

The Fundamental Process of Energy – Part I

A Qualitative Unification of Energy, Mass, and Gravity

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[I]f the ultimate model of physics is to be as simple as possible, then one should expect that all the features of our universe must at some level emerge purely from properties of space. –Stephen Wolfram, A New Kind of Science¹

[T]here must be, at the bottom of it all, not an equation, but an utterly simple idea. –John A. Wheeler

Abstract: The Universe is built upon a two-faceted Primary-Cause process, which serves as the key to the fundamental process of energy. Positive and negative energy processes are defined and used to resolve the cause-of-mass question, the cause-of-gravitation mystery, the *dark matter* problem, the *vacuum energy* confusion, the energy-balance misunderstanding, and the source-energy enigma. “The Fundamental Process of Energy” presents a qualitative understanding and conceptual unification of energy, mass, and gravity.

Keywords: energy; energy process; positive energy; negative energy; radiation; mass; gravitation; vacuum energy; dark energy; dark matter; source energy; cosmology, DSSU theory.

PACS: Cosmology; 98.80.-k; Gravitation; 95.30.Sf; Cosmological constant (Lambda) (98.80.Es).

In the ninth year following the discovery of the DSSU^A, another piece of the cosmic puzzle fell into place—the challenge of conceptual unification of energy was resolved.

As a scientific term, energy is defined simply as the capacity for doing work (and *work* always involves some kind of force). Some of the common forms of energy are radiation energy, thermal energy, kinetic energy, chemical energy, gravitational energy, and mass energy.

Amazingly, all forms of energy have one fundamental process in common and it is by this heretofore unrecognized process that they are unifiable.

In the following sections, I will reveal: the source of the photon energy; exactly how *mass* is a manifestation of energy; the cause of the energy of the gravitational field;

^A DSSU is the acronym for *the Dynamic Steady State Universe*—the cosmology theory that holds that the space medium is dynamic and that this medium expands and contracts **regionally and equally** resulting in a cosmic-scale cellularly-structured universe. It is a model based on the premise that all things are processes.

the nature of the energy of the “dark matter”; the misconceptions of the vacuum energy; and more.

Grasp the significance of the key process, understand its universality, and your view of energy will never be the same.

1. Brief Description of the Energy Problem

In the conventional view of energy, electromagnetic radiation is considered to be a fundamental form of energy. A photon, a particle of radiation energy, is said to be an excitation of the vacuum. A photon is somehow a manifestation of quantum fluctuations of the energy of the vacuum.

And what, we may well wonder, is this “energy of the vacuum”? ... Physicists claim that the emptiness of space is filled with all kinds of stuff like quantum particle-pair formation, various entities continually popping in and out of existence, and, as a background to all this activity, there are quantum units of vacuum energy. Whatever these quanta of *vacuum energy* may be, they are not just scattered around randomly in “empty” space. They

permeate *all* space. Physicist Robert Oerter explains, in his book *A Theory of Almost Everything*, that there are harmonic oscillators, one *at each point in space*, wherever there are quantum fields (which happens to be most everywhere). In otherwise empty space, these oscillators are pulsating in their lowest energy state. “We know, however, that a harmonic oscillator has some energy even in its lowest energy state. This [so called] vacuum energy exists at every point in space ...”²

Robert Oerter makes it quite clear. There are oscillators everywhere, at *every* point in space! And their pulsations represent vacuum energy. Now if a photon is to traverse a region of space, it must travel as an excitation *of* those oscillators. It has no choice. It cannot travel between the oscillators for there simply are no unoccupied points —no gaps to squeeze through. Therefore it is these oscillator that the photon excites as it propagates through empty space. And since the oscillators define the vacuum energy, it follows, according to Oerter’s conventional view, that the energy of the photon consists of vacuum energy.

However, this is like saying, “energy is composed of some other energy.” It does not tell us what *energy* itself really IS.

With the conventional approach, one exchanges the problem of explaining the energy of the photon with the new problem of trying to explain the energy of the fluctuators. Instead of a deeper definition of energy, one is faced with trying to define the vacuum energy.

Is vacuum energy the result of some other form of energy? —which in turn is the result of yet another? The question, it seems, becomes aimlessly regressive.

The point is that conventional physics has an *energy causality problem*.

As a first step in resolving the problem, we need to understand the nature of the vacuum.

2. The Vacuum, the Fluctuators, the Aether

On the macro-scale the vacuum is a region of space devoid of all matter (where “matter” means mass and radiation).

On the micro-scale the vacuum is ubiquitous. It occurs in all the interstices of all matter, including non-singular black holes. (The singularity is not a valid concept in DSSU theory; singularity-type black holes do not exist.)

It is well understood that the vacuum does *not* mean nothingness. The vacuum consists of fluctuators —space is densely filled with them. But note carefully, in DSSU theory these are not *energy* fluctuators; these are *not* Robert Oerter’s energy oscillators.

What is it that is actually fluctuating? I will address this question in a moment. For now, let me just say that they are the smallest excitations in space.

Of critical importance is that we do not attribute mass or energy to these entities.

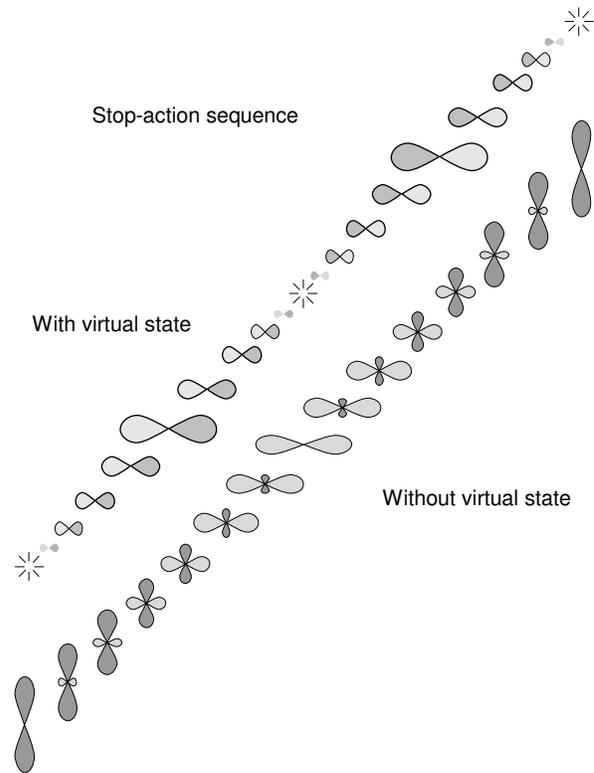


Fig. 1. Conceptual representation of units of aether. Such fluctuators (or oscillators) permeate all space. Although these fluctuations of excitation play an essential part in defining energy, they are **not themselves defined as such**.

To recap, space is permeated by a medium consisting of a super density of some kind of fluctuators. Photon translation through this space medium must involve an excitation of its fluctuators; evidently, photons propagate through the medium via some sort of conduction process. But pause and think for a moment. Doesn’t this invoke a light conducting medium!? What I have just described sounds just like a *luminiferous aether*! I know, I know, some call it a long discarded relic of voodoo science. I would counter with: one man’s discarded junk becomes another’s valued treasure. (No, I have not deviated towards some mystical side of physics or metaphysics. In fact, I will be citing the most highly-respect authority of the past century on this subject.)

It sounds like a luminiferous aether and *that* is precisely what it is. (For a conceptualization of the individual fluctuators please see Fig. 1.) All those countless unimaginably tiny fluctuators make up, collectively, the *aether medium*. However, it is not a material medium —that is to say, this substrate has neither mass nor energy.

