

Chapter 5

Creation and Evolution of Energy

It is currently thought that energy is self-existent and eternal; at no time is it ever created or destroyed. Revelation agrees that existent energy is eternal but not that it is self-existent. Energy is being created continuously. The absolute origin of energy is in the infinite energy potential of the Unqualified Absolute. Space potency in the Unqualified Absolute appears to be caused by Deity-initiated vibrations in the outer zone on the nether surface of Paradise. The concept of space potency is somewhat comparable in nature but not in origin to the theoretical concept of zero-point energy developed in the early part of the 20th century.

Energy evolves from the prereality of space potency in the Unqualified to the transcendental reality of cosmic force in response to the presence of the Paradise Master Force Organizers. The concept of cosmic force is comparable in several ways to the current concept of vacuum energy. This energy was first experimentally confirmed to exist in 1957. The theoretical quantity of vacuum energy (cosmic force) per cubic meter of space is unimaginably large, which makes it impossible for this energy to be responsive to gravity. Cosmic force is not responsive to gravity. It appears to be the medium in which the instantaneously interacting matter waves of quantum mechanics propagate.

Cosmic force is intentionally evolved by the force organizers into ultimatons, the first evolutionary stage of energy responsive to the absolute gravity of Paradise. Ultimatons are further evolved by the intentional action of the power directors into electrons, which typically contain 100 ultimatons. Ultimatons also evolve into electrons in response to gravity and temperature extremes. Physics has no explanation for the positive and negative electric charges exhibited by protons and electrons and assumes they are elemental properties of matter. We are told that electric charge is determined by the axial revolution of the ultimatons making up protons and electrons. There is persuasive evidence that ultra-high energy cosmic rays, first detected in 1961 by the Rossi Group at M.I.T., consist of ultimatons hitting the upper atmosphere at nearly the velocity of light.

1. Evolutionary Stages

Energy originates in the Unqualified Absolute and evolves through seven stages from the prereality of dead space potency to the absolute reality of living monota.

We incline to the belief that monota is the living, nonspirit energy of Paradise — an eternity counterpart of the living, spirit energy of the Original Son — hence the nonspiritual energy system of the Universal Father. ^{42:2.19}

We cannot differentiate the *nature* of Paradise spirit and Paradise monota; they are apparently alike. ^{42:2.20}

The physical body of Paradise consists of *absolutum*, which is “a homogeneous organization of space potency.... This Paradise source material is neither dead nor alive; it is the original nonspiritual expression of the First Source and Center.” ^{11:2.9} Monota evolves from space potency, but this evolution involves a transformation from dead to living energy. Beyond the electronic stage of evolution, “energy-power ... seems to begin to swing back towards force, but force of a nature very unlike that of space potency and primordial force.” ^{42:2.16} Monota is the living nonspirit energy which animates the material body of Paradise. For even the highest beings, the nature of this nonspirit energy is essentially indistinguishable from spirit energy.

The fourth evolutionary stage is that of electronic energy-matter consisting of subatomic and atomic particles. The evolutionary stages of energy are characterized by a progressive slowing down of the angular velocity of energy particles, their rate of rotation, and by their responsiveness to various forms of gravitation. The authors use the term energy in the broadest possible sense. “ENERGY we use as an all-inclusive term applied to spiritual, mindal, and material realms.” ^{0:6.2} With respect to physical energy, the Divine Counselor says, “We cannot follow your generally accepted definitions of force, energy, and power. There is such paucity of language that we must assign multiple meanings to these terms.” ^{0:6.2}

In discussing physical-energy manifestations, we generally use the terms cosmic force, emergent energy, and universe power. These are often employed as follows:

1. *Cosmic force* embraces all energies deriving from the Unqualified Absolute but which are as yet unresponsive to Paradise gravity.

2. *Emergent energy* embraces those energies which are responsive to Paradise gravity but are as yet unresponsive to local or linear gravity. This is the pre-electronic level of energy-matter.

3. *Universe power* includes all forms of energy which, while still responding to Paradise gravity, are directly responsive to linear gravity. This is the electronic level of energy-matter and all subsequent evolutions thereof. ^{0:6.4-7}

The evolution of space potency into cosmic force on nether Paradise is not described, but this evolution is not exclusively limited to the activated zone of the Unqualified Absolute. Space potency is also transmuted into cosmic force by the functioning of the Paradise Master Force Organizers in the pervaded space of the master universe. "The passive presence of the primary force organizers is sufficient to transform space potency into primordial force..." ^{42:2.10} When cosmic force is transmuted from space potency by the presence of a Paradise Master Force Organizer, it is usually referred to as primordial force; "...the openly recognized transmutation of space potency into primordial force is the primary differentiating function of the tension-presence of the living Paradise force organizers." ^{42:2.7} The force organizers evolve cosmic force from space potency for the purpose of creating nebulae.

Paradise force organizers are nebulae originators; they are able to initiate about their space presence the tremendous cyclones of force ... [which bring] into being the spiral and other nebulae, the mother wheels of the direct-origin suns and their varied systems. ^{15:4.4}

In outer space the force organizers are apparently responsible for the production of the gigantic universe wheels which are now in process of stellar evolution..." ^{12:4.6}

The word "nebula" is used to describe gravitationally bound structures over a very wide scale. A Universal Censor says he knows of nebulae consisting of a few tens of thousands of stars and of others containing "as many as one hundred million suns." ^{15:4.5} Our sun was one of the last originating in the Andronover nebula, from which over a million suns emerged. "The total number of suns and sun systems having origin in the Andronover nebula was 1,013,628. The number of the solar system sun is 1,013,572." ^{57:4.8}

The size, location, and timing of the creation of nebulae by the force organizers are determined by the Architects of the Master Universe, who dwell in the west of Paradise. "The Architects of the Master Universe have at their disposal numerous groups of assistants and helpers, including two vast orders of force organizers, the primary eventuated and the associate transcendental." ^{31:9.12} "These two mighty orders of primordial-force manipulators work exclusively

under the supervision of the Architects of the Master Universe, and at the present time they do not function extensively within the boundaries of the grand universe." 29:5.4 The creation of the material cosmos is intelligently directed; nebulae and galaxies do not randomly appear in space as a simple consequence of mindless physical laws. The organization of material creation into space levels revolving about the absolute gravitational center of Paradise requires a certain measure of symmetrical balance in the cosmic distribution of mass.

The passive presence of a force organizer is sufficient to transmute the *absoluta* of space potency into cosmic force. Primordial force is not responsive to either linear or absolute gravity. "Pure energy (primordial force) and pure spirit are wholly preresponsive to gravity. These primal forces, inhering in the Absolutes, are personally controlled by the Universal Father." 56:1.3 This personal control of cosmic force by the Father includes cosmic gravity. "The bestowal of cosmic force, the domain of cosmic gravity, is the function of the Isle of Paradise." 12:8.2 Cosmic gravity holds cosmic force in revolution about Paradise in the curved paths of the space levels: "cosmic force and emergent energy ... circle forever around the Isle of Paradise." 11:7.8

Following the transmutation of space potency into cosmic force, Primary Master Force Organizers evolve it into the first stage of *emergent energy*, referred to as *puissant energy*. Puissant energy begins to display some responsiveness to absolute Paradise gravity. "Puissant energy is not at first definitely responsive to the Paradise-gravity pull though probably yielding an aggregate-mass or space-directional response to the collective group of absolute influences operative from the nether side of Paradise." 42:2.11 The Mighty Messenger admits to "our inability fully to comprehend the origin, nature, and transmutations of cosmic force." 42:2.23 "The Nebadon Melchizedeks long since denominated the phenomenon of the transmutation of cosmic force into universe power as one of the seven 'infinities of divinity.'" 42:2.22

When puissant energy begins to manifest sufficient responsiveness to absolute gravity, the Primary Master Force Organizers step aside for the Associate Transcendental Master Force Organizers. "When energy emerges to the level of initial response to the circular and absolute-gravity grasp of Paradise, the primary force organizers give way to the functioning of their secondary associates." 42:2.11 This order of force organizers transmutes puissant energy into the second stage of emergent energy, referred to as *gravity energy*. The ultimaton is the first form of emergent energy that is fully responsive to absolute gravity.

