

The Fundamental Process of Energy – Part II

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.

In Part I of “The Fundamental Process of Energy” (IE#113) the substrate of the Universe, the aether medium, was defined as an all-pervasive nonmaterial essence-medium consisting of fundamental oscillators which, uniquely, *have no mass and no energy*. Critically important is that these fundamental fluctuators manifest at a level that is below (or prior to) physical energy. This aether medium with its essence fluctuators was then incorporated into a definition of the fundamental process of energy manifestation. The key requirement is that *any* and *all* manifestations of energy involve a localized quantitative change in aether units.

The energy-process definition was then invoked to show how a propagating photon —by a mode of aether excitation-absorption-annihilation involving the extinction of aether units— acquires its energy.

It was then shown how mass, by being composed of self-confined photons, conforms to the energy definition.

It was shown that the electromagnetic field involves a quantitative change in aether and thereby acquires its energy.

Lastly, it was shown how the energy within a gravitation field is acquired by a process of the self-dissipation of aether.

In the following sections the discussion will, initially, continue presenting the energy of a gravitation field and show how it fulfills the requirements of *the Fundamental Process of Energy*. Thereafter, the misconception of energy relating to “dark matter” is briefly discussed. Special attention is given to the energy of Lambda (dark energy), which turns out to be the essential “source” energy.

The highlight comes with the presentation of a new and profound perspective on the balance of energy in, and of, the 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.

8. Energy of the Gravitational Field

... continuation.

Contractile Nature of Aether

Recall, the direct absorption and assimilation of aether-space by matter is the ultimate source of gravitation. We have called this *primary gravity*. Primary gravity by itself, however, is a “force” with surprisingly negligible range. What really allows mass to dominate the Universe is the induced *secondary gravitation*. Its magnifying effect contracts far more aether-space in the region outside a gravitating body than does the primary gravity inside the body. How can we be so sure that the surrounding aether is actually being contracted —let alone being contracted on a massive scale? ... To answer this, we need to investigate the fluid dynamics of the gravitating region.

Mass serves as the “sink” for the dynamic flow of *space* (that is, the space medium). In addition to its non-compressible nature, let us imagine, for the moment, that aether is also a non-contractile fluid. We assume that it maintains all its discrete fluctuators during the spherically symmetrical flow towards a central mass body. (We also assume that the gravitating body is *at rest* in the aether medium; which means there are no other aether flow components.)

Under these conditions we may justifiably apply the standard fluid-flow continuity equation to any concentric shells about the mass—including the spherical surface of the mass itself.

$$\left[\begin{array}{c} \text{area of concentric} \\ \text{outer sphere} \end{array} \right] \times \left[\begin{array}{c} \text{flow velocity at} \\ \text{outer sphere} \end{array} \right] \times \left[\begin{array}{c} \text{fluid density at} \\ \text{outer sphere} \end{array} \right] = \left[\begin{array}{c} \text{area of concentric} \\ \text{inner sphere} \end{array} \right] \times \left[\begin{array}{c} \text{flow velocity at} \\ \text{inner sphere} \end{array} \right] \times \left[\begin{array}{c} \text{fluid density at} \\ \text{inner sphere} \end{array} \right] \tag{8-9}$$

Since aether density is constant (by definition), the two density terms cancel. For the inner concentric sphere we use the surface of the gravitating body; here the area is constant and is equal to $4\pi R^2$; and here the magnitude of the aether velocity is also constant, v_{surface} . Using these substitutions the equation allows us to determine the aether flow speed at any radial distance r (where $r > R$).

