas about what is happening all around us in a systematic way that includes most or all of the work in physics done before and probably well after this point in evolution. EC=Me specifies the value at any given instant relative to the link between QED laws and classical physical laws. It is the value of the *articulate integration* of the two. EC=Me does not illustrate the difference between QED and classical physics. It is more likely that the 2 degree Kelvin temperate invariance throughout the cosmos is the result of the combined interactions, births and deaths, of sub-atomic particles. EC = Me specifies what nature is and not what nature does. It has *nothing* to do with what nature *should do* in any hypothetical situation.

ARTICULATION
And EC=Me as a
NEW COSMOLOGICAL CONSTANT
Easy come, easy go...
Anonymous

The following five panels demonstrate a system of differentiated states of the electron and sub atomic particles varying in size. The articulating particles are moving in and out of existence every one hundred billion, billion billionth of a second. Please note that I have taken the liberty of organizing the dots in the illustration and have made them apparently on a single plane and have positioned the difference in panels 1 through 5 so that the particles drift to the left. In the left most panel, for instance, the large green dot starts a vertical line of particles in the illustration. From top to bottom they appear as green, blue, yellow, dark green, red and white. The purpose of this chain is simply to provide a point of reference.

The implication of a particle drift was not intended but the over all graphic design seems to be the clearest way of showing that particles do come and go where and when they please. You should also note the limitation of a two dimensional representation of a three dimensional idea; like the view of stars across the sky at night does not take into effect that the direction of motion may be away from the viewer. Stars that are very bright but far away appear farther away than stars that are dimmer but closer to the observer. Similarly particles in reality drift in all directions including in and out of the plane of this page at various angles and depths. A simple graphic such as the one below cannot demonstrate this fact accurately if at all. It should be noted that if the green dot (see the arrow above panel (1) represents, say, an electron, that in panel (2) the green dot does not necessarily represent the *same* electron.

One of the limits of EC=Me can range from $>0<$ to $\infty + 1$. Infinity + 1 may be represented by $E = MC^{\infty+1}$. The difference between ∞ and $\infty + 1$ is the space changed by the surface of the cosmos in 10^{-45} seconds. The change or net change in space anywhere on the ECEH has this amount of time and only this amount of time to happen. Any other change is not sub-atomic and is the net of a complex chain reaction between sub-atomic particles. This translates to the difference between a cosmos with or without a particle with the smallest possible mass or smallest possible energy with consideration for that particle's passage through the ECEH (see the Figure of the one dimensional potential well, the series of Figures below and the corresponding discussions). EC=Me and the discussed theory is then equivalent to the first *moment* in any theory, say the big bang where the universe is said to have grown from a size one trillion times smaller than an electron to the size of a standard softball. Actually, in the big bang model that first motion of expansion is said to be

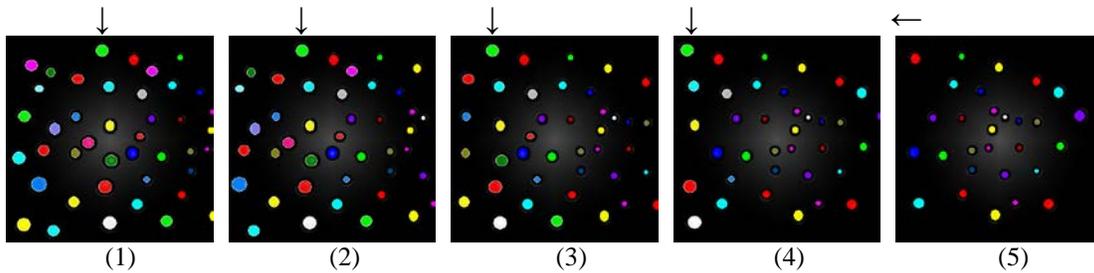
10^{-38} seconds. The difference of 10^{-7} seconds represents the *moment* before the big bang occurred (the *time* during which the original particle of the big had to become unstable). Something had to be there for the big bang to take place. It is interesting to note here that the big bang theory is not a theory that describes the *origin* of the universe but was a theory introduced to describe the *evolution* of the universe we live in. I do not subscribe to the big bang theory at all. Again I say that it is quite unlikely that there ever was an arrangement where an infinite number of particles and an infinite amount of energy occupied a finite space one trillionth the size of an electron. It is not impossible, just quite unlikely. But for the sake of illustration the big bang because it is well known and well studied is an acceptable algorithm and is great for use as an example from which we can extrapolate the truth.