And who was it that approved of just such an aether? Who was it that reversed his earlier rejection of aether and in the early 1920s acknowledged its legitimacy? ... Yes, it was the great Albert Einstein himself.

Quoting from his 1920 lecture, presented at the University of Leyden:

*“Recapitulating, we may say that according to the general theory of relativity space is endowed with physical qualities; in this sense, therefore, **there exists an aether**. According to the general theory of relativity space without aether is unthinkable; for in such space there not only would be no propagation of light, but also no possibility of existence for standards of space and time (measuring-rods and clocks), nor therefore any space-time intervals in the physical sense. **But this aether may not be thought of as endowed with the quality characteristics of ponderable media ...**”*
[Emphasis added]³

“Ponderable” is synonymous with perceptible. Since mass and energy are perceptible, Einstein’s certified aether must clearly be devoid of mass and energy. The long discarded treasure is revealing its shine.

“Aether is not a structure made of matter”

Einstein was not the first to recognize the special nature of aether. Many years earlier, at the turn of the nineteenth century, the aether’s non-materialness was recognized by Joseph Larmor, who wrote in 1900: “... Matter may be and likely is a structure in the aether but certainly aether is not a structure made of matter.”⁴

Let me now address the obvious question. If not energy, then what are the fluctuators? ... And here we must delve into a level of reality that is so low, so fundamental, that there is only one term that satisfactorily qualifies: The apt term is “essence.” We delve into a foundation level at which there is no “thing”, there is only process, and that process is so utterly simple that no simpler process could possibly exist. This we call the *essence process*.

So, what is it that is oscillating? Individually, the pulsations represent the essence process—an axiomatic process of DSSU theory. Collectively, they represent the essence medium of the Universe—an axiomatic nonmaterial substrate.

The aether is defined as the **essence** medium. It is a fluid-like medium consisting of pulsating **essence** entities.

The term “essence” was chosen, in part, because of its historical significance. The Ancient cosmologists, involved in the revolution of cosmology in which the role of gods was replaced by the role of natural law, deemed *space* (and everything it contained) to be the *5th essence*—the *quintessence*. As a term for the fifth element—after earth, water, air, and fire—the prefixed expression is strictly archaic. But the stripped-down term “essence” is ideal for the ultimate-source medium.

The aether units fluctuate between the two states of existence and non-existence; or, possibly, the fluctuation may be between two states of essence existence. See Fig. 1.

I should point out that by *not* attributing energy to the fluctuators, we are availed of a great opportunity. Aether units may be formed (“created”) or suppressed (“destroyed”) without any fear of violation of the conservation of energy law. This means, a quantitative expansion of aether may occur without conservation violation; and a quantitative contraction of aether may occur likewise. Later in the discussion, the fundamental importance of these two processes will become obvious.

Next we need to conceptualize the nature of the aether excitation in its basic perceptible form—the photon.

3. Nature of the Photon

Background

In the search for ultimate reality one of the greatest mysteries is the underlying nature of the quantum of electromagnetic radiation—the photon.^B Although much is known of the measurable behavior of the photon, the cause of the behavior is frustratingly elusive. We know what the photon does; but we do not know how. We do not quite know what it is.

Historically, it was the discovery of the discontinuous nature of the spectra of light emitted by atoms which led to the postulate that light consists of quanta of energy. The discontinuous spectrum lines indicated that energy, in the form of light, was being emitted in discrete amounts. These discrete “packets” were called photons and understood to represent a quantization of the electromagnetic wave (EM-wave). Photons carry energy, their measurable energy, in a proportional relationship to their frequency.

Photon Conceptualization

As the next step toward the fundamental process of energy, I should make it clear that the photon is an excitation—not of Robert Oerter’s energy oscillators, but—of *non-energy* essence fluctuators (the discrete units of the essence aether-medium). Please see Fig. 2a for a simplified visualization of the photon. The excitation may be conceptualized as a longitudinal surge with lateral components. There is a forward surge that diminishes as the lateral surges grow; then, as the lateral surges diminish there occurs a renewed forward surge. A schematic of the excitation sequence that takes place during one cycle of a photon’s advance through the aether is shown in Fig. 2b.

^B The name *photon* (for a small, discrete “lump” of energy) originated with the chemist Gilbert Lewis, in 1926; the symbol for a photon is γ because of the connection with gamma rays.

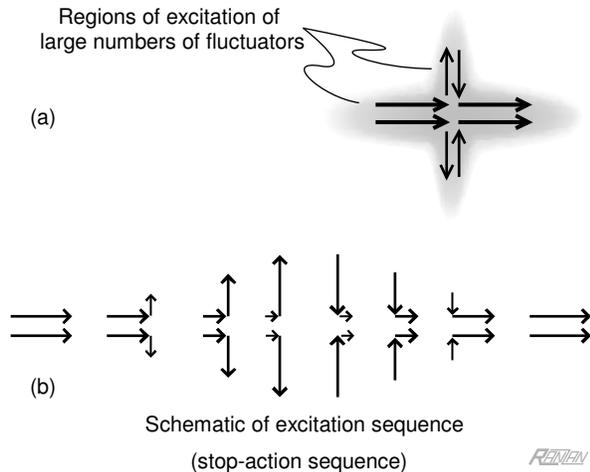


Fig. 2. *Conceptualization of photon.* (a) Isolated photon with its regions of excitation involving large numbers of fluctuators. (b) Schematic of the excitation sequence of a photon. The sequence represents one full cycle.

As a photon proceeds through its cyclical excitations, it simultaneously advances through the aether. A time-lapse visualization of a propagating photon is shown in Fig. 3.

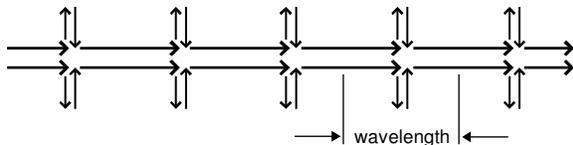


Fig. 3. A time-lapse schematic of the pattern of excitation of a photon (or EM-wave) that has travelled from left to right.

How many essence fluctuators are involved in the conduction of a photon at any particular instant? It is difficult to say but it may be truly vast; one photon may be the excitation of trillions of fluctuators.

The Model Explains Various Properties

The conceptual model can explain various properties of the photon. The photon/EM-wave is known to have both longitudinal and lateral components. In the present model, the longitudinal excitation is no doubt associated with propagation properties; while the lateral excitations may be associated with electric and magnetic properties.

The longitudinal excitation is associated with the speed at which light propagates. Fundamentally, the speed is determined by the excitation conduction rate which in turn is related to the oscillating rate of the aether fluctuators. The forward surge of the aether excitation is conducted by the fundamental fluctuators whose rate of

oscillation determines the speed of the collective excitation manifesting as the photon. As for the frequency and intensity of the lateral excitations, we may confidently assume they do not affect the rate of forward progression of excitation. (I should point out that there is no delay between the forward surge segments of the conceptual photon; the instant one forward surge is completed the next surge begins.)

The speed of a photon traveling through a transparent medium is the same as the speed in vacuum. However, primarily because of the phenomenon of photon scattering the path length of the photon increases; consequently, there is an appearance of a reduced speed of light. When light travels through a transparent medium (or, more generally, when EM-waves travel through a material medium) it is refracted by matter and its apparent speed is reduced in accordance with the material medium's characteristic *index of refraction*.

The **polarization** of light. The polarization phenomenon requires the photon to be a planar interacting system. It must have some regularity in its planar excitation (i.e., planar along the direction of propagation). The lateral excitations fulfill this requirement. See Fig. 3.

Photon spin. The photon is said to have a spin number of 1 . The physical interpretation of spin-1 involves a full axis rotation to return a particle to the original configuration. This quality of spin may be attributed to a spiral action of the forward surge of the propagating excitation (as shown in Fig. 4).