These force organizers transmute *primordial force* (pre-energy not responsive to direct Paradise gravity) into primary or *puissant energy*, energy transmuting from the exclusive grasp of the Unqualified Absolute to the gravity grasp of the Isle of Paradise. They are thereupon succeeded by the associate force organizers, who continue the process of energy transmutation from the primary through the secondary or *gravity-energy* stage. 29:5.5

Space potency appears to be an energetic vibration of some kind manifesting as the free space presence of the Unqualified Absolute. Primordial (cosmic) force is a transcendental and undifferentiated force blanket pervading the master universe. Puissant energy is the initial form of emergent energy and includes the infraultimatic rays of wave-energy: “the borderland revolutions of ultimatons as they begin to assume definite form. This is the first stage of emergent energy in which wavelike phenomena can be detected and measured.” 42:5.3 The second stage of emergent energy is the ultimaton, which is “directly responsive to the circular grasp of Paradise (absolute) gravity.” 42:2.12 Ultimatons are now being indirectly detected, apparently, as ultra-high energy cosmic rays striking the top of the earth’s atmosphere. Ultimatons are “the pre-electronic level of energy-matter.” 0:6.6

Within the grand universe the Universe Power Directors usually take over from the Associate Transcendental Master Force Organizers and continue the evolution of energy from ultimatons into electrons and atoms. “Upon the appearance of gravity response, the Associate Master Force Organizers may retire from the energy cyclones of space provided the Universe Power Directors are assignable to that field of action.” 42:2.12 However, most of this evolution of electronic matter from ultimatons seems to occur naturally in response to gravity and temperature extremes: “...very little of superuniverse mass is organized by the direct action of the power directors.” 15:5.1 It appears that the Associate Master Force Organizers turn nebulae over to the Universe Power Directors in the grand universe but not in the universes of outer space. “The Seven Master Spirits are the creators of the Universe Power Directors and their associates, entities who are indispensable to the organization, control, and regulation of the physical energies of the grand universe.” 16:4.3

Ultimatons are responsive to absolute Paradise gravity but not to linear gravity. However, ultimatons “disclos[e] a certain potential for sensitivity to the linear-gravity pull inherent in the soon appearing material mass of the electronic and the postelectronic stages of energy and matter.” 42:2.12 A typical electron is constituted of exactly one hundred ultimatons. “There are never more nor less than one hundred ultimatons in a typical electron.” 42:6.5 Electrons and other subatomic particles are fully responsive to linear gravity. When ultimatons are

organized into an electron, their potential for linear gravity response becomes actualized. Electronic matter is responsive to both absolute and linear gravity.

Table 1: **Energy Levels and Forms of Gravitation**

<i>evolved level</i>	<i>particle</i>	<i>form of gravitation</i>
0. space potency	pre-force fluctuations	none
1. cosmic force	virtual particles	cosmic gravity
2a. puissant energy	infra-ultimatons	partial absolute gravity
2b. gravity energy	ultimatons	absolute gravity
3. universe power	electrons/atoms	linear & absolute gravity

The varying gravitational responses of cosmic force, emergent energy, and universe power are due to different forms of gravitation as well as to the scale of the structures involved. There is also a correlation between gravitational response and the angular velocity of energy particles. "When the energies of the universe are so slowed down that they acquire the requisite degree of motion, then, under favorable conditions, these same energies become mass." 133:5.10 "The ultimatons, unknown on Urantia, slow down through many phases of physical activity before they attain the revolutionary-energy prerequisites to electronic organization." 42:6.4 This relationship between angular velocity and gravitational response is dynamic. A change in the angular velocity of a particle causes a change in the effective force of gravity acting upon it. "Ultimatons are capable of accelerating revolutionary velocity to the point of partial antigravity behavior, but they cannot, independent of force organizers or power directors, attain the critical escape velocity of deindividuation, return to the puissant-energy stage." 42:6.3 An increase in angular velocity results in a decrease in gravitational responsiveness, partial antigravity behavior.

In the Standard Model of particle physics, the electron is taken to be an elementary particle with no subcomponents. Revelation describes four pre-electronic forms of energy: space potency, cosmic force, puissant energy, and ultimatons.

2. Space Potency and Zero-Point Energy

The discovery of special relativity in 1905 demonstrated that space and time are not absolutely constant and independent realities. As velocity increases, duration in the moving frame stretches out, slows down, “dilates,” and distance contracts and shrinks in the direction of motion. In special relativity the relationship between spacetime frames is given by the Lorentz term, $\gamma = 1/\sqrt{1 - v^2/c^2}$, which is always greater than or equal to one. This term incorporates the fundamental relationship between the relative linear velocity v of some object and the velocity of light c in an observer’s frame of reference. Duration in a moving frame (t_1) stretches out as linear velocity increases: $t_1 = t_0\gamma$. Distance in a moving frame (d_1) contracts parallel to the vector of motion as linear velocity increases: $d_1 = d_0/\gamma$. Distance and duration differ in different inertial frames, but the product of distance and duration is a universal constant in every inertial frame, since γ/γ is unity. This constant product of time and space is due to the fact that the velocity of light – distance divided by duration – is a universal constant.

$$d_0\sqrt{1 - v^2/c^2} \cdot \frac{t_0}{\sqrt{1 - v^2/c^2}} = d_1 \cdot t_1$$

This constant product leads to the idea of a spacetime continuum, in which distance and duration can be measured to an arbitrarily high degree of precision. In 1927 Werner Heisenberg published his paper on the uncertainty principle, which demonstrates that both the position and motion of a particle cannot be measured with exact precision at the same instant. The more accurately the position of a moving particle is measured, the less accurately its momentum (mass times velocity) at that instant can be measured, and conversely. “It is impossible accurately to determine, simultaneously, the exact location and the velocity of a moving object.”^{65:6.1} Position and momentum are called conjugate variables in quantum theory.

The limit of accuracy in measuring a particle’s position can be represented by Δx , and the limit of accuracy in its linear momentum by Δp . The uncertainty principle states that the product of these conjugate variables is always greater than or equal to one-half of the Planck constant h , which is the minimum possible change in energy, a quantum of action.

$$\Delta x \Delta p \geq \frac{h}{2}$$

The rate of time in the frame of the particle is determined by its relative velocity. A change in the particle's velocity causes a change in its time as measured by a resting observer: $t_1 = t_0/\gamma$. Distance in the particle's frame is also inversely variable by the same factor. The perfectly precise relationship between spacetime frames described by relativity becomes imprecise and uncertain on the quantum scale. This uncertainty leads to the breakdown of the concept of the spacetime continuum on the quantum scale. The uncertainty principle extends to the particle's relative energy-mass, which is dependent on the spacetime frame. Energy and time are conjugate realities in the same way that position and momentum are. The shorter the time interval Δt over which a change of energy ΔE is measured, the more uncertainty there is in any measurement of the quantity of energy.

$$\Delta E \Delta t \geq \frac{h}{2}$$

Unlike the conjugate relationship between position and momentum, this uncertainty relationship between time and energy applies to particles that are stationary in an inertial frame. The energy of a stationary particle becomes increasingly uncertain as the duration of time over which it is measured is shortened. In the unreachable limit of an instant of time, zero duration, the uncertainty in the quantity of energy becomes theoretically infinite.

Planck's quantum of action imposes minimum limits on the measurement of distance, duration, energy, and mass. The quantum of action has units of angular momentum and a value of $h = 6.626 \times 10^{-34}$ Js (Joule-seconds). In 1905 Einstein proposed that the energy of light is discretely propagated as photons which have an energy equal to Planck's constant times an integral frequency: $E = hf$. The wave frequency f can be transformed into an angular frequency ω by the simple relation $f = \omega/2\pi$. Substituting ω for f , the equation becomes $E = h\omega/2\pi$. The quantity $\hbar = h/2\pi$ is the reduced Planck constant ("h-bar"), which represents the minimum of angular momentum in quantum mechanics. In terms of angular momentum, Einstein's photoelectric equation can be written as $E = \hbar\omega$. The minimum possible length and time are calculated using the reduced Planck constant, which has a value of $\hbar = 1.054 \times 10^{-34}$ Js. In the following equations, c is the velocity of light and G is the Newtonian gravitational constant.