The green particle (see the arrows over the Figures (1), (2), (3) and (4)) could have switched from an electron to a positron (equal mass opposite charge) or as shown directly by the difference of panel (1) and panel (2) the green electron could have popped out of existence from its place in panel (1) and then a different electron of exact same charge and spin could have popped back into existence in panel (2) just at a tiny displacement to the left (in front of, behind, to the right) of itself in this example. Or simply, the green dot could have been replaced by empty space with no charge, a bit of dark matter or a bit of dark energy.

To further the analogy a string of particles presented here arbitrarily for reference only appears under the arrow as a series of reference points only: green, blue, yellow, dark green, red and white. In the real world these particles would rather die than to be seen together at the same time in the same place. No pun intended.

It follows that the net energy or heat of the $EC=Me$ system at the ECEH is the lump sum heat residue which is constant throughout the cosmos that we have been calling COBE background radiation. The system is driven by the infinite number of sub-atomic transactions.

Figure 8



Analysis of this theorem, $EC=Me$ allows for a theory of everything, but does not allow itself to be used as an analytical tool for examining *parts* of the cosmos and will not yield useful numerical solutions as does $F = mv^2$, $R \times T = D$ or $E = mc^2$. $EC = Me$ does not consider *distance* or *time*, but conceptually attempts to *re-describe motion* by analogy with known equations. The classical formulas describe things in terms of distance *and* time. $EC = Me$ does not do this. Space-time is not in the defined scope of this paper. For $EC=Me$ to be explained clearly, the old landmark characteristics of the Cosmos must be at once thrown away, yet *realized*.

The black background in the Figure is important. To the classical physicist it would represent space-time or a quantum idea like the Higgs-boson field. In the Figures above, the black background represents the inactivity of the dark matter / dark energy field for sure but in this paper it is only intended to be representative of the ECEH. As such it can help the reader imagine that the ECEH is three dimensional and is in fact everywhere. The borders of ECEH depicted above are sub-atomic in scale and are so throughout the cosmos. [Click here](#) for an animated Figure of ECEH as a net of $EC=Me$. Again the link between Classical Physics and the Quantum Mechanical Systems also known as Quantum Electro Dynamics

What's the Matter?

*Nothing really matters because
Matter's really nothing!
Don Collins*

The mass distribution of matter is close to homogeneous in the large scale average. The COBE background radiation map gives us some idea of the finite size and shape of the observable universe. The observable universe, though, is problematic, because surely we cannot see everything for any number of good, already discovered reasons. De Witter's "tired light" is one good example. Another, similar analysis tells us that if the recession velocity of the observable universe at some distant point is in fact receding faster than the speed of light, faster than 670,000,000 mph, then nothing will ever be noticed about points involved in or beyond that recession velocity no matter how sophisticated our observational skills become.

ECEH is meant to represent events at that recession velocity equal to and greater than the speed of light. These events have a profound effect on what has been "left behind". The November 2005 issue of Scientific American had a terrific article called "The Illusion of Gravity" that helps us to imagine some new ways to conceptualize gravity, motion, distance and time. Conditions at the Universe / Cosmic border are really the focus of this paper. It therefore is convenient at this time to list a few of the elementary particles. This list will enable the reader to visualize the effects of QED which are an important component of this theory of a *distinctly new, granular cosmos* I am trying to advance in this paper.

Another way to explain the inherent nature of ECEH is to ask what would happen to matter colliding with matter or *resonances* when the speed of matter passes the speed of light squared and reaches the speed of light with an infinite exponential value!

The most indistinct (read: distant) sectors of ECEH (read: forbidden migration off the S^{n1}) would then have the value:

$$E = MC^\infty$$

In order maintain a relationship with classical physics, even non-local classical physics, we need a formula that will yield a finite value from elements of the formula that include infinity. ECEH values are reduced to $EC=Me$ which is the *manageable* flux of infinity, $(-1, >0<, +1)$.