$$4\pi r^2 \times v = 4\pi R^2 \times v_{\text{surface}} \tag{8-10}$$

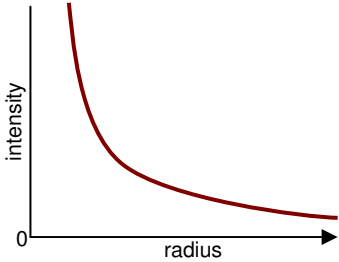
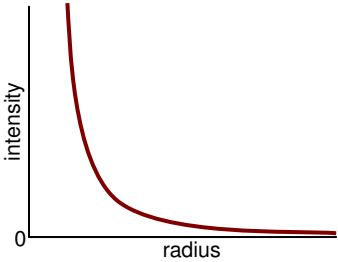
After simplifying further, the *non-contractile aether* speed can then be expressed as:

$$v = (\text{constant}_1) / r^2 \tag{8-11}$$

Gravity, as usual, is the acceleration of aether. By taking the *time* derivative of the above expression, the acceleration, and hence the gravity intensity, of the *non-contractile aether* is

$$a = (\text{constant}_2) / r^5 \tag{8-12}$$

The comparison between ordinary acceleration (as produced by contractile aether) and special-fluid acceleration (as produced by non-contractile aether) now

Table 1. Aether Determines Intensity		
	Reality-Based Aether	Thought-Experiment Aether
Type of aether:	CONTRACTILE	NON-CONTRACTILE
Aether inflow (velocity):	$v = -\sqrt{2GM/r}$ $v = \frac{(\text{constant}_i)}{\sqrt{r}}$	(as derived in text) $v = \frac{dr}{dt} = \frac{(\text{constant}_1)}{r^2}$
Gravitational acceleration: (gravitation intensity)	$a = \frac{(\text{constant}_{ii})}{r^2}$	$a = \frac{dv}{dt} = \frac{dv}{dr} \frac{dr}{dt} = \frac{d\left(\frac{\text{constant}_1}{r^2}\right)}{dr} \times \frac{dr}{dt}$ $a = \frac{(\text{constant}_2)}{r^5}$
Interpretation:	INVERSE-SQUARE LAW	INVERSE FIFTH-POWER LAW
Graph of gravitation intensity:		
Conclusion:	The comparison makes it clear that the aether medium must contract—and must do so by an enormous factor—to be consistent with observed properties (middle column).	

reveals the enormous potency of *normal gravitation*. The comparison is between acceleration varying inversely with the *second power* on the one hand, and varying inversely with the *fifth power* on the other. Normal Newtonian gravity varies with $1/r^2$; our thought-experiment gravity varies with $1/r^5$. This experimental gravity weakens in its intensity far more rapidly than does actual gravity as may easily be calculated for increasing distance away from the mass. A summary of the comparison is presented in [Table 1](#).

Ignoring the constants, the two accelerations differ by a factor of r^3 ! But the intensity of gravitation, according to Newton and experience, varies according to the inverse square law—and not as $1/r^5$. The Newtonian gravitational attraction between two bodies diminishes with increasing distance between them as the inverse of the square of that distance; if the distance is doubled the force declines by a factor of four. However, with our non-contractile gravitating region, a doubling of distance between two masses decreases the gravitational attraction by an astonishing factor of 32. Non-contractile aether fails the reality test. The conclusion is that *aether-space must be a self-dissipating/contracting fluid* (under convergent-flow conditions). Furthermore, the rate of contraction is most considerable.

Aether Contraction Region Acts as a Gravitation Amplifier

Given that space is a constant-density, non-compressible, yet contractile, fluid, the reasoning behind the *amplification effect* is as follows: The cause of

gravitation is the direct assimilation of aether by the central mass. This produces an acceleration of the surrounding aether inflow (this is true whether or not secondary space-contraction takes place, as was shown above with the standard fluid flow equation). It is *that* acceleration which then induces aether, in the gravitational region, to contract; and the contraction, in turn, amplifies the inflow acceleration. Thus, initial aether-contraction (absorption-assimilation) by mass, leads to acceleration; leads to secondary contraction; leads to further acceleration. In this way the *space contraction region* acts as a gravitation amplifier. See the graph in [Fig. 12](#).

Why do we care that the gravitation field, in addition to being an aether inflow region, is an aether self-extinction region? We care because we can now identify and understand the nature of the *energy* of the field.