Table 2: **Planck Units**

Planck length	1.616×10^{-35} m	$l_p = ct_p = \sqrt{\frac{\hbar G}{c^3}}$
Planck time	5.391×10^{-44} s	$t_p = \frac{l_p}{c} = \sqrt{\frac{\hbar G}{c^5}}$
Planck energy	1.956×10^9 J	$E_p = \sqrt{\frac{\hbar c^5}{G}}$
Planck mass	2.176×10^{-8} kg	$m_p = \sqrt{\frac{\hbar c}{G}}$

The Planck time t_p is theoretically the minimum possible subdivision of duration. It is unimaginably short and far beyond the current reach of technological measurement. If this minimum possible time is used in the uncertainty equation, $\Delta E \Delta t \geq \hbar/2$, then the minimum possible uncertainty in the measurement of energy will be greater than or equal to the unbelievably large quantity of 9.776×10^8 Joules. This is one half of the Planck energy of 1.956×10^9 J, which is the maximum possible energy that can be contained in a Planck volume of l_p^3 . The degree of uncertainty in measuring energy over the Planck time is beyond extreme. The energy of an electron at rest is 8.187×10^{-14} J. If the attempt is made to measure an electron's energy over the Planck time, the uncertainty in measurement equals 9.776×10^8 J, a value which is 22 orders of magnitude greater than the electron's energy. This extraordinary discrepancy in energy levels due to Planck's quantum of action and the uncertainty principle points towards an unbelievably enormous potential for fluctuation in the measurement of energy.

Max Planck's 1900 discovery of the quantum of action developed from the idea that energy radiates from atoms which act like simple harmonic oscillators. Simple oscillators can only vibrate at integral multiples of a lowest possible frequency f . The energy radiated by an atom varies with both its frequency and its absolute temperature T (Kelvin scale). Planck's formula for the energy radiated by an atomic oscillator includes the Boltzmann and Planck constants, k and h .

$$E = \frac{hf}{e^{kT} - 1}$$

Temperature is a measure of radiated energy. Under Planck's formula, the energy goes to zero as the absolute temperature does. In 1913 Einstein and Otto

Stern published a proposal that all particles always act like Planck's quantum oscillators. Planck assumed that his oscillators could have a frequency of zero, which leads to a complete absence of motion and heat. Einstein and Stern assumed that particles must have some minimum angular motion, because each simple harmonic oscillator has a minimum possible frequency. The result is that every particle has a minimum possible energy which is greater than zero, even at a temperature of absolute zero, the zero-point. This zero-point energy equals $E_0 = hf/2$, where h is Planck's constant and f is the minimum frequency for a simple harmonic oscillator. Substituting ω for f gives the zero-point energy for an oscillator in terms of angular frequency. The zero-point energy for a given particle with a minimum angular frequency is finite.

$$E_0 = \frac{hf}{2} = \frac{h\omega}{4\pi} = \frac{\hbar\omega}{2}$$

It is not coincidental that the zero-point energy is exactly one-half of the energy given by the photoelectric equation. The concept of zero-point energy was originally developed in the context of atoms at a temperature of absolute zero. The uncertainty principle was published in 1927. The discrepancy between the rest energy of particles and the much greater uncertainty in measuring their energy over short time periods began to be understood in terms of *quantum superposition*. A particle does not have a single energy level prior to its actual measurement. Instead, all possible energy levels within the limits set by the uncertainty principle are present in a quantum state of superposition. Einstein and Stern calculated a minimum energy at a temperature of absolute zero, based upon the minimum possible angular frequency of a particle. However, the sum of all possible frequencies present in the state of quantum superposition before measurement adds up to a potentially infinite quantity of energy.

By the 1940s this concept of potentially infinite zero-point energy found theoretical application in the quantum concept of spacetime. Instead of the stable spacetime continuum of classical and relativistic physics, quantum theory proposed that the vacuum of spacetime vibrates on the quantum scale. The proposed cause of these quantum fluctuations is directly related to the uncertainty principle; that is, the location and velocity of a particle cannot be exactly measured at the same instant because of these vibrations in spacetime. In quantum field theory these fluctuations are modeled with Planck's quantum oscillators. If space is treated as a relative property of energy-mass, quantum oscillators should cause spacetime to fluctuate.

The zero-point energies of the oscillators within a finite volume add up to some total energy. However, each oscillator has an indeterminate angular frequency over time, because of energy-time uncertainty. In quantum theory this indeterminacy is not taken to mean that the oscillator has a certain frequency which is unknown. Instead, all of the angular frequencies within the range of uncertainty are taken to co-exist in a state of quantum superposition. The number of quantized angular frequencies in the range of uncertainty is unknowably large, so the total zero-point energy of the spacetime vacuum is potentially infinite.

There are several parallels between the concepts of space potency and the theoretical zero-point energy of the vacuum. The *absoluta* of space potency are the potential of infinite energy. The zero-point energy of quantum oscillators in the vacuum is potentially infinite. Space potency is a pre-reality and exhibits no response to gravity. The zero-point energy of the vacuum is unreal in any empirical sense. It cannot be gravitationally responsive in any case, since it is potentially infinite. The evolution of energy involves the slowing down of angular frequency. Ultimatons “slow down through many phases of physical activity before they attain the revolutionary-energy prerequisites to electronic organization.” 42:6.4 The *absoluta* of space potency must, therefore, have the highest possible frequency, since they are the origin of all subsequently evolved energy. The highest possible energy of a quantum oscillator has the Planck energy of 1.221×10^{28} eV and the maximum possible frequency of 2.95×10^{42} Hz. Under quantum theory all particles must have energies and frequencies which are less than these values. In light of these parallels, it seems reasonable to equate the *absoluta* of space potency with the quantum oscillators of zero-point energy in the vacuum, at least on a conceptual level.

There is no current theory which explains how a particle with the Planck energy in excess of 10^{28} eV might form. Current theory cannot even explain how the 3.2×10^{20} eV cosmic ray detected in 1991 at the Dugway Proving Grounds in Utah might have been generated, let alone a particle with more than 50 million times this energy. Revelation offers the possible outline of an explanation for the energy of the *absoluta* of space potency.

The potential for all physical energy resides in the Unqualified Absolute. The static infinity of the impersonal Unqualified Absolute contains the potential for space potency but is not the cause of it. Motion occurs in eternity in response to volition. The energy vibrations manifesting as the pre-reality of space potency appear to originate in vibrations generated within the Unqualified Absolute by Deity. The Universal Father, as the First Source and Center, appears to cause

these vibrations. The Father acts upon the static prereal substance of the Unqualified in the outer zone on the nether surface of the Isle of Paradise.

Space potency is a prereality; it is the domain of the Unqualified Absolute and is responsive only to the personal grasp of the Universal Father... 42:2.5

The outer zone is the largest and most active of the three concentric and elliptical belts of unidentified space potential. This area is the site of unimagined activities, the central circuit point of emanations which proceed spaceward in every direction to the outermost borders of the seven superuniverses and on beyond to overspread the enormous and incomprehensible domains of all outer space... 11:5.7

Space potency ... may be roughly conceived to include all those absolute influences and potentials which emanate from Paradise and constitute the space presence of the Unqualified Absolute. 11:8.8

“Unimaginable agitations” originate in the outer zone of nether Paradise and emanate throughout the master universe as the prereality of space potency, the unquestioned free space presence of the Unqualified Absolute. This localized action by the Father makes the outer zone of nether Paradise the functional center of the free space presence of the Unqualified Absolute. “We hardly conceive of the Unqualified Absolute as a person, but we do think of the functional space presence of this Absolute as focalized on nether Paradise.” 11:2.8 The vibrations emanating from the outer zone appear to result in the appearance of *absoluta* in the otherwise static quiescence of the Unqualified Absolute.