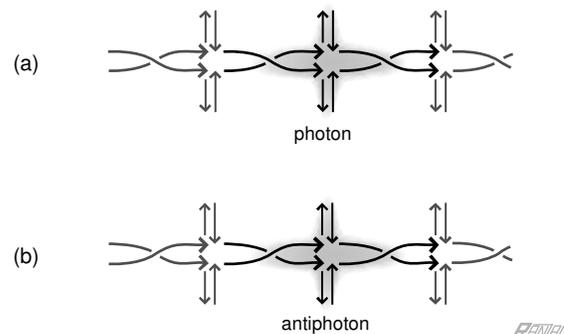


Fig. 4. Interpretation of photon spin. The spin of the antiphoton is simply in the opposite rotational direction. (Notice that the spin does not affect the polarization.)

Antiparticle of the photon. The fundamental particles of EM radiation are their own antiparticles. The antiparticle of a photon is another photon of opposite spin. Both kinds are equally abundant and may be emitted by luminous bodies of either matter or antimatter.

Photon confinement. This property is required if photons are to participate in the formation of other particles. In fact, photon confinement may be *the* essential role in all mass-particle formation. How might this be

accomplished? How might the aether excitation (the photon of Fig. 4), traveling at lightspeed, be confined?

The reader, no doubt, is aware of the gravitational bending of light. All gravitating bodies, including our Sun, via their gravitational fields, have the ability to bend light rays to some degree or other. Gravitational lensing is a popular version of this effect. But the effect is maximal in the case of “black holes” where the path of photons (at some appropriate radial distance) are bent into a full circle—they enter a circular orbit about the black hole.

Now consider the microscopic realm. In order to confine photons one needs a highly localized region of space to attain some threshold energy density. That is, the intensity of the localized aether excitation must be great enough to cause the bending of the EM-wave into a full circle and form a looped wave-pattern.

One of the requirements for a wave-pattern to be stable is that there must be an integer number of waves along the circumference of the loop. If the loop has the length of one wavelength, then such a loop represents the confinement of a photon.

Because of certain symmetry rules applicable in quantum physics, not one, but two separate loops are formed.

And how is the requisite energy density achieved? ... All it takes is the collision of two gamma particles—two high-energy (ultra-high frequency) photons. See Fig. 5.

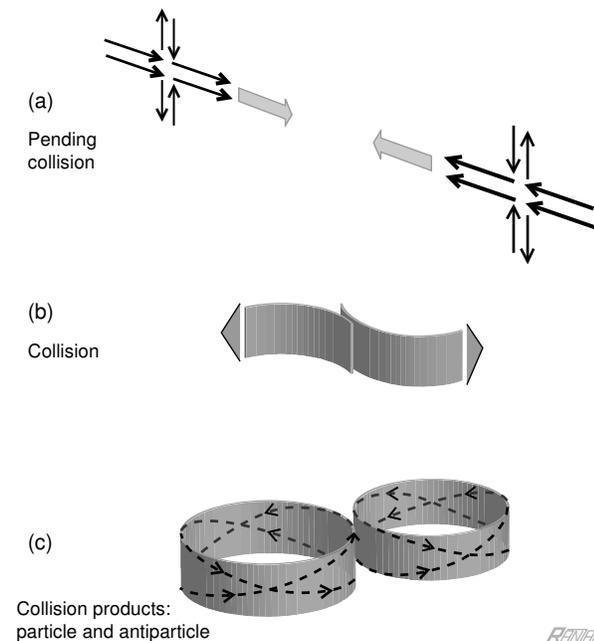


Fig. 5. *Photon confinement.* Two high-energy photons, in part (a), collide, in part (b), to produce a particle-and-antiparticle pair, in part (c). The energy density of the combined photons is so great, that the photons are forced to double back. Symmetry is achieved by having one particle acquire a right-hand helical structured confinement and the other particle a left-hand helical confinement.

A quick reality check. Does the collision of two high-energy photons actually produce a particle-antiparticle

pair? Yes. In the mid-twentieth century it was discovered that such collisions produce one negatron e^- and one positron e^+ . The negatron is more commonly called the *electron* and the positron is its oppositely charged antiparticle. The interaction is reversible and is expressed as:

$$\gamma + \gamma \leftrightarrow e^- + e^+$$

The deeper nature of *photon confinement* will be discussed later in connection with the energy of mass.

Are photons the only fundamental particle of energy? It is quite possible that this is the case. If so, then any other energy particles would necessarily be an assembly of photons. (Mass particles will be discussed later.) However, if there are other kinds of fundamental (energy) particles, then it is hypothesized that they are, more or less, similar to photons. I will simply call them photon-like particles.

And what about neutrinos? The several types of neutrinos^C in the Standard Model are considered, in the new theory, to be either photon-like particles or they are non-entities. The ostensible participation of neutrinos in particle interaction may simply represent a localized, momentary, interaction with the aether—and not some entities with independent existence. Effects conventionally attributed to neutrinos might be better attributed to aether. There is also the possibility that neutrinos may be some entangled combination of photons.

Gravitons? Gravitons, as energy particles, definitely do not exist. All attempts to detect them have failed. Incidentally, in the reality-based Dynamic Steady State Universe, gravitation is not a force and needs no force carrier.

4. The Energy-Particle Conduction Process

Conduction by Aether Absorption

This section, and the following section, will reveal the key process that unlocks the mystery of mass, energy, and gravitation—the key process that bestows the property of mass as well as energy and gravitation. Although there is a long history for the search of a unifying process, to the best of my knowledge, the following process has never before been postulated. This process may well be one of the Universe’s best kept secrets.

The secret is in the way the photon (and photon-like particles) is conducted by the aether.

Whether in a free state or a confined state, photon propagation through the aether is a process of *conduction by aether absorption*. See Fig. 6. The aether through which the excitation propagates is itself absorbed; those fluctuators participating in the excitation are absorbed *and do not reappear!*

^C The standard model includes the electron-, muon-, and tau-neutrinos and their antiparticles. Their charge is zero; their mass is zero (or almost zero).

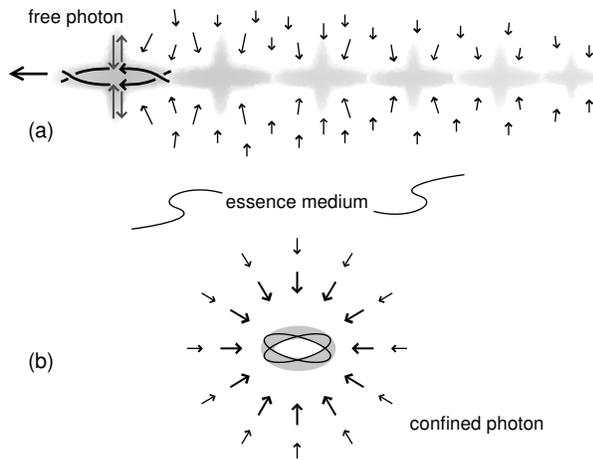


Fig. 6. The fundamental particle of energy (the photon) propagates through the essence medium by consuming units of aether—a process of conduction by excitation-and-absorption. The result is a **disappearance** of aether and a **flow** to replace the deficiency. (a) In the case of a free photon, the flow is transient and spread along the trailing trajectory. (b) In the case of a confined photon, it is a sustained flow directed radially inward.

The DSSU postulate of light conduction through aether-space involves *a most unusual mode of conduction*. Light waves are not vibrations of the particles of a mechanical medium; rather, light “waves” simply travel through the medium by a process of conduction—a unique process that consumes the “particles” of the medium. A photon, in DSSU theory, is a wave-like conduction-disturbance of aether. This “conduction” is unlike any other—the photon is conducted *by* aether in a manner that is destructive *of* aether.