The Link Between Classical Physics And Quantum Electro Dynamic Mechanical Transactions

I have to remind you that the ECEH, or net cosmic energy event horizon, is the *thing* that matter passes through when it phases into or phases out of the cosmos. Mass and energy phase in or out of the cosmos anywhere. The link between classical physics and quantum electro dynamic transactions is the effect of articulation operating at the speed of light or greater to infinite value. The special theory of relativity is valid only up until the speed c is reached. The speed limitation of classical physics does not break down in the quantum electro dynamic transactions because events at a speed greater than c simply spend their excessive energy phasing in and out of the cosmos at greater and greater distances than predicted by classical physical formulas. Articulating particles *migrate* away from any surface at a variable infinite speed and the boundary between the classical physical world and the proteonic quantum transactions exist as a totally separate fabric of the cosmos than does space-time. If the articulation of a transaction is predicted to be $EC = >-1$, for instance, classical physics applies to the quantum state in theory. As well, if the articulation of a transaction is predicted to be $EC = <+1$ practical classical physics again applies. When $EC = >0<$, known classical formulas apply. If it should transpire ever that EC does somehow equal 0 remember that EC is presented as an absolute value and that 0 is equal to 1 by definition in the real number system.

The connectivity between quantum electro dynamics and classical physics only breaks down when predictions beyond the fundamental laws of physics are pressed into service. $R \times T = D$ breaks down. But, $F = M \times V$ does not. Not ever. $E = MC^2$ will never break down when used in either system, and the exponent of C squared may rise to infinity plus almost one, fall to near zero, or approximate almost -1 as suggested by $EC=Me$. The fundamental rules always apply to both systems. No time dependent fundamentals will apply to both systems. Any formula subject to limited intervals of time, distance and space cannot be integrated into both systems.

The formulas of Faraday and Maxwell concerning electromagnetism are the firmest tie between quantum mechanics and classical physics.

Table 2

Some Elementary Particles

Class	Name	Symbol	Charge	Mass $\frac{MeV}{c^2}$	Lifetime
Leptons	Photon	γ	0	0	∞
	Nuetrino	ν_e	0	0	∞
		ν_μ	0	0	∞
		ν_c	0	0	∞
	Electron	e^\pm	$\pm e$	0.5110	∞
	Muon	μ^\pm	$\pm e$	105.7	2.20×10^{-6}
	Tau	τ^\pm	$\pm e$	1777	2.91×10^{-13}
Hadrons	Pion	π^\pm	$\pm e$	139.6	2.60×10^{-8}
		π^0	0	135.0	0.84×10^{-16}
Mesons	Kaon	K^\pm	$\pm e$	493.7	1.24×10^{-8}
		K^0	0	497.7	0.89×10^{-10}
	Dmeson	D^\pm	$\pm e$	1869	10.6×10^{-13}
		D^0	0	1865	4.2×10^{-13}
	Proton	P	+e	938.3	$>1.6 \times 10^{-32}$
	Neutron	n	0	939.6	887
	Lambda	Λ	0	1116	2.63×10^{-10}
Baryons	Sigma	Σ^+	+e	1189	0.80×10^{-10}
		Σ^0	0	1193	7.4×10^{-20}
		Σ^-	-e	1197	1.48×10^{-10}
	Xi	Ξ^0	0	1315	2.90×10^{-10}
		Ξ^-	-e	1321	1.64×10^{-10}
		Ω^-	-e	1672	0.82×10^{-10}

Quantum particles vary a great deal. This representation of subatomic particles is taken directly from the book *Gravitation* and represents only a small sampling of particles that have been observed. Some are small, massless and carry no charge. Others have a hint of mass and may or may not carry a charge. These varied particles have peculiar effects at the border between the Universe and the Cosmos. The ECEH region and the outer Cosmos form sort of a particle soup. Some of these particles, like the photon and free electron start out as only resonances. The resonances have effects upon the lightest of the particles and their anti-particles or neutral forms of the particle. The resonances excite the smaller particles. The smaller bits and pieces eventually collide to form the basic sub-atomic elements of atoms, which in turn join to form atoms and once an atom is formed, complete with at least one orbiting electron, it becomes fit to transduce a photon, rendering the

characteristic of visibility and may perhaps eventually be sent on a path toward our observable universe.