Recall the definition of energy—whenever there is a quantitative change in the number of essence fluctuators there exists a manifestation of energy. The contraction-disappearance of aether is the veritable process that gives the gravitation field its energy!

The Energy of the Field

Physicists know there is energy in a gravitational field (referring to the field itself, not the objects in it). They can give you a mathematical reason for its energy, but not a physical causal reason. A common belief in physics has been, and continues to be, that the gravitational field is

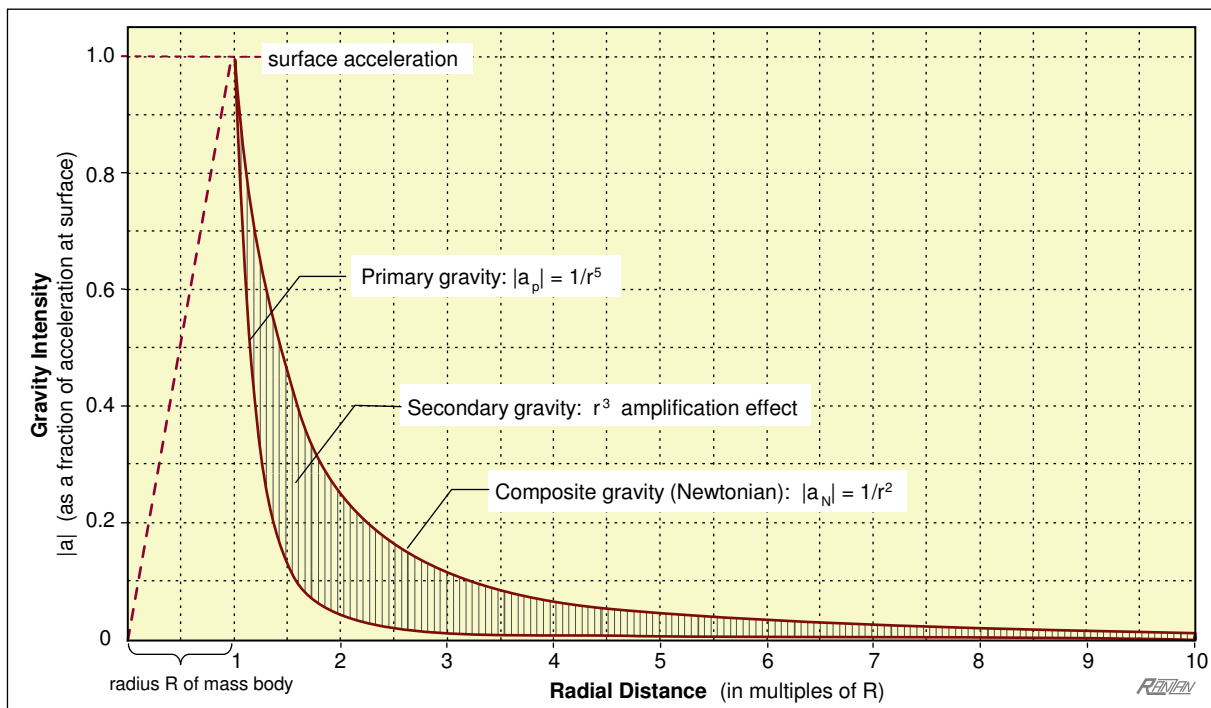


Fig. 12. Graphical representation of the intensity of gravity (as a proportional function of distance). The *secondary gravity*—the gravity amplifying effect—is shown as the shaded region. According to DSSU theory, *aether contraction* (self-extinction) is the effect that amplifies *primary gravity* from a weak inverse-5th-power law to a potent inverse-square law that rules the Universe. (Note: The graph is more accurately a comparison of two objects with different density. For the surface accelerations to be identical as portrayed in the drawing, the Newtonian-gravity object must have a mass density four times that of the primary-gravity object.)

some kind of electromagnetic effect. Let me make this absolutely clear. The gravitational field is *not* an electromagnetic effect —and its energy is not electromagnetic. There is no such thing as force transmitting particles for gravitation: No gravitons (as mentioned earlier) and no anti-gravitons.