Since all material entities are composed of photons or photon-like particles, it follows that all matter involves a process of *conduction by consumption*—a continuous process of aether absorption. In other words, all objects are manifestations of the absorption-of-aether process. Atoms, pencils, rocks, and organisms exist because they are sustained by a continuous stream of essence-process units.

Historical Reflection

Let us reflect for a moment. Why wasn’t this process discovered before? (Maybe it was discovered, maybe even several times, but then immediately rejected because it did not fit into some larger preconceived theory.) We have a process—conformant to natural law, elegant in its simplicity, profound in its consequences—that, nevertheless, was somehow missed by the philosophers and physicists of three long millennia! How could it have been overlooked by these experts in ontology?

From the time of the Ancients through to the early part of the 20th century, aether was considered to be some sort of material substance (“ponderable” to use Einstein’s

expression). A material substance, of course, can be changeable and converted to other states *but* it could never disappear—never vanish into nonexistence. There was usually some form of the law of conservation of mass and energy that could be called upon to restrict the proposed nature of the aether medium. Aether *consumption*, a process of a seemingly magical nature, was inconceivable.

So it was for thousands of years.

The Modern experts missed it because practically all professional theorists denied the very existence of any version of aether. Some were active deniers, who ridiculed the concept and discouraged or prohibited publication; others were passive deniers and simply ignored the concept.

It was missed because of the fixation on Einstein’s original view of aether, while his qualifying correction, expressed later in his Leyden lecture, was ignored. It was completely ignored!

It was missed because no one considered an interactive, but *non-ponderable*, aether—what is now invoked as the DSSU essence medium.

5. Energy Process Defined

With the concepts of the previous sections, we are now ready to define the *energy manifestation process*.

The definition of energy: Energy, at the most fundamental level, is manifest in the consumptive-absorption of fundamental fluctuators which are also known as discrete units of aether (aether itself being defined as the non-material, fluidic, essence-medium of the Universe). Any process—any process whatsoever—that consumes/absorbs aether is an energy manifesting process. Regardless of scale, if there is a quantitative change in the aether then some form of energy is involved.

Without this active process, neither mass nor radiation can exist. And without mass or radiation there can be no gravitation.

Energy as a process, so defined, is itself the consequence of the even more fundamental *essence process* (the pulsations of discrete essence units that permeate all space, as described earlier). In DSSU theory, a clear distinction is made between the *energy manifesting process* and the *essence process*. It is this fundamental distinction that precludes the “fluctuating discrete units of *space*” from being labeled *energy* fluctuators or *energy* vibrations. This is the reason for the warning, given in [Section 2](#), that the *fundamental fluctuators* are not energy oscillators.

There is a direct quantitative relationship between energy and aether absorbed. Consider radiation energy. The greater the frequency of an EM-wave, the greater is the number of lateral aether excitations. The more lateral excitations, the greater is the quantity of aether absorbed.

The greater the aether absorption, the greater is the photon's energy.

A photon's energy is defined as $E = hf$; and when the frequency f is expressed in terms of the wavelength λ we have,

$$E = h \frac{c}{\lambda} \tag{5-1}$$

Now think about what c/λ means. It means the number of wavelengths arriving at a certain point (or passing some marker) each and every second. The complete energy expression means

$$(\text{energy}_{\text{photon}}) = (\text{constant}) \times (\text{no. of waves arriving per sec}).$$

Each wavelength represents a certain excitation; and the greater the number of excitations per second the greater the energy. Blue light carries more energy than red light because the blue's more numerous excitations consume more aether than red light.

6. The Energy of Mass

“Particles are the interface between absolute and relative [read "potential"] reality. In what we term matter, particles join together essence and existence.” –Anthony P. Perella, *Answering Mysteries of the Origin of Matter*

Mass particles are almost certainly composed of confined photons —confined, singly or in pairs, into a wide variety of possible patterns. Physicists J. G. Williamson and M. B. van der Mark have presented some compelling evidence including the supporting theory. Notably, there is strong evidence that the electron is composed of a confined photon.⁵

In this section, I want to justify the notion that mass is a conduction-by-aether-absorption process. Mass, rather than being a thing, is a process. I will show how the fundamental particle of energy may configure itself into a mass particle —a mass particle, which, depending on the chirality, can produce a positive or negative charge.

Let us take a closer look at the photon-confinement shown in Fig. 5c. Consider one of the loops as it would appear in a flattened-out (and untwisted) state. It would appear as in Fig. 7a where we have a photon travelling from the right to the left. I encourage the reader to make a simple paper cutout of the strip as illustrated. Apply one full twist to the model to form a right-handed helix; then join the two ends together (above the plane of the page), as shown in Fig. 7b. The result will be a twisted loop (as shown in Fig. 7c) which can easily be folded into the double loop of Fig. 7d.

Remarkably, the double-loop configuration is able to model key features of an electron, including the spin-1/2 property, the **spin magnetic dipole moment** μ_s , and the **spin angular momentum** S .⁶

The photon's electric field vector, is represented by the symbol \odot for the point-end of the vector and by “x” or “ \otimes ” for the tail-end of the vector. In the double-loop configuration, in Fig. 7d, the E-field vectors are radial and directed inward, and the B-field is vertically upward. The magnetic field vectors are responsible for what is known as the electron's magnetic dipole.

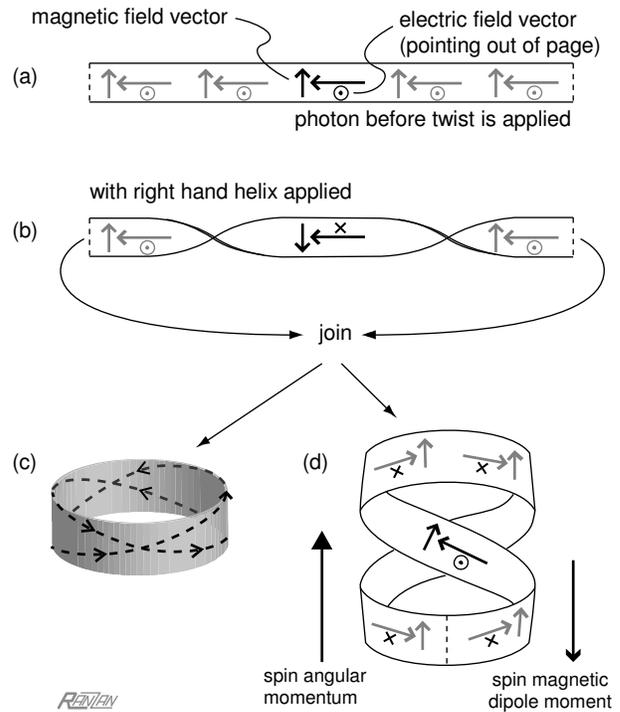


Fig. 7. Illustrative modeling sequence for confining photon to produce a mass particle. (a) Schematic of a photon moving right to left with speed c . (b) A full twist is applied and the two ends are joined together above the plane of the page. (c) The resulting single loop is probably unstable. (d) But with the double loop configuration, all the key features of the electron are modeled. Notice that all the electric field vectors point inward thus modeling the electron's negative charge; all the magnetic field vectors point upward thus modeling the electron's magnetic dipole.

The inward pointing electric field vectors, of the double-loop configuration, represent aether disturbances and serve to model the lines of force associated with the electron's negative charge. (More on this shortly.)

I have shown (mainly for clarity) more wavelengths than actually occur in the confinement trajectory. In order to achieve a stable configuration it seems certain that only a single wavelength is involved in the double-loop structure.