The endless possibilities of the Unqualified Absolute are centered around the *absolutum* of the Isle of Paradise, whence emanate the unimaginable agitations of the otherwise static quiescence of the Unqualified. 104:4.28

The *absolutum* of Paradise consist of stationary systems of reality derived from the Unqualified Absolute. The Unqualified contains an infinite number of static *absoluta*, constituting an infinitely dense continuum with the potential for energy. The Father causes compression waves to originate from the outer zone of nether Paradise, and these waves spread outward in this continuous medium of *absoluta*, like sound waves through air or ripples on the surface of a pond. Compression waves propagate by direct contact between the adjacent particles making up a medium. The higher the density of a medium, the faster compression (longitudinal) waves propagate through it. Sound waves travel faster through water than air and faster still through steel. Unlike transverse electromagnetic waves, longitudinal waves are transmitted by direct contact and do not have a theoretical upper limit to their propagation velocity. Space potency is potentially an infinitely dense medium. The unimaginable agitations

originating in the outer zone of nether Paradise might, therefore, propagate virtually instantaneously.

Individual *absoluta* oscillate back and forth in response to these compression waves with an energy which might be equivalent to the maximum Planck energy of 10^{28} eV. All of this occurs on the absolute level of reality in the existential eternity of absolute extension. Change is possible in existential eternity, but this reality level exists beyond and before the finite and ultimate realities of time and space. Space is an absolutely ultimate reality which impinges upon but does not reach into the absolute level. "Space comes the nearest of all nonabsolute things to being absolute." 118:3.5 The oscillations of *absoluta* on the absolute level appear to cause oscillations in the transcendental infinitesimals of space. If the uncertainty principle is correct, the Planck time of 10^{-44} seconds is the smallest possible interval of duration, which equates to a frequency of 10^{42} Hz.

The infinitesimals of space are ultimate realities existing in transcended time, not eternity. The change in an infinitesimal's location relative to absolute extension is caused by oscillating *absoluta*; space can be treated as a property of energy-mass. The Planck duration of 10^{-44} seconds may intervene between two different locations of an infinitesimal. This change in absolute location is a transcendental event, during which the infinitesimal exists in both locations at the same time in a state of quantum superposition. In the next Planck time the infinitesimal oscillates back to its original location to complete the cycle of vibration. At no time does the infinitesimal have a single location in absolute extension. The quantum fluctuations of spacetime can be understood in terms of the quantum superposition of multiple states of infinitesimals. On the quantum scale spacetime is fluctuating, indeterminate, fuzzy, smeared out, because of the transcendental oscillations of infinitesimals. These trace back to the oscillations of *absoluta* caused by the compression waves in the Unqualified Absolute generated from nether Paradise by the will of the First Source and Center.

3. Cosmic Force and Vacuum Energy

Cosmic force derives from space potency. This derivation occurs on nether Paradise and at selected locations in the master universe. When the Master Force Organizers cause the emergence of cosmic force from space potency by their

passive presence, it is usually referred to as primordial force. Cosmic force pervades the space of the master universe and is nonresponsive to absolute or linear gravity, although it does respond to some form of cosmic gravity centering on Paradise. Cosmic force is not some variation or derivative of electromagnetic energy, which is responsive to gravity. There are a number of parallels between the concepts of cosmic force and vacuum energy.

The idea of vacuum energy first emerged around the middle the 20th century. The Dutch physicist Hendrik Casimir first proposed the existence of vacuum energy in a 1948 paper.^[7] Electrically conductive plates form a surface boundary for electromagnetic radiation, causing photons to be reflected. Under the theory of quantum electrodynamics (QED), Casimir hypothesized that an electromagnetic field consisting of multiple frequencies should generate a net force which pushes two parallel, conductive plates together. If the plates are close enough, the pressure of the electromagnetic radiation between the inner surfaces of the plates should be significantly less than the pressure on their outside surfaces.

The inner and outer surfaces reflect different sets of waves. In the region between the plates, only standing waves which resonate in the cavity and shorter wavelengths are fully reflected. The maximum wavelength of a standing wave is twice the distance between the reflective surfaces of a cavity. Longer wavelengths (lower frequencies, less energy) are not reflected back and forth within the cavity; they pass through the conductive boundary. The outer surfaces of the plates also form cavities which are much larger and reflect wavelengths which are longer than the maximum standing wavelength in the cavity between the plates. The outer surfaces reflect all of the waves reflected by the inner surfaces, plus wavelengths too large to resonate in the cavity between the plates, resulting in a net force pushing the plates together. The closer the plates are, the larger this net force becomes.

The Casimir force between two parallel plates varies inversely with the distance (L) between them raised to the fourth power, where this distance squared is much less than the area (A) of the plates ($L^2 \ll A$). The formula^[8] for this force between parallel conducting plates is:

$$F_{Cas \parallel} = -\frac{\hbar c \pi^2}{240 L^4} A$$

Force can be divided by area to give a pressure, which is measured in Pascals (Pa). The Casimir force between two parallel plates separated by 10 nanometers equals a pressure of about 100,000 Pascals. This pressure is about equal to the

atmospheric pressure on the earth's surface, which is 101,325 Pascals. The first tentative confirmation of the Casimir effect was found in 1957 by M. J. Sparnaay at the Philips Research Laboratories in Eindhoven. ^[9] A better qualitative measurement was made in 1969 by D. Tabor and R. H. S. Winterton. ^[10] It was not until 1997 that a good measurement was made by S. K. Lamoreaux which confirmed the predicted value to within five percent. ^[11] According to a 2000 paper by the physicist Svend Erik Rugh, there was very limited interest in the Casimir effect in the 1960s and 1970s. ^[12] Eventually, the potential of the theory and the tentative confirmations of the Casimir effect in 1957 and 1969 began to draw serious attention to the reality of vacuum energy.

Rugh describes quantum fields as exhibiting zero-point fluctuations at every point in space, regardless of the presence or absence of matter or electromagnetic radiation. It is these zero-point fluctuations which are the predominant source of the enormous density of vacuum energy. Theoretically, there are an unknowably large number of frequencies associated with the quantum fluctuations in the vacuum of spacetime, and the zero-point energy of the vacuum is potentially infinite. To get around this infinity, only the zero-point fluctuations arising from electromagnetic fields can be considered, which is the approach taken by Casimir. The vacuum energy can then be calculated as the sum of the discrete superposed electromagnetic frequencies within a given frequency range.

$$E_{vac} = \sum_{i=1}^{i=n} \frac{\hbar\omega_i}{2}$$

According to Rugh, the vacuum energy ground state for the single octave of visible light is $\sim 220 \text{ J/m}^3$. The Standard Model of particle physics extends up to the ultraviolet cutoff at $\sim 10^{11} \text{ eV}$ ($\sim 10^{25} \text{ Hz}$), which gives a vacuum energy density of $\sim 10^{46} \text{ J/m}^3$. ^[12] Theorists generally go beyond the ultraviolet cutoff and calculate the vacuum energy density in terms of the quantum superposition of all energies up to the Planck energy of 10^{28} eV ($\sim 10^{42} \text{ Hz}$).

$$E_{vac} = \frac{E_P^4}{\hbar^3 c^3} = 4.632 \times 10^{113} \text{ J/m}^3$$

This energy density in the vacuum is approximately equal to the Planck energy divided by the Planck volume (l_p^3); that is, every quantum oscillator in the vacuum is assumed to have the Planck energy. This is an unbelievably large energy density. If this electromagnetic energy in one cubic meter of the vacuum is expressed as a mass equivalent, it equals 5.15×10^{96} kilograms, which is the

mass of our sun multiplied by 10^{65} . This mass is roughly 10^{43} times greater than total estimated mass in the universe.