It is very possible that some particles as large as or larger than photons may be created just inside the ECEH but with such an orientation that they fly away from our observable universe, disappearing into the endless cosmos and though they once might have been part of the universe, they will never ever be observed again. It is as if 96% of the cosmos around every real thing is trapped in a wormhole that sucks matter away from the observable universe to such great distances away that it is always unobservable. The ECEH is actually the hyper surface of the universe where the recession velocity on the border varies from just below the speed of light, equal to the speed of light and in excess of the speed of light up to infinite velocities. In this region of space, $EC=Me$ becomes a bare bones, no frills, unqualified descriptor of the observable universe and its complex interactions with the larger cosmos. A relatively simple analogy gives us a clearer picture of $EC = Me$. The analogy involves the close study of how photons interact with matter.

I was reading “Six Easy Pieces” by Richard P. Feynman when I came across the following example of how photons interact with matter. Allow me to interject here the *way* in which photons interact with matter, this was part of the epiphany I had about infinity. God bless you wherever you are Mr. Feynman for helping along the correct path!

Photons are transduced through matter. The electrons of any material will absorb a photon in the top molecular layer of the material that is exposed to light. The photons are snatched (absorbed) up by electrons in the transducing medium and travel along with the electrons for a few billion, billion, billionths of a second until they are transferred to the electrons in the next molecular layer of the material, and so on, until all the photons from the light source are emitted from the other side at the last layer, furthest from the light source striking the molecular material. The motion of the transduction process is completely random and arbitrary. But each type of material that can transduce electrons in this manner has a different capacity to manage a certain number of photons because of the varying number and state of the electrons in each molecule of each different type of material. The process creates a significant amount of heat.

Photons interacting with pure silicon crystals (glass) exhibit an interesting characteristic. Ninety-six percent (96%) of all light is reflected away from the surface of the thinnest layer of glass that can be formed with present technology. Only four percent (4%) of the photons are absorbed and transduced by the electrons in the most single layer of glass that can be produced with current technology. Any image viewed from the opposite side of the photon light stream appears largely unchanged! How so if 96% of the photons are missing from the image? That of course is another topic completely and cannot be addressed in this paper.

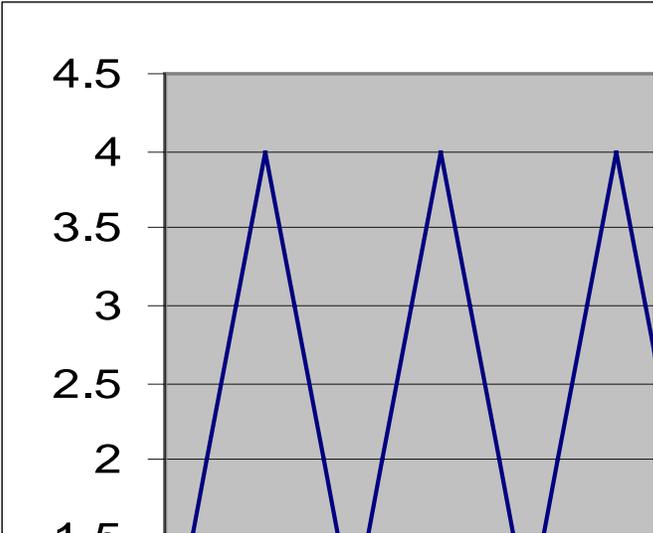
This example does not represent *all* of the ways in which light can be transduced through matter or the way in which it behaves in the presence of most mediums. However, it is a great parallel to the state of affairs in the cosmos as described above.

The production of photons itself is a worthy topic that needs to be re-examined from time to time because of the evolutionary properties of the universe. Just as we expect to find new particles with the advent of larger and better super-colliders we can expect new and more exotic materials to be created

as the recession velocity of the universe gets larger and larger. And the recession velocity of the observable universe does increase so exponentially that new materials are almost impossible to predict.