As for the wavelength itself: Realize that while the electron's key features are independent of the length of the “wave,” the wavelength does, however, determine the electron's energy level which is important to electron confinement within atomic structures.

The physical interpretation of the “spin ½” feature is that it takes two rotations to return to the original configuration. That is, the spin-½ of the electron is tied to the fact that the spin-1 photon requires two confinement orbits before returning to the original orientation. This means the spin of the photon and the spin of the electron fit together in a harmonious match.

How the antielectron, the positron, may be similarly modeled is illustrated in the next section.

Let us work out the mass of the confined photon. In the DSSU framework, **mass**, as we have seen, is a conduction-by-aether-absorption process; a confined photon embodies this process. But what is the mass of the confined photon (the electron) in mathematical terms? ... Combining Einstein’s equation $E = mc^2$ and the photon-energy equation from the previous section, $E = h(c/\lambda)$, we have

$$E_{\text{photon}} = m_{\gamma}c^2 = h\frac{c}{\lambda}. \quad (6-1)$$

Solving for the mass (of the confined photon) gives,

$$m_{\text{photon}} = \left(\frac{hc}{\lambda}\right)\frac{1}{c^2}, \quad (6-2)$$

which, under this theory, represents the mass of an electron at rest. That is, since the confined photon is the electron, the above expression must also represent the mass of the electron. Knowing that the double loop consists of a single wavelength and applying some simple geometry, we can express λ in terms of the double-loop radius ($\lambda = 4\pi r$). The result is

$$m_{\text{electron}} = \frac{h}{4\pi rc}. \quad (6-3)$$

Notice the inverse relationship between mass and radius. This is significant, for it reflects a fact of particle physics that the smaller the structure the greater is its mass (and the greater is the contained energy).

The primary reason that physicists consider the electron to be elementary, as far as mass is concerned, is that experimentally it behaves as a point-like particle and therefore appears structureless.⁷ There is now a simple explanation. The electron appears structureless because its single component is a photon and a photon has no structure—a photon being but a pattern of aether excitation.

Now what about other mass particles? In the article *Is the Electron a Photon with Toroidal Topology?* the authors have stated:

“If the electron is indeed constituted by a photon, other elementary particles may also be composed of photon states, but in some other configuration to that shown ... The possibility that muons and tauons may be formed by electron-like states with a different internal curvature has been discussed in the literature [D. Hestenes, *The Zitterbewegung Interpretation of*

Quantum Mechanics, **Found. Phys.** 20, 1213 (1990)]. We speculate that the hadrons [particles affected by the *strong force*] may be described by composite confined photon states. If we identify a quark with a confined photon state which is not sufficient in itself to complete a closed loop in space, but transforms a photon going in one spatial direction to one travelling in another, it would then only be possible to build closed three-dimensional loops from these elements with qqq [three quarks] and $q\bar{q}$ [quark, antiquark] combinations.”⁸

In other words, if quarks are identified with a confined photon state, then all particles composed of quarks are a composition of confined-photon states. This applies to all mesons (a class of hadrons)—these being quark-antiquark pairs. And it applies to all baryons (e.g., proton, neutron)—these being combinations of exactly three quarks.

This is truly amazing. All mass, it now appears, is an assembly of confined photons.

Now remember, photons are basically little more than longitudinal and lateral excitations which absorb and consume aether as an intrinsic activity in this excitation process. It is by this absorption process that particles and objects *grab*, so to speak, into the aether-space that they occupy. Thus, the property of inertial mass—that inherent resistance to any change in motion—is acquired. Thus, mass energy is manifest.

What the Physics community has always assumed is that mass is some sort of addition to empty space. In the *conduction-absorption theory*, mass is the opposite; mass is the *removal* of entities—essence entities—that permeate all space.

The concept of mass as a wavelike substance for the expression of energy is a fundamental finding for the unified picture of physical reality in the Dynamic Universe. –Physicist Tuomo Suntola⁹

7. Energy of the Electric Field

... [T]here is a deep underlying symmetry in nature for electric charge: for every positive charge in the universe, there is a negative charge to balance it.
–Paul Davies¹⁰

The purpose of the *electric field* is to convey (or mediate) the Coulomb force. Traditionally the Coulomb force, associated with positive and negative charges, was said to be “mediated” by a **field**; the modern terminology is to say that it is mediated by an *exchange of particles* (often called the *quanta* of the field). In the case of electrostatics and electrodynamics the mediator is the photon.¹¹ The photon, of course, is our source of aether excitation.

As an additional backgrounder, let us return to the Leyden lecture.

Einstein credits Hendrix A. Lorentz, whom Einstein considered to be the most powerful thinker he had known,¹² with the concept of aether as a vital component. Einstein, praises Lorentz for having “brought theory into harmony with experience by means of a wonderful simplification of theoretical principles ... [making] the most important advance in the theory of electricity since Maxwell.” Lorentz made the aether a vital component — the medium necessary for the very existence of the electromagnetic field.

“As in empty space, so too in the interior of material bodies, the aether, and not matter viewed atomistically, was exclusively the seat of electromagnetic fields.” [Emphasis added]¹³

Let us consider the simplest kind of electric field — the electrostatic field. An electrostatic field is defined as a time-independent electric field, such as that produced by stationary charges. A free, unaccelerated, electron is a stationary negative charge.

Electric and electrostatic fields possess energy. They do so in the sense that they are responsible for the potential energy which any charged entities acquire by their presence and position in the field’s domain.

The electron surrounds itself with a negative electrostatic field. See Fig. 8. The energy of this field is often visualized as being channeled, or concentrated, in radial lines of force. And *that* energy is derived from the disturbance/excitation of aether — a disturbance that takes place continuously and has a degree of correspondence with those field lines. It seems certain that electromagnetic forces involve the interaction of aether “particles.”

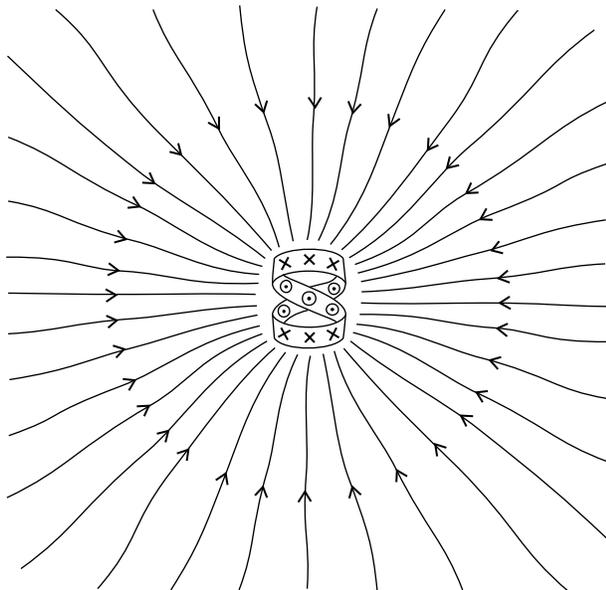


Fig. 8. The radial electrostatic field of the electron. These lines of force radiating from the central confined photon represent an excitation of, and interaction with, the aether medium. The excitation-interaction is, by definition, accompanied by aether absorption-annihilation. And it is this aether annihilation that ultimately defines the energy of the electric field.

The nature of the interaction, its ability to selectively attract and repulse, can only be imagined; and, even then, with great difficulty. Possibly photons travel back and forth along a pattern suggested by the lines of force. We do know, however, from our energy process definition, that a major aspect of the aether disturbance involves the absorption-annihilation of the essence medium.