Vacuum energy is theorized to arise from the sum of zero-point electromagnetic energies in the vacuum. It is an established fact that electromagnetic energy responds to gravity. This density of electromagnetic energy would cause the universe to collapse into a gravitational singularity. Therefore, vacuum energy is either not real or it is not responsive to gravity. Numerous predictions based upon this theory of vacuum energy, such as the Casimir effect, have been empirically verified, which argues that it is a real energy. But the fundamental problem here is the gravitational responsiveness of electromagnetic energy. In the final remarks to his paper Rugh suggests the evidence indicates that there is no real vacuum energy of empty space, unless it is real but does not gravitate. "It would of course be an overwhelming surprise if physical real vacuum energy did not gravitate since this would point to a serious misunderstanding in the standard expectations for the connection between quantum field theory and the theory of gravitation." [12]

The standard expectation Rugh references is the assumption that the vacuum energy of quantum field theory must be physically coordinated with gravity, as it is understood in Einstein's general theory of relativity. This assumption leads to the idea that there must be a theory of quantum gravity, which unifies quantum field theory and the general theory. If vacuum energy is derived from electromagnetic energy, then it must be responsive to gravity and be coordinated with the general theory. It would be an "overwhelming surprise" if vacuum energy was real and not responsive to gravity, since this would require that vacuum energy does not arise from electromagnetic energy. It appears that the mechanics of the theory of vacuum energy are correct to some extent, since they give empirically verifiable predictions. The evidence suggests that vacuum energy is real. If it is real, then the origin and nature of vacuum energy cannot be electromagnetic radiation. If electromagnetic energy is not the origin, the only possible source of vacuum energy would seem to be the zero-point energy responsibly for the quantum fluctuations of spacetime.

The spacetime continuum breaks down on the quantum scale because of fluctuations in the metric of spacetime. There has been speculation that the uncertainty principle is somehow responsible for these quantum fluctuations in spacetime; that is, this principle may be a physical law which imposes limitations upon position and momentum, time and energy, and this results in spacetime fluctuations. Yet, it seems equally as valid to speculate that the fluctuations in spacetime are the cause for the observable phenomena described by the

uncertainty principle. The cause of these fluctuations would then be the zero-point energy of the vacuum. Zero-point energy is theoretically infinite. It can, however, be modeled as consisting of quantum oscillators (*absoluta*) where each occupies a Planck volume and contains the Planck energy. The frequency of such quantum oscillators is 10^{42} Hz, which gives the same energy density of 4.632×10^{113} J/m³ as calculated for the vacuum energy. These Planck energy oscillators would then be the cause of spacetime fluctuations which lead to the uncertainty principle.

Revelation suggests the idea that the quantum fluctuations of spacetime infinitesimals are caused by the unimaginable agitations of the *absoluta* of space potency. Since quantum oscillators always radiate energy, *absoluta* can be thought of as emitting energy on the absolute level with a frequency approximately equal to the Planck frequency of 10^{42} Hz. The transcendental tension-presence of a Master Force Organizer is sufficient to transform space potency into cosmic force. Conceptually, a force organizer could “tap into” the energy “radiated” by *absoluta* on the absolute level. Cosmic force can then be modeled as quantum oscillators with a frequency of 10^{42} Hz and energy of 10^{28} eV. Cosmic force has an energy equivalent to the theoretical ground state of vacuum energy. Unlike vacuum energy derived from electromagnetic energy, cosmic force derived from space potency is unresponsive to gravity.

The mechanics of this derivation are merely heuristic. Modeling cosmic force and space potency as quantum oscillators does not mean that they physically correspond to this model. Conceptually, space potency is the pre-force from which the primal reality of cosmic force is derived, regardless of the true nature of either or the actual mechanics involved. Nevertheless, a model provides a means of further investigation.

The non-responsiveness of cosmic force to gravity can explain why the extreme density of vacuum energy does not lead to universal gravitational collapse. But it also makes cosmic force undetectable in any direct way. Force can only be detected indirectly by its measurable effects on mass. To be physically real, cosmic force must cause measurable effects. Cosmic force should have wave properties, since it can be modeled as a quantum oscillator with the Planck energy. The conception of a form of energy which meets these criteria was first proposed by Louis de Broglie in 1924.

Einstein hypothesized the existence of photons in his photoelectric equation: $E = hf$. In 1923 Arthur Compton experimentally confirmed that photons act like particles, in what is known as the Compton Effect. When Compton bombarded

atoms with X-ray photons, electrons were ejected with a measurable momentum. He found that the change in the momentum of an electron ($m_e\Delta v$) exactly equals the energy of the incident X-ray minus the energy of the scattered X-ray. The change in frequency of the X-ray equals a change in energy by the photoelectric equation ($\Delta E = h(f_2 - f_1)$) and therefore the relativistic mass (m_p) of the X-ray changes ($\Delta m_p = \Delta E/c^2$) when it is scattered. The decrease in the X-ray's relativistic mass decreases its momentum ($\Delta m_p c$). Compton found that the increase in the electron's momentum ($m_e\Delta v$) due to increased velocity exactly equals the decrease in the X-ray's momentum ($\Delta m_p c = m_e\Delta v$). From this he derived a general relationship called the Compton wavelength: $\lambda = h/mc$. The Compton wavelength is the physical basis upon which quantum wave mechanics is built.

In 1924 Louis de Broglie inferred the existence of matter waves from Einstein's equation for the photoelectric effect and the Compton Effect. A photon has a relativistic mass and generates an electromagnetic wave. The Compton Effect demonstrates that subluminal particles, like electrons, have an energy-wave under the special theory of relativity. This wave-energy cannot be electromagnetic, since electrons cannot move at the velocity of light. De Broglie referred to them as matter waves and proposed that they are a real form of energy. Since there is nothing special about the mass of an electron, all moving particles have associated matter waves. The energy of these matter waves is directly related to the mass of the particle times its velocity (momentum), just as electromagnetic waves are directly related to the relativistic mass of their photons times the velocity of light. The de Broglie wavelength (λ) is:

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

The matter wavelength for a subluminal particle is inversely proportional to its momentum mv , where m is its relativistic mass. The matter (Compton) wavelength for a photon equals its electromagnetic wavelength, since the momentum of a photon is its relativistic mass multiplied by the speed of light: $p = m_p c$. Most significantly, the matter wave associated with a photon is not an electromagnetic wave, which consists of interacting electric and magnetic fields. However, the energy of these matter waves is also discretely quantized by Planck's constant, in exactly the way that electromagnetic waves are. Compton's relation equates the momentum of a photon to the momentum of a mass particle. De Broglie's equation equates the energy of matter waves to the energy of electromagnetic waves.

De Broglie's matter wave hypothesis was experimentally confirmed in 1927 by Clinton Davisson and Lester Germer of Bell Labs. The discovery of these matter waves was the impetus behind the theory of quantum wave mechanics. But de Broglie's idea that matter waves are a new form of energy was universally rejected in fairly short order.

In 1926 Max Born published his interpretation of matter waves as representing the statistical probability of locating a moving particle. In Born's conception, "matter waves" are mathematical abstractions, not objective realities. In the same year Erwin Schrödinger developed a mathematical description of how these matter waves change over time and interact with other matter waves. Schrödinger's equation has become the preferred mathematical formulation for quantum wave mechanics.

By 1927 Niels Bohr and Werner Heisenberg began to put forward what is now known as the Copenhagen interpretation. Bohr persuasively argued that matter waves do not correspond to any physical reality, as de Broglie originally proposed. In general agreement with Born, he argued that they are just a statistical means of determining the probabilities of quantum outcomes. Bohr maintained that there are no matter waves and no quantum particles; there are just abstract quantum probability descriptions which do not correspond to objectively real waves or particles. In Bohr's view the paradox of wave-particle duality is apparent and not real, for the simple reason that there are no real waves and no real particles before an act of measurement occurs. During the act of measurement, the quantum wave function "collapses" and either a particle or a wave is detected, but never both at the same time.