The gravitational field is an acceleration field —not a force field. A force field demands a force carrier —but there are no force carriers! None, whatsoever. ... But if this is true, *why, then, the persistent search for carriers?* The answer is that within a force-type theory there simply is no choice; within the 4th Cosmology there is no choice and no way out. (Besides, the searchers are unlikely to abandon their venerated theory; and so, the futile quest continues.)

In the cosmology of the 5th revolution, the physical reason for the presence of energy is that in a gravitation flow-field there is a process of the self-dissipation of aether. Individual units of aether, those essence fluctuators, in the flow-field, are literally disappearing — being absorbed into the domain of non-existence— in a process which agrees with our very definition of energy.

From our energy perspective, what is the difference between the EM-field and the gravitational field? ...

The EM-field involves aether annihilation by absorption-conduction.

The gravitation flow-field involves aether annihilation by self-extinction.

What unifies them is the new definition of the energy process.

* * *

Of course it would be a great advance if we could succeed in comprehending the gravitational field and the electromagnetic field together as one unified conformation. Then for the first time the epoch of theoretical physics founded by Faraday and Maxwell would reach a satisfactory conclusion. The contrast between aether and matter would fade away ... —Einstein's Leyden lecture, 1920²

9. Energy of the Supposed “Dark Matter”

The so called “dark matter” that, under the conventional view, is believed to exist within galaxy clusters as a dominant gravitating component does not really exist. The mysterious, non-interacting, nonluminous, undetected “matter” that is said to amplify the gravitational cohesion of galaxy clusters will not be found.

The belief, by the adherents of the 4th Cosmology, of the existence of some new kind of matter is another symptom of “the Crisis” —the utter failure to understand the workings of gravitation on the cosmic scale.

The failure is not merely a situation of having the wrong components; it is a situation of having the key components in the theory act in the wrong direction. I mean this quite literally.

The failure in Conventional Cosmology, with respect to galaxy cluster cohesion, is the belief that the *expansion*

force of the universe acts in opposition to the *contraction force* of the universe — the belief that the Lambda effect (the generic expansion of cosmic space or space medium) acts *in opposition* to the cosmic gravitational effect. In other words, opposites are viewed as being in conflict. The Conventionalists have naively configured these key opposites to be in conflict with each other. *Lambda*, it is believed, hampers gravitation.

The truth is that gravitation and Lambda are opposites that act toward a common end —they are *opposites in harmony*. This stunning exegesis is well described and illustrated in the 2010 research paper entitled *The Story of Gravity and Lambda –How the Theory of Heraclitus Solved the Dark Matter Mystery*.³ The need for dark matter disappears once it is understood that contractile gravitation and Lambda both contribute toward the cohesion of galaxy clusters.

Dark matter has gradually acquired the status of a necessary component of the mathematical universe; but as a component of the real world, it is a failed speculation. In the 5th Cosmology, there is no dark matter and no associated dark-matter energy.

“There is no ‘dark matter,’ merely an exotic self-interaction and annihilation process of the quantum cellular structure that is space.”

—Reginald T. Cahill⁴

But there is another type of energy mystery —the so called *dark energy*. Unlike the dark-matter energy, this form of energy is real. And it has the experts baffled in a big way.

“... why does the universe have dark energy? That’s the biggest question right now.”

—Lawrence M. Krauss⁵

To answer this big question we next focus on the Lambda effect.

10. The Energy of Lambda The Source Energy

... Einstein invented Lambda: to tame the spiritual forces and keep the sky from falling.

—Corey S. Powell⁶

Cosmic Tension

Our cellular universe, as any astronomer will confirm, consists of vast empty regions surrounded by significant clusters of galaxies along with dust clouds, gas clouds, and other debris —material inevitably attracted to the galaxies. These galaxy clusters are major centers of gravitation. See Fig. 13.