The lines of force of the electron are directed inward; those of the positron, the antielectron, are directed outward. The choice of directions is simply a historical convention (arbitrarily assigned). The positron is shown in Fig. 9, which details how it is modeled as a confined photon and the resulting positive electric field. And *where*, we may well ask, do all these field lines “go”? Where do the positive field lines terminate, and the negative ones originate? ... It turns out that they are all interconnected — positive to negative and vice versa.

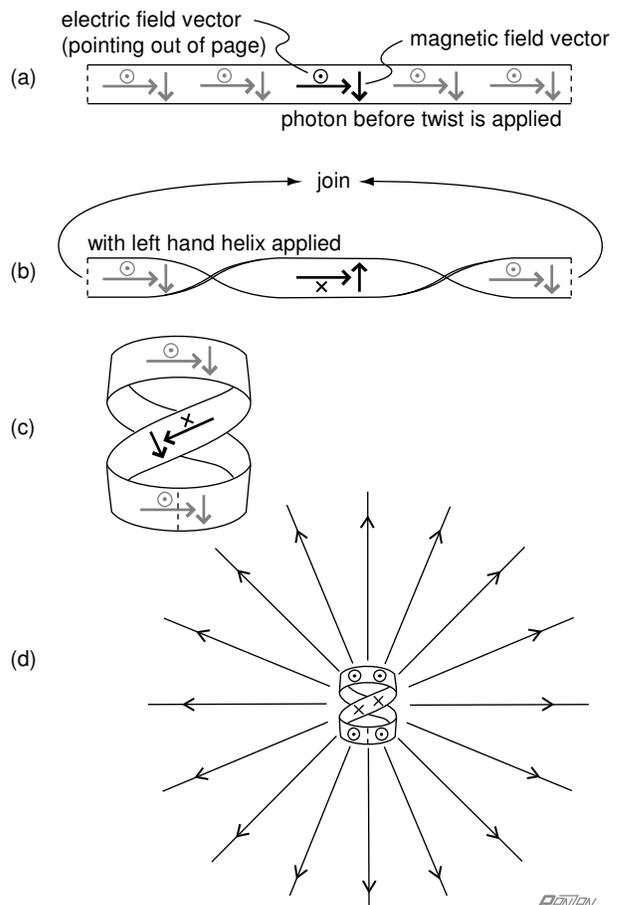


Fig. 9. Illustrative sequence for confining a photon to produce a positron with a positive electrostatic field. (a) Schematic of a photon moving left to right with speed c . (b) A full twist is applied and the two ends are joined together **below** the plane of the page. (c) The confined photon forms a stable double-loop; all the key features of the positron are modeled. (d) The electric field —the charge lines-of-force— is a 3-dimensional radial pattern of aether excitations, which include *aether absorption-annihilation*.

Now since an EM-field exists, in great part, as an absorption-consumption process of aether, it would be expected that the mass particle from which the field excitation emanates will possess more overall mass than an electrically neutral particle. Whenever there is more energy present, it implies that there is more *equivalent* mass. In other words, the energy of an EM-field should be equivalent to some additional amount of mass. Indeed, such is the case.

It was recognized by J. J. Thomson in 1881 that a charged body—due to its electromagnetic self-energy—is harder to set in motion than an uncharged body. The additional work of Oliver Heaviside (1889) and George Frederick Charles Searle (1896) established that the electrostatic energy behaves as some sort of “electromagnetic mass,” which can increase the normal mechanical mass of the bodies.¹⁴

Poincaré (1900) determined that the electromagnetic field energy has a mass density of $m = E/c^2$, where E is the field’s electromagnetic energy per unit volume, and m is the mass *equivalence*. Furthermore, he noticed that the electromagnetic field contributes its own additional momentum, clearly indicating that the field adds a certain amount mass.¹⁵

There were efforts to combine the two kinds of “mass” into a single concept, a single equation, but were eventually abandoned in favour of a basic *mass-energy* and a separate *EM-field-energy*.¹⁶ In the DSSU unified theory, both kinds are understood to be processes involving the absorption-annihilation of aether.

In the next section we deal with a totally different kind of field. Whereas the EM-field consists of lines of force (pathways of patterns of aether excitations) the gravitational field has no lines of force and no excitations of aether. Of the four “forces” of nature, gravitation is, by far, the easiest to understand.

Standard Physics/Cosmology, however, considers gravitation to be, by far, the most challenging. A major problem is that gravitation theory is missing a causal mechanism. The experts know it. But worse, the exhaustively scrutinized gravity effect utterly refuses to fit into the detailed theoretical view of reality that Academia has meticulously constructed during the past one hundred years. The confusion over the nature of gravitation has led the cosmology branch of physics into a state of crisis—recall the 1998 headline story “Cosmology in Crisis.” If gravitation, the acknowledged most important effect/force in shaping the universe, is not understood, then the resulting theory of the universe is simply a mathematical exercise and *not* a representation of the real world.

How important is the understanding of gravitation? How serious is the crisis? Is it the past failure to make gravitation fit that has now led mankind to the Fifth Revolution in cosmology.^D

^D The 2nd revolution in cosmology, as mentioned on page 3, was the overthrow of the universes ruled by Gods in favour of a Universe ruled by Natural Law; the 3rd revolution was the

8. Energy of the Gravitational Field

Direct Cause of Gravitation

I have discussed radiation, mass, and charge. I have shown that they all exist as excitations of a nonmaterial aether. Moreover, all these excitations involve the absorption and annihilation of aether—tiny amounts on the particle scale, astronomical amounts on the astronomical scale. Remember, this annihilation is *not* the conversion of one form of energy into another—not like particle-antiparticle annihilation. Rather, this is a disappearance of the aether involved in the excitation. So, what happens when there is a significant aggregation of mass, radiation, and charge?

What happens when the aggregation is in the form of a planet, a moon, or a star? Just think of all that mass, all that radiation, all those energy processes taking place. Think of the vast numbers of quarks, electrons, photons, and EM-fields that must be supplied with the aether medium which sustains them. And that is exactly what the aether medium does, it sustains them. What was shown to occur on the quantum particle scale (as described earlier in Fig. 6) now occurs on the astronomical scale. And the cause of the gravity effect is now in our grasp.

The *direct cause* of gravitation is simply the accumulated absorption effect of all the mass and mass equivalences. The cause of gravitation is the activity of the multitude of confined photons as they excite and absorb-annihilate aether. Surrounding any large mass accumulation, a bulk flow of aether becomes necessary in order to feed a truly insatiable demand. This bulk-flow aspect of gravitation is simply the side-effect of the relentless demand by mass (and its equivalences) for the essence medium.

An understanding of the cause of gravitation is a major advance but our focus here is on energy. In the context of the *energy* discussion, this *primary* gravity, being a mere side-effect, is of ancillary interest. Far more interesting, and relevant, is the gravitational “field” that surrounds a mass body.

Comparison of Gravitation Fields, the Conventional View vs the DSSU

In standard cosmology we say that a gravitational field exists for every object that has mass. One object attracts another by means of the gravitational field; and the *gravitational field intensity* is defined as the *force per unit mass* or simply the *freefall acceleration*.^E For a body having mass M , the magnitude of the gravitational field intensity at some exterior point with radial distance r is (GM/r^2) —which reduces to units of acceleration. As an example, at the Earth’s surface, r is simply the radius of the Earth, M the mass of the Earth, and the gravitational field intensity is simply equal to g , which is the

Copernican Revolution (the Heliocentric Universe); and the 4th revolution was the Creationism Revolution (the Expanding Universe).

^E In general: Gravity_{intensity} = (Force_{gravity on object}) / (Mass_{object in field}) = (Acceleration of object due to the large central body).

acceleration due to the force of gravity (or about 9.8 meters per second squared).