The Copenhagen interpretation is still accepted by the overwhelming majority of physicists, but it has led to a theoretical impasse. The idea of quantum gravity is representative of the present stalemate in theoretical physics. Since matter waves are unreal, electromagnetic radiation is assumed to be the only energy in empty space which can be the origin of vacuum energy. Since around the 1970s, vacuum energy has been accepted as real, because the theory successfully explains the Casimir force, the Lamb shift, spontaneous emission, and other phenomena. However, the extreme density of electromagnetic energy in the vacuum cannot be reconciled with the incontrovertible fact of gravity. Despite the almost universal rejection of de Broglie's matter waves as physically real, revelation describes quantum waves as real energy disturbances in the physical reality of cosmic force.

4. Primordial Force Behavior

Cosmic force is nonresponsive to gravity. Unlike the 19th century concept of the ether, this mass-less force medium offers no inertial resistance to motion. The space within a material body moves with it, which necessitates that the infinitesimals of space outside of the body be displaced by its motion. Cosmic force pervades space, and the space displaced by particle motion causes wave phenomena in undifferentiated field of cosmic force that are proportional in amplitude and interval to the dimensions and velocity of a moving particle. This is analogous to the way in which water is displaced around the hull of a ship, generating waves, except that space and cosmic force present no inertial resistance to the passage of particles.

The excitation of the content of space produces a wavelike reaction to the passage of rapidly moving particles of matter, just as the passage of a ship through water initiates waves of varying amplitude and interval. Primordial-force behavior does give rise to phenomena which are in many ways analogous to your postulated ether. Space is not empty; the spheres of all space whirl and plunge on through a vast ocean of outspread force-energy; neither is the space content of an atom empty. ^{42:5.15-16}

These waves generated by particles moving through the field of cosmic force are de Broglie's matter waves and possess real energy. Both the wave and particle are ordinary objects, in the sense that they are objectively real apart from any act of observation or measurement by an experimenter. Wave disturbances in the field of cosmic force must propagate with virtual instantaneity, because of the unimaginably high density of vacuum energy. Nonlocality is an apparently instantaneous interaction between quantum particles. This conclusively excludes electromagnetic energy as the possible medium of these instantaneous interactions occur. The Copenhagen interpretation simply asserts the belief that there is no cause behind this instantaneous interaction; there is no deeper reality beneath the wave functions of quantum mechanics. Revelation describes cosmic force as a transcendental form of energy pervading space in which the wave phenomena of quantum mechanics occur. These wave phenomena are physically real and interact with real quantum particles.

Ultimatons, electrons, and other mass aggregations of energy are uniform particles of matter, and in their transit through space they really proceed in direct lines. Light and all other forms of recognizable energy manifestations consist of a succession of definite energy particles which proceed in direct lines except as modified by gravity and other intervening forces. That these processions of energy particles appear as wave phenomena when subjected to

certain observations is due to the resistance of the undifferentiated force blanket of all space, the hypothetical ether, and to the intergravity tension of the associated aggregations of matter. ^{42:5.14}

The never-ending confusion attending the observation of the wave mechanics of quantum behavior is due to the superimposition of energy waves: Two crests can combine to make a double-height crest, while a crest and a trough may combine, thus producing mutual cancellation. ^{42:4.14}

Light and all other particles “really proceed in direct lines” and generate waves, “due to the resistance of the undifferentiated force blanket of all space.” The objective reality of matter waves is manifest in the wave interactions of refraction, diffraction, and interference. “The spacing of the particle-intervals of matter, together with the initial velocity of the energy beams, establishes the undulatory appearance of many forms of energy-matter.” ^{42:5.14} The “wave mechanics of quantum behavior” result in constructive and destructive interference, because of the superimposition of matter waves. The waves modeled by quantum mechanics are matter wave-energy phenomena propagating in the unimaginably dense field of cosmic force.

A realistic model to explain wave-particle duality which has some resemblance to this was presented by Louis de Broglie in 1927. His simple pilot-wave theory treats particles and matter waves as ordinary (objectively real) objects in opposition to the Copenhagen interpretation of wave-particle duality. De Broglie’s proposal found no advocates, since Bohr’s interpretation was seen as being superior. In 1932 the renowned mathematician John von Neumann published a proof which purported to demonstrate that quantum theory can never be described by ordinary particles and waves which objectively possess definite properties. His proof was also thought to demonstrate that there could be no hidden variables associated with ordinary waves and particles which might make a realistic interpretation of quantum mechanics possible. A hidden variable, in this instance, is a property, state, or condition of an ordinary object which is inherently inaccessible to direct measurement. Von Neumann’s proof was universally accepted as theoretical confirmation of the Copenhagen interpretation. Bohr asserted that this proof demonstrates that quantum mechanics is a complete and finished theory. There is no “deeper” quantum reality, no waves and particles, and there can be no hidden variables which might explain quantum phenomena in the realistic manner followed by classical physics.

The physicist David Bohm examined von Neumann’s proof and discovered that it did not completely exclude hidden variables. In 1952 he published two

papers ^[13,14] in which he presented a far more sophisticated version of de Broglie's pilot-wave theory. Bohm's theory successfully describes quantum mechanics in terms of ordinary particles and waves. Every particle, including photons, generates a real matter wave, which acts as a pilot-wave. The pilot-wave probes the "whole environment" instantaneously and continuously guides the motion of the particle in response to these interactions. As the environment changes due to the motion of a particle, the instantaneous interactions between the pilot-wave and the environment changes the net force acting on the particle and the quantum wave function evolves over time. The whole environment includes the pilot-waves from other particles. Bohm's pilot-wave theory is fully consistent with the mathematics of quantum mechanics and makes exactly the same predictions. However, Bohm presents a realistic model of ordinary particles and matter waves which successfully explains the underlying reality of quantum theory. Bohm's realistic interpretation is directly opposed to the Copenhagen interpretation, which holds that no realistic explanation is possible.

Although Bohm's pilot-waves are the physical reality of de Broglie's matter waves, from which quantum mechanics arises, they are not truly ordinary objects in the classical sense. Consistency with quantum theory requires these pilot-waves to propagate instantaneously over arbitrarily large distances. Bohm gives a realistic explanation of the correlations between classical particles and pilot-waves in the context of the 1935 Einstein-Podolsky-Rosen paradox. However, the requirement for pilot-waves to propagate instantaneously was considered a fatal flaw by almost everyone, including Einstein, and no one considered Bohm's theory credible.

John Stewart Bell was a notable exception to this general dismissal of Bohm's interpretation, according to science writer Manjit Kumar. Bell studied Bohm's pilot-wave theory in the early 1960s and came away convinced that Bohm had managed to do the impossible by developing a realistic theory for what lies behind quantum phenomena. ^[15] Bell identified the theoretical loophole in Neumann's proof permitting hidden variables under certain conditions, upon which Bohm's hypothesis depends, and published his finding in 1964. In the same year Bell formulated and published what is now known as Bell's Theorem. This theorem establishes the experimental parameters under which either Einstein's local realism or quantum theory's nonlocality can be demonstrated as correct. Einstein believed both waves and particles are ordinary classical realities which can only interact locally within the limits established by the velocity limit of light. Quantum theory assumes that instantaneous interactions occur, since quantum phenomena are unconstrained by the velocity of light. Bell's Theorem

permits an empirical determination of whether quantum interactions must always be local, as Einstein argued, or if they can be instantaneous and nonlocal, as quantum theory argues.

In 1972 John Clauser finally put Bell's Theorem to the test and found that Einstein's local realism is incorrect. In 1982 Alain Aspect conducted a second and more refined experiment which produced relatively conclusive results confirming Clauser's findings. There is a nonlocal, instantaneous interaction between widely separated quantum events, as quantum theory predicts. These and other experiments end the possibility of a realistic interpretation of quantum theory in terms of Einstein's idea of ordinary objects and local hidden variables. However, the realism of Bohm's pilot-wave theory was developed under the premise of ordinary objects and *nonlocal* hidden variables; specifically the nonlocal nature of instantaneous pilot-waves. The Copenhagen interpretation assumes that an electron is not an ordinary physical object before it is actually measured, while Bohm assumes that it is both ordinary and local. The pilot-wave (matter wave) connected to the electron is ordinary, in the sense of existing independently of observation. But its instantaneous propagation and interaction makes it a nonlocal hidden variable.