Now consider how the clusters, positioned as they are on opposite sides of a void region, respond to each other. Each is gravitationally “pulling” on the other across this vast no-man’s region. Each pair of clusters produces a *negative cosmic stress* between them. Moreover, all the galaxy clusters comprising a typical cosmic structural cell

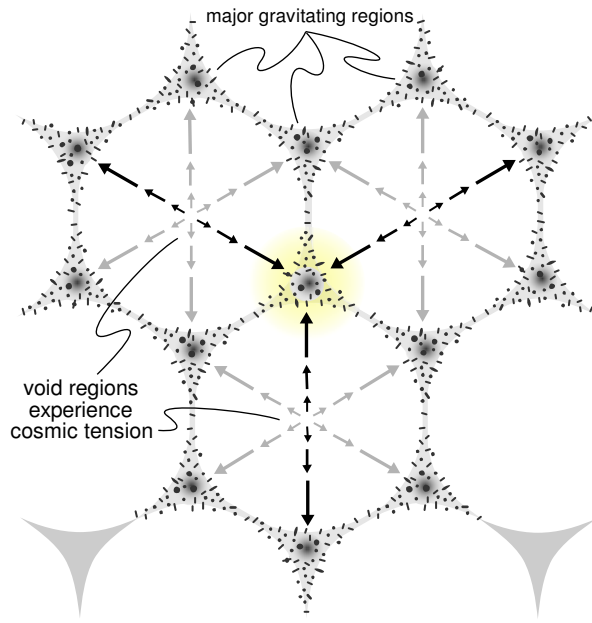


Fig. 13. Natural pattern (idealized and cross-sectioned) of cosmic cells and galaxy clusters. As major centers of gravitation the clusters “pull” on each other in, more or less, symmetrical pairs, as indicated by the gravity-intensity vectors. Consequently, the central regions of the cosmic cells are **regions of negative pressure** (which, in astrophysics, translates into a positive Lambda effect).

can be paired in this way. And there are seven such pairs active in every 3-dimensional cosmic cell. The result is a vast region in which aether-space is under *tension*. (Realize that the opposite clusters cannot come together to relieve the tension. Every cluster is simultaneously being “pulled” from the opposing direction. It is being “pulled” from several cells, each of which it belongs to as a member.)

A schematic profile of the gravity intensity across a typical cosmic cell—a profile that includes the gravity wells of two opposing rich galaxy clusters—is shown in Fig. 14.

A cosmic region that is under tension, behaves much like Einstein’s famous *cosmological constant*—it pushes galaxies and clusters apart. (But in DSSU theory clusters are stationary.)

Nature reacts to the cosmic tension. It leads to the

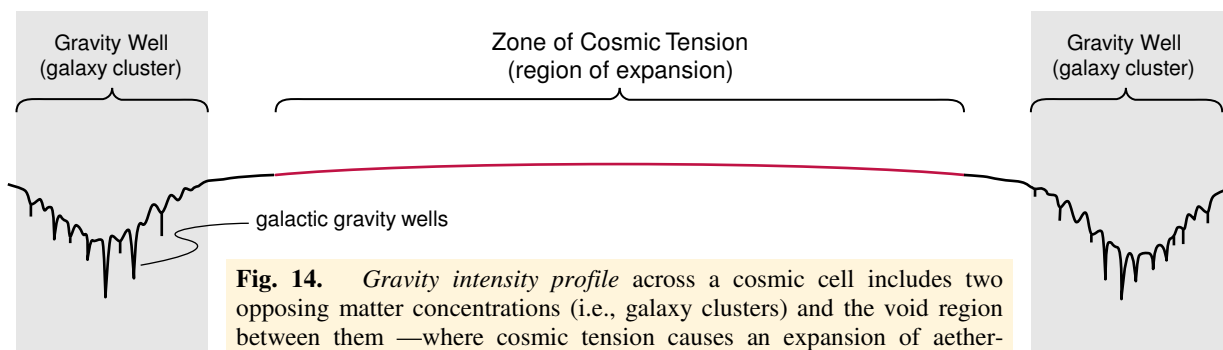


Fig. 14. Gravity intensity profile across a cosmic cell includes two opposing matter concentrations (i.e., galaxy clusters) and the void region between them—where cosmic tension causes an expansion of aether-space. The schematic profile spans approximately 340 million lightyears, which is the typical diameter of a cosmic cell. (Not to scale)

expansion of space. A positive *cosmological constant* implies space expansion.