However, as the glass in the example above is thickened by a carefully measured amount the reflected light is increased and the photon adsorption falls off proportionally to any further increases in thickness until the adsorption and transduction reaches about 1% and then adsorption begins to increase. The result is that as the thinnest layer of glass that we can make thickens, the adsorption amount follows quantitative rise and fall sequences for various values of $f(\theta)$: 4%, 3%, 2%, 1%, 2%, 3%, 4%, 3%, 2%, 1%, 2%, 3%, 4%...

Figure 9



Where $f(\theta)$ is relative to the thickness of a uniformly dense glass.

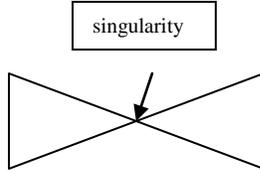
$f(\theta) = \lim (1,4)$ for the process of adsorption and transduction of photons as they interact with glass of increasing density. Specifically photons are absorbed by electrons in one location in matter and emitted (either before or after they are absorbed!) from the electrons at a different location along their geodesic lines. Quantum dynamics do not affect the transduction process. However, by the time a photon passes through a uniform thickness of any material by process of adsorption and transduction, all of the subatomic material comprising the individual photons and the molecules of the transducing material itself might have been swapped away at the ECEH.

Now, for the rest of the analogy, recently it has come to my attention that I can only see 4% of the universe. The universe according to the most recent observations is in a state, a permanent state, of expansion. And the observed cosmic expansion is a permanently accelerating expansion. Up until this discovery it had always been assumed that the universe was experiencing an expansion that would eventually slow down, completely stop, and finally reverse itself. It had been predicted that all of the matter in the universe and its colloquial energies would collapse back into a singularity where it was supposed it all came from in the first place. It had been thought that our present existence was part of a never ending cycle.

The EC=Me concept does not advise us one way or another with regard to an identifiable beginning or end to cosmic activity. It just indicates that such activity is present and has two or more whole number values that we can count on. Without any EC value there would be no articulation and we wouldn't have a notion of motion or a notion of anything else for that matter. There would be no carbon based life forms for sure.

Contraction and Expansion of the universe from a singularity (a single point at ECEH) as part of a cycle:

Figure 10



In order to determine exactly what we must think about in an orderly way, we must now look at the conditions I am proposing to exist at the ECEH border. Firstly, we must examine the inside of the border, in a classical way. Treating the border as a classical hyper surface as defined in Einstein's field equation, but where the radius is so large it is not a function of time!

Formulas 26, 26a, 26b, 26c and 26d

$$\left(\frac{da}{dt}\right)^2 - \frac{8\pi P_{mo} a_0^3/3}{a} - \frac{8\pi P_{ro} a_0^4/3}{a^2} = -1$$

$$\left(\frac{da}{dt}\right)^2 - \frac{a_{max}}{a} = -1 \quad \text{matter dominates}$$

$$\left(\frac{da}{t}\right)^2 - \frac{a^{*2}}{a^2} = -1 \quad \text{radiation dominates}$$

$$(da)^2 - \frac{EC^2}{a} = -1 \quad \text{time does not dominate}$$

$$(da)^2 - \frac{EC_{max}}{EC} = -1 \quad \text{the finite quantitative solution}$$

where $|a| = |EC|$ in the finite quantitative solution, in units of $\frac{g}{cm^3}$ or ergs/sec

and when particle transaction work is done = +1 and Kinetic Energy = 0, EC = >0 to +1

and when no work is done = 0 and Kinetic Energy = 0, EC = >0<

and when there is a potential state for particle transaction = -1 and Kinetic Energy -1

Here, Einstein's equation and his finite limit on EC = Me represents EC in a closed model of the cosmos and all the formulas relate to a fluid dynamic state. When all three values of EC=Me are tried the fluid dynamic state gives way to the granular QED characteristic that becomes absolutely common *everywhere*. The effect of assigning the values = >0 to +1 to Einstein's field equation qualifies the conclusion of a fluid dynamic state to a conclusion that there is a static state that is articulating to accomplish the needed changes in the cosmos to account for the differences in solution. The *values* of

fluid dynamic transactions of classical physics and the *values* of quantum electro dynamic transactions are the same for every model. The only needed change in current thinking about the relationship between the two distinct systems is to think *articulation* instead of thinking *motion*.