Physicists have a very strong bias against any proposal involving instantaneous action-at-a-distance, and Bohm's theory requires matter waves to propagate and interact instantaneously. Even though Bohm's theory is fully compatible with quantum mechanics, it was immediately rejected because pilot-waves act instantaneously at a distance. The idea of instantaneous interactions between quantum waves is acceptable, as long as these waves are not physically real. The discovery of instantaneous interactions between widely separated particles in 1972 directly challenges the Copenhagen interpretation. The quantum mechanical evolution of a matter wave predicts the probability of a specific interaction between the particles, and this instantaneous interaction has been confirmed. Real effects must have real causes and the only thing connecting the two particles is de Broglie's matter waves. The matter waves of quantum mechanics must be real, but it is impossible for them to be electromagnetic waves, because they act instantaneously. This is the same conclusion which arises from a consideration of the quantum mechanical origin of vacuum energy. Vacuum energy causes real effects like the Casimir force and must be real, but it cannot be electromagnetic in nature, because of the gravitational consequences this would entail.

The empirical evidence can be consistently interpreted as supporting the physical reality of matter waves in the context of quantum mechanics, as shown

by Bohm's hypothesis. Theory precludes the possibility that matter waves are electromagnetic in nature, but there is no form of energy in current physical theory which is compatible with the nature of these matter waves. The only form of energy comparable to them is the instantaneous force of gravity in classical Newtonian theory. Revelation describes gravity as an instantaneous force. The reality of vacuum energy is cosmic force in which the matter waves of quantum mechanics propagate and interact instantaneously. All particles, including photons, are ordinary particles with objective properties and move in straight inertial lines, unless acted upon by a superior force. The interactions between energy particles and the matter waves of cosmic force are modeled by Bohm's pilot-wave theory and described by the wave functions of quantum mechanics.

5. Ultimatons and Electric Charge

The tension-presence of a Master Force Organizer is sufficient to transform the pre-force of space potency into cosmic force. Master Force Organizers slow down the quantum oscillators of cosmic force and evolve puissant energy. Puissant energy is manifest in infraultimatons, which are not fully formed ultimatons. Infraultimatons appear in "the borderland revolutions of ultimatons as they begin to assume definite form. This is the first stage of emergent energy in which wavelike phenomena can be detected and measured." 42:5.3 The Associate Transcendental Master Force Organizers slow down infraultimatons and evolve ultimatons, which are "directly responsive to the circular grasp of Paradise (absolute) gravity." 42:2.12 The creation of ultimatons in space is by design. The creation of nebulae by the force organizers is "the mighty outworking of the unsearchable plans of the Architects of the Master Universe." 12:2.1 The further evolution of energy-matter from ultimatons occurs in response to both intelligent action and indiscriminate physical law.

"Temperature—heat and cold—is secondary only to gravity in the realms of energy and matter evolution. Ultimatons are humbly obedient to temperature extremes. Low temperatures favor certain forms of electronic construction and atomic assembly, while high temperatures facilitate all sorts of atomic breakup and material disintegration." 42:4.7 Once ultimatons are created by the force organizers, they evolve naturally into electrons in response to both gravity and

low temperature. "The ultimatons, unknown on Urantia, slow down through many phases of physical activity before they attain the revolutionary-energy prerequisites to electronic organization." 42:6.4 Their angular velocity can also be intentionally slowed down by the associate force organizers or the power directors. When ultimatons have slowed down sufficiently, they form electrons. "Mutual attraction holds one hundred ultimatons together in the constitution of the electron; and there are never more nor less than one hundred ultimatons in a typical electron." 42:6.5 "As the ultimatons aggregate into electrons, condensation occurs with a consequent storage of energy." 42:5.4 Electrons are responsive to both linear and absolute gravity. Other subatomic particles form from electrons.

In 1955 it was believed that the protons and neutrons forming the atomic nucleus were elementary particles. The idea that these subatomic particles are made up of component particles contradicted scientific thought at this time. In 1968 experiments at the Stanford Linear Accelerator demonstrated that protons are not elementary particles. They are composed of smaller particles called quarks. The Standard Model of particle physics, developed from the late 1960s onward, considers electrons, electron neutrinos, up quarks, and down quarks to be the four first generation elementary particles. The first generation charged particles – electrons and the up and down quarks forming the protons and neutrons of atomic nuclei – do not permanently lose energy through decay. These three elementary particles are the substance of atoms, baryonic matter. The up quark has about 4.7 times the energy-mass of an electron and the down quark about 9.4 times. On the basis of these energy-mass differences, it is entirely possible that these quarks are constituted of electrons.

Electric charge is considered a fundamental property of certain elementary particles in the Standard Model. The electron is taken as the standard unit of electric charge. It is known that electric charge is quantized. All charged elementary particles, including quarks, have charges which are integral multiples of $\frac{1}{3} e$, where e is the charge of a single electron. There is no theory or conjecture which explains the cause of electric charge, its positive and negative manifestations, or the relationship of electric charge to the energy-mass of elementary particles.

The Committee on Data for Science and Technology (CODATA) derives the exact quantity of the elementary charge from four constants: the Planck constant (h), the fine structure constant (α), the magnetic constant (μ_0), and the velocity of light (c).

$$e^2 = \frac{2h\alpha}{\mu_0 c}$$

All four of these constants are derived from classical physics and are invariable in relativity theory. This leads to the inference that the elementary charge of a particle is invariable; that is, an increase in relative velocity will cause the mass of the particle to increase but it will not cause an increase in the quantity of electric charge. The invariability of electric charge has been empirically verified. When a charged particle is given a relative velocity, its energy-mass increases, but its electric charge remains constant.

If charge was an inherent property of matter, the quantity of charge should increase when the quantity of energy-mass increases. An electron with a sufficiently large relative velocity should have a higher electric charge than an electron which is relatively motionless. The fact that the quantity of charge is invariant necessarily means that it is not related to a specific quantity of energy-mass. Charge is quantized, but the evidence demonstrates that it is not an inherent property of energy-mass. If electrons are elementary, irreducible particles, there does not seem to be any possible physical origin or cause for electric charge, since the quantity of charge does not vary with the energy-mass of the electron. A proton weighs almost two thousand times more than an electron, but its electric charge is exactly equal and opposite to the electron's.

The reality of electric charge must arise within electrons and protons from something other than their energy-mass. If electric charge arises from something going on within these particles, it is reasonable to hypothesize the existence of subelectronic particles whose activity is responsible for electric charge. Electrons are made up of ultimatons, and revelation attributes the force of electric charge to the actions of ultimatons. Isolated ultimatons do not have electric charge. Positive and negative electric charge arises from the axial revolutions of ultimatons as they are dynamically interassociated within electrons and protons.

Ultimatons do not describe orbits or whirl about in circuits within the electrons, but they do spread or cluster in accordance with their axial revolutionary velocities, thus determining the differential electronic dimensions. This same ultimatonic velocity of axial revolution also determines the negative or positive reactions of the several types of electronic units. The entire segregation and grouping of electronic matter, together with the electric differentiation of negative and positive bodies of energy-matter, result from these various functions of the component ultimatonic interassociation. ^{42:6.6}

The reality of elementary charge cannot be attributed to an electron's or proton's energy-mass. This strongly suggests that it is attributable to

subelectronic particles making up an electron. There appears to be a potential explanation for the invariant quantity of electric charge in ultimatonic activities and interassociations. At the least, the invariance of elementary charge can be legitimately interpreted as evidence for the existence of subelectronic particles - ultimatons.

Under the Copenhagen interpretation, neither waves nor particles exist in any classical sense prior to their measurement. A significant difficulty with this view is that there is no electron which might have the elementary property of charge prior to an act of observation. Nevertheless, electrons are deflected by charged plates while they are in flight and before they are observed. The Copenhagen interpretation leads to the untenable conclusion that electric charge is objectively real but is not associated with an objectively real object prior to detection. In Bohm's pilot-wave model, which is conceptually compatible with revelation and fully compatible with quantum mechanics, electrons exist as ordinary objects with objective properties, such as mass and electric charge, prior to their measurement.