Astrophysicists *do* recognize that there is some kind of cosmic energy in the universe. Lawrence M. Krauss, for instance, tells us that “... some form of cosmic energy mimics a cosmological constant.”⁷ The energy, the Λ -constant, the expansion, all fit the mathematical model but there is a problem with the fit to reality. “[N]o one understands why empty space should have energy. It’s the weirdest idea in the world!”⁸ It is also the key to understanding the universe. *That* he recognizes. What Lawrence Krauss and his colleagues fail to recognize is that, while their mathematical universe is a **single-cell** universe model, the real Universe is **multi-cellular**.

Cosmic tension is equivalent to negative pressure and produces an expansion of space.⁹ It is one of the foundation pillars of all modern cosmology. But note, this expansion has nothing to do with empty space; it has everything to do with the aether permeating that space. Cosmic tension, or negative pressure, produces an expansion of the aether medium.

This means that the voids must be regions of aether expansion. The voids are regions in which there is a quantitative growth of essence fluctuators. All the previously described energy manifestations involved the disappearance of aether. Now here is an instance of the appearance of *new* aether. The Lambda “force” involves the birth of new fluctuators.

What a stunning result!

We have found *the source energy of the universe*.

Voids as Regions of “Source” Energy

Since all the forms of energy previously discussed were aether-consuming processes we should think of them as “sink” energy. It then makes perfect sense to call the process—the process taking place in the cosmic voids—a *source energy process*. In this case, the energy is the process of new fluctuators actually coming into being. But I should again point out that the pulsations of the discrete fluctuators *are not the manifestation of energy*. Rather, it is only their coming into being that represents energy. (The pulsation activity we carefully associated only with the essential *essence process*; not with the energy process.)

“Source” Energy is Special

In recognition of its unique status, we link the Lambda energy with the *essence process*. Here is how.

The oscillatory essence process: It only occurs on the subquantum scale. It is the pulsation “activity” of the fluctuators.

The cosmic essence process: On the subquantum scale, it is the coming-into-being of new fluctuators; on the cosmic scale, it is the quantitative growth of aether. It is the expansion of the space medium.

The “source” energy process (Lambda) is the same as the cosmic essence process. The terms are synonymous. It is in this equivalence statement that the essence process and the energy process are linked. This is truly profound, for, among other things, it represents the key for resolving the great mystery of the entropy flow(s) of the Universe.

11. Balancing the Energy of the Universe

But it is no longer a universe in balance; if the dark energy continues to prevail, astronomers say, the cosmos will blow apart, chilling all life.
—Sir Martin Rees (2002)

Energy Accounting

In the generally accepted way of accounting for the energy content of the universe, the energy associated with gravitation is considered to be negative and all the others are considered to be positive, as shown in Table 2. The historical classification of gravitation as a form of negative energy was a good choice. It logically serves as the opposite to Lambda (positive energy). But how did mass and radiation end up on the “positive” side of the Table? Originally, in the historical development of particle physics, one of the solutions for the energy-of-particle equation was ostensibly a representation of negative energy; but, in time, it was decided that all matter is to be considered as *positive* energy. More on this shortly.

From our new understanding of the energy process we can see that something is not right with the conventional accounting. There is no compelling reason for assigning a positive qualifier to the various forms of non-gravitational energy. It will be shown that there is nothing forcing us to place mass-, radiation-, and coulomb- energy in the positive-energy column.

Table 2.