The important thing to note about the conventional view is that gravitation is a *force field*. (In fact, it is the belief in this force-field concept that drives the futile search for the force carrier—the graviton.) The force, in some unknown way, acts on objects causing them to accelerate.

The vectors of a conventional gravitational field (Fig. 10a) represent the force experienced by a unit mass. The vectors also represent the acceleration of any small freefalling object regardless of its mass. (This motion was first revealed in Galileo’s naturally-accelerated-motion experiment: heavy objects fall at the same increasing rate as less massive objects.)

The DSSU gravitational field is fundamentally different. Instead of a force field it is a *dynamic aether* “field”—an active region which can be divided into two functional components.

The first is the *aether flow* field. Surrounding any gravitating body there is a bulk flow of aether—a continuous streaming into the central mass body. The speed of the aether flow *increases* with proximity to the surface of the central body. In a non-rotating system in undisturbed aether space, the speed is proportional to $\sqrt{1/r}$, where r is the distance from the center point of the body. More importantly, it is the *rate of change* of the actual flow velocity that determines the freefall acceleration experienced by all mass, matter, and radiation within the gravitating region.

The vectors that describe the *aether flow field* represent the accelerating flow of the aether medium. That is to say, the inflow vectors represent the rate of change of the actual aether bulk movement. See Fig. 10b.

The second functional component is the *aether contraction field*. This is the component that accounts for the *dynamic* property. The vectors in this field represent the *contraction* of the aether medium. The contraction field is shown as the dotted vectors in Fig. 10b. This contraction can be described as an actual disappearance, or self-dissipation, of aether. The rate of contraction of aether increases along with the acceleration of the bulk flow (with nearness to the mass). While the aether flow acceleration varies as $1/r^2$, the contraction of aether itself varies as $1/r^3$. The reason for the inverse-cube relationship will be explained shortly.

The fact that the rate of aether contraction increases with proximity to the central mass in proportion to the inverse of the radius cubed means that the *dynamic aether field* is overwhelmingly dominated by its powerful contraction aspect. Although the central mass is the *direct* source of gravitation (manifesting as accelerating aether flow), it is the *external regional contraction of aether* that makes the acceleration a truly formidable effect. Without this contraction, local acceleration, and gravity in general, would be far, far, weaker.

The conventional gravitation field is a *force field* and it is the force that causes anything in the field to accelerate (towards the center of mass). The DSSU

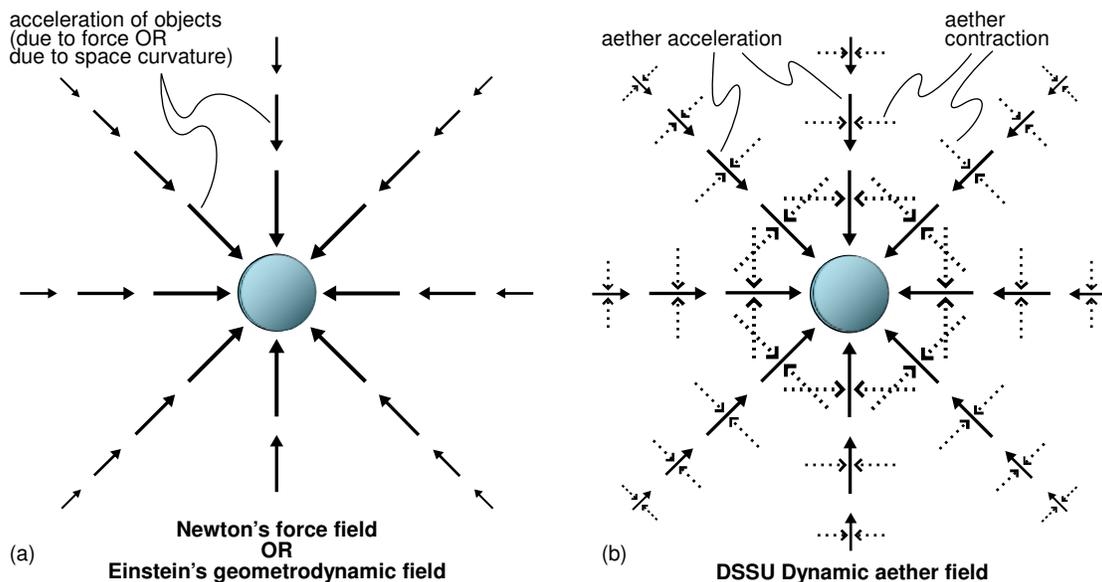


Fig. 10. Gravity fields. (a) The conventional gravitation field has two interpretations: Under the Newtonian interpretation the vectors represent the force that acts on matter to cause any object in the field to experience acceleration. Under the Einsteinean interpretation they represent the change in the geometry of spacetime which somehow causes objects to likewise accelerate.

(b) The DSSU gravitational field is a dynamic-aether region for which the radial vectors represent the acceleration of the aether flow. Note that the direction of the aether acceleration has nothing to do with the net velocity of the aether. The reason can be explained with this loose analogy: The acceleration you experience in an automobile as it rounds a bend in the road is *not* in the direction of the car’s motion (its velocity). The dotted vectors in (b) represent the contraction of aether-space—the *self-extinction of aether*.

gravitational field is a *dynamic-aether region* and anything in that region tends to accelerate *with the acceleration of the local aether flow* (again, towards the center of mass).

In a *force field*, the force tells matter how to move. In a *dynamic-aether field*, the aether medium tells matter how to move.

There is also the gravitation field of *general relativity*—called a *geometro-dynamic space field*. It is based on non-Euclidean geometry. However, since general relativity does not recognize the existence of a space medium (notwithstanding the message of the Leyden lecture), no one quite knows what the *geometro-dynamic field* is and how it actually works. Its hallmark is the mathematical precision with which it describes the acceleration effect on matter within a distorted spacetime region (a gravitational field). It is the penultimate theory of gravitation. However, since its inception, in 1915, it has lacked an essential ingredient—a causal mechanism.

Aether Flow: Acceleration and Velocity

What we experience as the acceleration due to gravity is, in the DSSU gravity theory, the acceleration of the space-medium itself. *The intensity of the gravitational effect at a particular location is a measure of the local space-flow acceleration.* The acceleration is simply the time-rate-of-change of the aether flow speed. Now, consider a gravitating body that is non-rotating (this ensures that the aether *acceleration vectors* are directed toward the center of mass); also, consider this body to be “at-rest” within the surrounding aether medium (this ensures that the aether *velocity vectors* are directed toward the center of mass). Expressions for acceleration and velocity of aether inflow are derived as follows.

Let the mass of some planet-size body be represented by *M* and its radius by *R*. A small test mass is resting at some arbitrary distance, *r* from the center of mass *M*; it is shown, in Fig. 11, resting just above the sphere’s surface. This small mass, designated as *m*, is “experiencing” a force-like effect, in accordance with Newton’s Law of Gravity:

$$F_{gravity} = -GMm/r^2, \text{ where } M \gg m, \text{ and } r > R. \quad (8-1)$$

But from Newton’s 2nd Law of Motion, a force is defined as $F = (mass) \times (acceleration)$, so that

$$ma = -GMm/r^2. \quad (8-2)$$

Although at rest in the frame of the sphere, the test mass is undergoing acceleration; and whenever there is an acceleration there must be a velocity. Replace the acceleration with its definition, $a = dv/dt$, and apply the chain rule:

$$\frac{dv}{dt} = \frac{dv}{dr} \frac{dr}{dt} = -\frac{GM}{r^2}, \quad (8-3)$$

which (after replacing dr/dt with its identity *v*) may be integrated and solved for the velocity.