Given enough evolutionary change, every model of the universe, open or closed, radiation dominated or matter dominated will be challenged and found to be wrong. This is because articulation breeds evolutionary states of matter and energy. These evolutionary events are largely brought about by accidents – transactions that ordinarily would be considered out of the question, at the ECEH.

I have considered that by first analyzing EC as you would analyze any of the standard models, some confusion might arise. But I think that more confusion would arise if none of the standard models were presented as a basis for a forward view that will lead to using the EC model to describe nature more fully than ever before. *Now* is the *moment* we should realize. Whatever *is now* is *evolving infinitely* and an infinite number of mathematical solutions exist as descriptors of the characteristics of nature for every level of evolution.

Next, let's look at some EC singular reactions without reference to any point on the border, inside or outside the universe. Factually the following descriptions of singular reactions are from sets of well known reactions accomplished in cyclotrons. My purpose in presenting these diagrams is to demonstrate the simultaneity of the three states +1, >0<, and -1 of $EC = Me$. This eliminates the need for a systematic explanation of yet another model of the universe; that is one that is “pulsating” at its edges or borders. It also eliminates the need for the definition of “depth” regarding the geometry of any border. The schematics provide an easy example and reference as to the QED reactions that may occur simply anywhere at all, inside the universe, in the border between the universe and the cosmos and in the cosmos itself. This may be a little redundant but I trust that it is a clear statement of the relevance of the composition and activity that is the focus of this paper. The schematic is not meant to differentiate between atomic and nuclear reactions. That is another story. Put simply enough, an electron has an energy of hf when it makes a quantum leap within an atomic structure. A photon has much more energy and gives of a light called gamma radiation when it makes a quantum jump to leave the nucleus of an atom. These are two distinctly different types of quantum reactions. Both types of reactions take place in the cosmos. In fact, an infinite number of reactions or transactions take place in the cosmos.

SOME COSMIC TRANSACTIONS

The straight lines with the arrows on end do not represent vectors in space-time. They represent articulation toward or away from an event. At the point of the transaction, represented by the small “central” graphic of an explosion, the value for $EC = >0<$. The values assigned to each particle on the way to or away from the point of transaction are assigned the values >-1 and $<+1$ to create a practical example of a sub-atomic particle transaction.

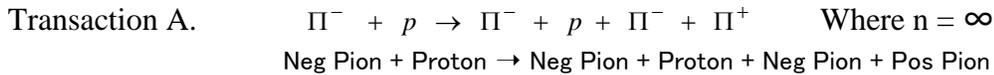
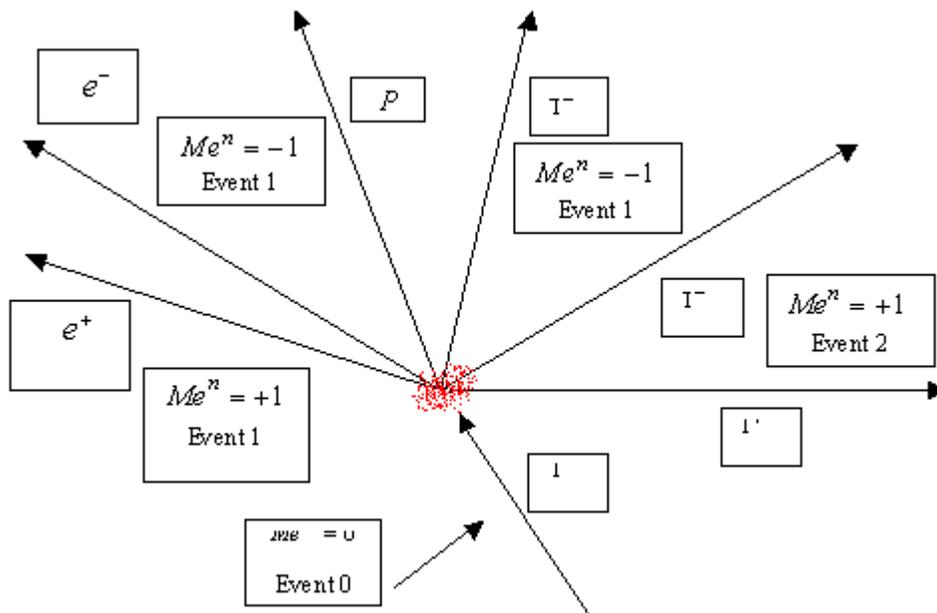