6. Ultimatons and Cosmic Rays

When an electron is in motion, it generates both electric and magnetic fields. "The electronic charge creates an electric field; movement gives rise to an electric current; the current produces a magnetic field. When an electron is suddenly stopped, the resultant electromagnetic commotion produces the X ray; the X ray is *that* disturbance." 42:5.8 Electromagnetic waves are not directly associated with moving ultimatons. Without an electric charge, an ultimatton does not have an electric field, and its motion does not generate a magnetic field.

Ultimatons are associated with matter wave excitations in the field of cosmic force. They have "mutual resistance to cosmic force." 42:6.4 Electromagnetic waves are associated with photons, which are emitted and absorbed by electronic matter. "Orbital shifting of electrons results in the ejection or the absorption of very definite and uniform measurable particles of light-energy, while the individual electron always gives up a particle of light-energy when subjected to collision." 42:5.6 The phenomena of matter waves and electromagnetic waves can be organized by frequency octaves. "In the superuniverse of Orvonton there are

one hundred octaves of wave energy.”^{42:5.1} Visible light spans a single octave from red at 3.99×10^{14} Hz to violet at 7.99×10^{14} Hz. We are also told that “the visible rays embrac[es] a single octave, number forty-six in this series.” Red light is the bottom of the 46th octave, so the bottom of the first octave is at 11.34 Hz ($11.34 \times 2^{45} = 3.99 \times 10^{14}$). Violet light is the top of the 46th octave, putting the top of the 100th octave at 1.44×10^{31} Hz ($7.99 \times 10^{14} * 2^{54}$). We are told that the highest purely electromagnetic radiation is the short space rays. “These are the shortest of all purely electronic vibrations and represent the preatomic stage of this form of matter. These rays require extraordinarily high or low temperatures for their production. There are two sorts of these space rays: one attendant upon the birth of atoms and the other indicative of atomic disruption.”^{42:5.5}

The short space rays are gamma radiation. High-energy gamma ray photons originate during the creation and destruction of atomic (baryonic) matter. “These phenomena of atom building and atom dissolution, as in the highly heated nebulae, are attended by the emergence of flood tides of short space rays of radiant energy.”^{58:3.1} During astrophysical gamma ray bursts, high-energy gamma ray photons and cosmic ray particles are both observed. These bursts are believed to originate in distant extragalactic events, such as novae, supernovae, quasars, and blazars.

In an October 2011 press release from the Harvard Smithsonian Center for Astrophysics, it was reported that gamma ray photons of about 10^{11} eV were observed by the Very Energetic Radiation Imaging Telescope Array System (VERITAS) located at the Smithsonian's Whipple Observatory near Tucson, Arizona.^[16] A 2000 analysis of the most active gamma ray galaxy known, Markarian 501, estimated the existence of gamma ray photons at about 5×10^{12} eV.^[17] A high-energy gamma photon with this energy has a frequency of 1.2×10^{27} Hz, which is at about the 86th frequency octave. This is 10,000 times the frequency and energy of the most powerful gamma rays emitted during radioactive decay. Gamma ray frequencies should not exceed the 100th octave at 1.44×10^{31} Hz and energy of 5.96×10^{16} eV, and, so far, they do not. This maximum energy level for electromagnetic gamma rays is not far removed from the minimum energy $\sim 10^{15}$ eV for extragalactic high-energy cosmic rays.

Cosmic rays are not electromagnetic energy. They are subatomic particles which strike the upper atmosphere at close to the velocity of light with energies of at least 10^{12} eV. Cosmic rays are believed to consist mostly of protons, with about one percent consisting of electrons. Victor Hess is credited with discovering cosmic rays in a 1912 balloon experiment, which carried ionization detectors up to an altitude of more than five kilometers. In 1938 the French

physicist Pierre Auger discovered that particle showers are generated by cosmic rays hitting the earth's upper atmosphere. By analyzing these particle showers he calculated that the primary cosmic rays initiating them must have energies on the order of $\sim 10^{15}$ eV. ^[18] This is ten million times the energy of gamma rays from radioactive decay and a thousand times greater than the highest energy gamma rays detected from space. At the time of Auger's discovery, it was unknown how subatomic particles could be accelerated to the velocity required to have this much energy.

In 1949 the Italian-American physicist Enrico Fermi proposed a "magnetic shock acceleration" model to explain how protons can be accelerated to energies of up to 10^{15} eV, which explained Auger's findings. ^[19] This explanation was sufficient until 1961, when the Rossi Cosmic Ray Group at M.I.T. published their discovery of cosmic rays with energies of 10^{18} eV. ^[20] In 1991 the High Resolution (HiRes) Fly's Eye Project in Utah detected a cosmic ray with an energy of 3×10^{20} eV. ^[77] According to the Pierre Auger Observatory website, there is no explanation for how protons can be accelerated to energies beyond 10^{15} eV. "Fermi's acceleration mechanism provides an explanation for cosmic ray energies perhaps as high as 10^{15} eV. Acceleration mechanisms for cosmic rays of higher energies are not understood." ^[21] The HiRes Fly's Eye Project takes the position that the most powerful gamma ray bursts possible from supernovae and quasars are not theoretically strong enough to accelerate protons above 10^{18} eV. "It is difficult to explain the existence of cosmic rays above 10^{18} eV, because supernovae are simply not large enough to maintain acceleration to the UHE regime." ^[22] Particles with energies above 10^{18} eV are considered ultra-high-energy (UHE) cosmic rays. There is currently no conjecture which attempts to explain how UHE cosmic rays are generated.

Supernovae are relatively rare events. The most powerful are Type 1a supernovae, in which virtually all of the mass of a dying star is suddenly converted into radiant energy. Not even this type of event can accelerate subatomic particles to the velocities required to account for cosmic rays above 10^{18} eV. Since 2004 the Pierre Auger Observatory in Argentina has detected millions of UHE cosmic rays. It is now known that cosmic rays above 10^{18} eV occur at a rate of one particle per square kilometer per year. This amounts to 1.4 million UHE cosmic rays showering in upon the earth's upper atmosphere every day. UHE cosmic rays are now routinely detected, but their cause remains a complete mystery.

We are told that ultimatons originate primarily in the outer space levels, due to the creative activities of the Associate Transcendental Master Force

Organizers. The creation of nebulae, from which many stars will eventually be thrown off, certainly involves energies far in excess of those released during a supernova event. This is a potential mechanism which could account for the acceleration of ultimatons to energies above 10^{18} eV, which are then detected as UHE cosmic rays striking the earth's upper atmosphere. "Long before physicists ever discover the ultimatons, they will undoubtedly detect the phenomena of these rays as they shower in upon Urantia." 42:5.4 It seems quite probable that cosmic rays above 10^{18} eV consist of ultimatons which are thrown off by whirling nebulae in their early stages of formation.

Cosmic force can be modeled by a quantum oscillator with a frequency of 3×10^{42} Hz and energy of 10^{28} eV. This places cosmic force at about the 137th frequency octave. There are 100 octaves of electromagnetic radiation in Orvonton with an upper limit of 1.4×10^{31} Hz and energy of 6×10^{16} eV. High-energy cosmic rays have energies in the range of $10^{15} - 10^{18}$ eV and consist almost entirely of protons. Ultra-high-energy cosmic rays very probably consist of ultimatons with energies above 10^{18} eV and frequencies above 2.4×10^{32} Hz. Ultimatonic cosmic rays begin around the 104th octave (10^{18} eV) at energies which are an order of magnitude greater than the most energetic electromagnetic waves, which are limited to 100 octaves in Orvonton. Infraultimatonic cosmic rays end before the 137th octave, since a particle at this octave has the Planck energy of 10^{28} eV. Revelation traces cosmic force back to the *absoluta* of space potency in the Unqualified Absolute, and then to the unimaginable agitations in the Unqualified occurring in the outer zone of nether Paradise in response to the will of the First Source and Center, the Universal Father.