$$\int v dv = -\int \frac{GM}{r^2} dr, \quad (8-4)$$

$$\frac{v^2}{2} = \frac{GM}{r} + C, \quad (8-5)$$

where $C = 0$ since $v = 0$ when $r = \infty$,

$$v^2 = \frac{2GM}{r}. \quad (8-6)$$

Understand that the test mass is stationary in the sphere reference-frame; it is not accelerating and has no speed with respect to the gravitating body. However, the test mass *does* have a speed with respect to the aether medium. The *v* in the equation represents the relative speed between the fixed test mass and the aether.

$$v = \pm \sqrt{2GM/r}. \quad (8-7)$$

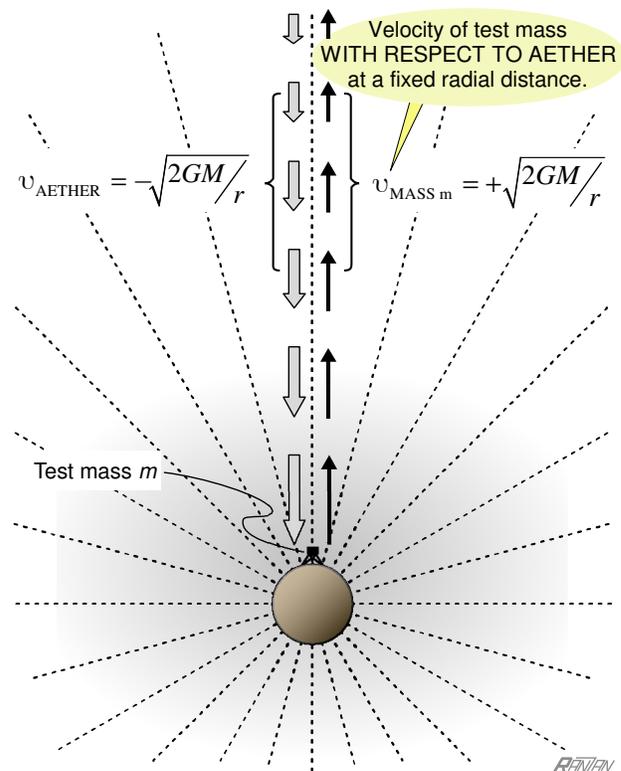


Fig. 11. Aether-flow velocity field as given by the **negative** solution (of the equation derived in the text from the Newtonian Laws) and indicated by the block arrows. (The aether-flow arrows may also be thought of as *comoving freefall*.) The **positive** solution gives the velocity magnitude of the test mass with respect to aether, where the test mass is being held “stationary” at the corresponding distance *r*. (The field is idealized; it is assumed, for the sake of simplicity, that the gravitating body is not rotating and there are no other aether-flow components.)

The equation has two solutions; one positive and one negative. The positive solution expresses the “upward” motion of the test mass *through* the aether (in the **positive** radial direction). The negative solution represents the *aether flow velocity* (in the **negative** radial direction) streaming past the test mass.

The negative solution represents the speed of *inflowing aether* at the particular radial location specified by r . If the direction is specified with the subscript “inflow” then the negative sign can be discarded; we then have the expression that describes the mass body’s aether-velocity field.

$$v_{\text{inflow}} = \sqrt{2GM/r}, \quad (8-8)$$

where G is the gravitational constant and r is the radial distance (from the center of the mass M) to any position of interest external to M .

Figure 11 is clearly an idealized situation. Most regions of our universe consist of a patchwork of overlapping gravitation fields with smaller fields embedded within larger ones. There are usually several aether-flow vector components involved, as, for example, those affecting our own planet Earth. The major components include the sun-bound flow of 42.2 km/s; a 30 km/s flow due to the Earth’s orbital motion; and a staggering cosmic component of 365 km/s; all of which are superimposed on the Earth’s inflow of only 11.2 km/s (at the surface). The flow field experienced by the Earth is the vector sum of those several components. It is the rate of change of the combined vector flows that gives us the acceleration vectors —the vectors of the Earth’s ***aether flow acceleration*** region.

Let me emphasize, it is only the rate of change which is important. The cosmic-flow component is a cosmic hurricane of 365 km/s but its rate of change is, locally, quite negligible. The orbital component of 30 km/s is constant and contributes almost nothing to the acceleration of flow. For this reason, the Earth’s relatively small 11.2 km/s inflow accounts for practically all the

local aether acceleration (9.8 m/s^2 near Earth’s surface). What all this means is that the aether flow velocity, derived above, refers specifically to the velocity component which is “causing” the local acceleration.

The 365 km/s cosmic-flow component, as well as the solar component, passing through the Earth (literally passing through our planet) have no effect on the Earth’s net inflow component. It may seem a bit counterintuitive but that is the nature of the superposition of vector fields.

If we wish to use Fig. 11 to model the Earth situation, then the inflow velocity (block arrows) shown would represent only the Earth component of a complex composite aether-velocity field. It would not represent the actual aether flow.

The typical gravitational field is an aether *contracting* region. But how can we be certain of this? A skeptic might say that maybe aether is simply flowing, without contracting. Maybe aether streams into mass and is only *then* contracted out of existence (by the absorption-annihilation process) —only after it reaches the interior of the mass. It is easy to show that this is not the case and that aether, during convergent flow, must contract.

... continues ...

The discussion of the *contractile nature of aether* continues in Part II where we delve deeper into the “Energy of the Gravitational Field” and show how it fulfills the requirements of the *fundamental process of energy*. Special attention is given to the energy of Lambda (dark energy), which turns out to be the essential “source” energy.

Part II also gives a presentation of a new and profound perspective on the cosmic-scale balance of energy —a balance that ensures a non-expanding Universe; followed by a powerful application of the energy-process definition in resolving a serious problem plaguing the Physics Community —the problem relating to the nature of the energy of the vacuum.

DSSU Glossary

Aether: the generic term for the all-pervasive nonmaterial *essence* medium. In its quantized form *it has no mass and no energy*.

Energy definition: Any localized quantitative change in aether units. Energy, both mass-energy and radiation-energy, at the most fundamental level is manifest in the absorption of discrete units of the space medium (defined as *a nonmaterial aether*). Without this active process, neither mass nor radiation can exist.

EM-field: a region, surrounding a charge, in which a characteristic pattern of excitation is sustained by a process of aether annihilation by absorption-conduction.

Essence fluctuators: the discrete units of the essence medium, the medium that we equate with a non-ponderable aether. They are simply the active entities of a *nonmaterial, non-energy, aether*.

Fundamental fluctuators: see *essence fluctuators*.

Gravitation: is an effect —a side-effect of the mode of conduction of radiation and mass *by* aether and *through* aether. Gravitation is a secondary effect of the conduction process of photons and photon-like particles in the aether medium. These particles may be free or confined —free in the form of radiation, confined in the form of mass.

Gravitation field: a region, surrounding mass (and mass equivalences), in which a process of aether-annihilated-by-self-extinction contributes to the acceleration of aether inflow. It acts as a gravitational amplifier; and represents *secondary gravitation*.

Lambda: Depending on the theory, Lambda represents **vacuum energy**; the **cosmological constant**; the mysterious **dark energy**; the counter-effect to regular gravity, **anti-gravitation**; the **negative pressure** of the space medium; and equivalently, the **tension** stress in, or on, the space medium. In DSSU theory Lambda symbolizes the **source energy** and **Λ expansion** (aether medium expansion).

Photon: A photon is a wave-like conduction-disturbance of aether. This “conduction” is unlike any other. The photon is conducted *by* aether in a manner that is destructive *of* aether. (It is an energy particle that may be thought of as a laterally oscillating excitation of the aether while traveling in the longitudinal direction.)

Primary gravitation: is associated with the process —conduction by aether-absorption— that sustains mass and radiation particles and EM-fields.

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