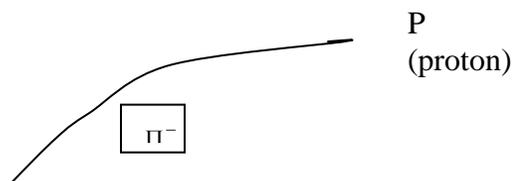
Figure 11



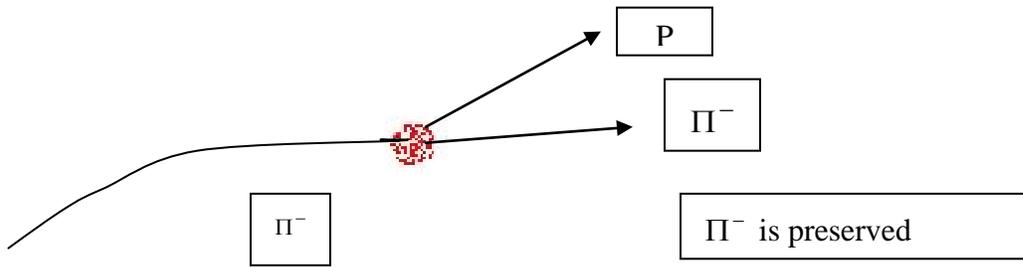
A free pion (Π^-) interacts with another proton to give two neutral particles, a Π^0 and a neutron. The Π^0 decays into two gamma rays. One of the gamma rays creates the electron-positron pair.

Schematic 1.0 Hypothetical reaction in detail; beginning cosmic state $EC = 0$

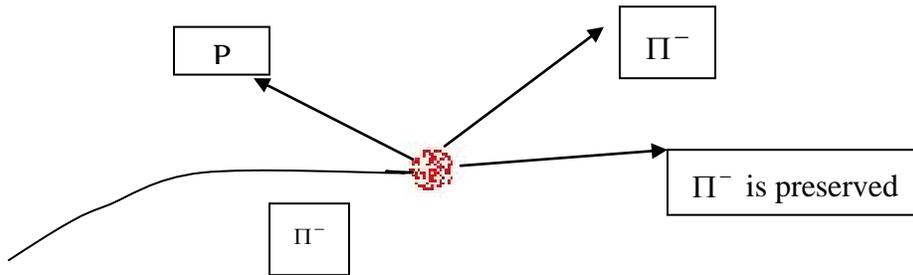
1.a Path of random pion



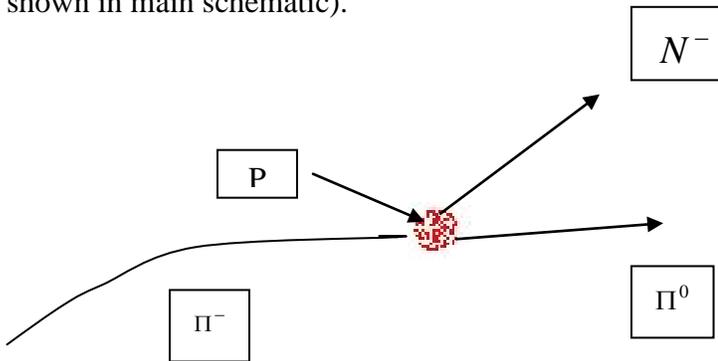
1. b Pion interacts with proton, P



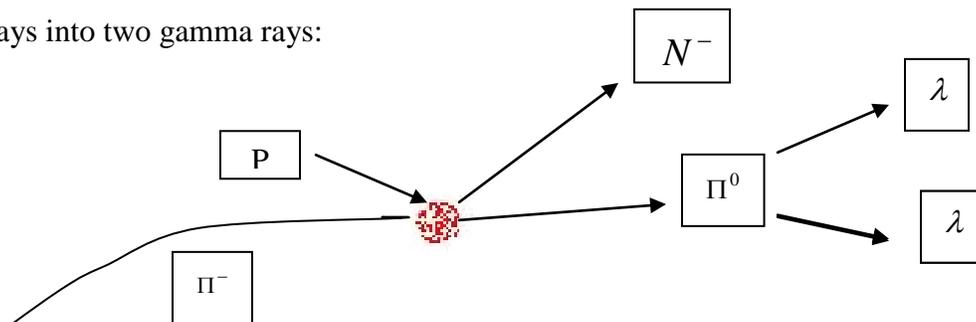
1.c Intermediate reaction



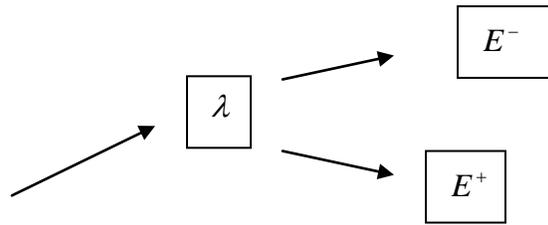
1.d One of the π^- interacts with another proton to give to neutral particles: π^0 and a Neutron (not shown in main schematic).



1.e π^0 decays into two gamma rays:



1.f One of the gamma rays λ undergoes a reaction that creates an electron/positron pair.



CONCLUSIONS

First conclusion: There is no place in the cosmos where there is nothing and there is no place *outside* the cosmos. Virtual empty space anywhere in the cosmos is a hotbed for proteonic activity. Spaces vacated by articulating sub-atomic particles are filled in immediately by other migrating resonance(s), wave(s) or particle(s).

Second conclusion: There is no such thing as motion. Change occurs throughout the cosmos by effects of articulating mass and energy.

Third conclusion: With regard to infinite distance, any traverse between point a and point b is irrelevant and unnecessary.

Fourth conclusion: With regard to infinite time, any duration is irrelevant and unnecessary.

Fifth conclusion: The cosmos is static and infinite and without geometry of any kind as a whole.

Sixth conclusion: There is no case for gravity as there is no graviton. The effect of the process of articulation at the ECEH is what attracts one particle into existence alongside another or vice versa.

Seventh conclusion: Quantum Mechanics and Classical Physics are tied together firmly under the classical laws of electromagnetism as put forth by Maxwell and Faraday.

Eighth conclusion: All classical laws of physics that do not agree with quantum mechanics need to be redefined so that they do. You do not make bricks out of houses. You make houses out of bricks.

FINAL MUSINGS

Time must never be thought of as pre-existing in any sense, it is a manufactured quantity.

Hermann Bondi

[Time is in fact manufactured en masse at the Bureau of International Weights and measures at Sevres, France.]

The great thing about time is that it goes on.

Arthur Eddington

I could be bundled up in a nutshell and count myself as king of infinite space.

William Shakespeare
Hamlet, Act 2, Scene 2

The present moment is a powerful goddess.

Johann Goethe

The distribution between past, present and future is only an illusion, even if a stubborn one.

Albert Einstein

[Einstein's first attempt to construct a model of the universe was based on the assumption that it was static and unchanging.]

Who cares about the half a second after the big bang; what about the half a second before?

Fay Weldon

We cannot catch the fleeting minute and put it alongside a later minute.

Fay Weldon

Einstein said that if quantum mechanics is right, then the world is crazy. Well, Einstein was right. The world is crazy.

Daniel Greenberger

Even God cannot change the past.

Agathon

Should we be prepared to see some day a new structure for the foundations of physics that does away with time? ...Yes, because "time" is in trouble.

John Wheeler

They spend their time mostly looking forward to the past.

John Osborne

Whether there is or there is not time is a question for psychologists. It is not a question for cosmologists.

Edward F. Collins