Energy Balance Sheet (conventional physics)	
Positive Energy	Negative Energy
<input type="checkbox"/> Lambda (as dark energy) <input type="checkbox"/> Lambda (as Einstein’s cosmological constant) <input type="checkbox"/> Mass & Radiation <input type="checkbox"/> Electromagnetic fields <input type="checkbox"/> Vacuum Energy (per string theory)	<input type="checkbox"/> Gravitation
Problems: Various	Problem: Cause is missing

In the new accounting (Table 3), energy is viewed as a balance between a fount process and a negation process. Since Lambda is the source energy (the growth of the essence medium), it logically represents positive energy. All other manifestations of energy —because they absorb/consume the essence medium (meaning a loss of the essence medium)— must therefore represent negative energy.

With the new accounting we do not claim,

$$(positive\ energy) + (negative\ energy) = 0 .$$

Instead, we have

$$(+energy\ process) + (-\ energy\ process) = (2\ opposite\ processes).$$

Table 3.

Energy Balance Sheet (DSSU)	
Positive Energy	Negative Energy
<input type="checkbox"/> Lambda (the formation of new aether)	<input type="checkbox"/> Mass & Radiation <input type="checkbox"/> Gravitation <input type="checkbox"/> Electromagnetic fields
Defining Feature: Aether source	Defining Feature: Aether sink

Next, I will detail the justification for placing mass-, radiation-, and coulomb- energy into the negative energy column.

The Energy Equation

The relativistic energy-momentum relation is

$$E^2 = m^2c^4 + \mathbf{p}^2c^2 . \tag{11-1}$$

As an equation for energy *E*, it admits two solutions,

$$E = \pm\sqrt{m^2c^4 + \mathbf{p}^2c^2} . \tag{11-2}$$

“The positive root is associated with particle states, and the negative root with antiparticle states.”¹⁰ In the Dirac version of this equation, for spin ½ objects, there are four independent solutions.

Now, notice that the interpretation of the two solutions is not of one being *positive* energy and the other being *negative* energy. Physicists do not claim that matter and antimatter represent opposite forms of energy, one positive and the other negative. *Both particles and antiparticles are considered to be the same form of energy* —strictly positive energy.

The question is *what determines the sign assignment?* —the positive energy or negative energy designation?

That choice is not imposed by the above energy equation! It turns out to be an arbitrary choice; it is an assumption. (The signs in the solution could simply refer to other qualities such as plus and minus charge, or spin-up and spin-down.)

Theorists, long ago (1940s, Stuckelberg and Feynman) decided to place particles and antiparticles on an equal

footing —both were deemed to represent positive energy. Physicist David Griffiths, in *Introduction to Elementary Particles*,¹¹ describes how Stuckelberg and Feynman provided a way around the intractable problem of infinite energy radiation predicted with the negative energy solution. “In the Feynman-Stuckelberg formulation the negative energy solutions are reexpressed as *positive-energy* states of a *different particle* (the positron); the electron and positron [as a particle and antiparticle pair] appear on an equal footing ...”

Incidentally, the reason why the “negative solution” was not considered to represent negative energy was mainly mathematical. If the positive solution $+\sqrt{m^2c^4 + \mathbf{p}^2c^2}$ is taken as positive energy and $-\sqrt{m^2c^4 + \mathbf{p}^2c^2}$ is taken as negative energy, it would mean, given the natural tendency of every system to evolve in the direction of lower energy, that the electron, for instance, would “runaway” to increasingly negative states. According to the mathematical interpretation, the electron in this process would *radiate an infinite amount of energy*.¹² Nevertheless, Paul Dirac’s early view was that electrons could have positive and negative energy states.

The Paul Dirac version of the relativistic energy-momentum equation allows for four independent solutions.

Here is the basic definition of the Dirac equation: A relativistic wave equation for an electron in an electromagnetic field, in which the wave function has four components corresponding to four internal states specified by a two-valued spin coordinate and an energy coordinate which can have a positive or negative value.¹³

The Dirac equation: It provides a description of elementary spin ½ particles, such as electrons, consistent with both the principles of quantum mechanics and the theory of special relativity.¹⁴

The importance of the Dirac equation is that it allows for two classes of objects: particles and antiparticles. Furthermore, each of these may have two spin states (spin up and spin down). The modern interpretation for spin ½ particles is charted in Fig. 15. Note carefully, the solutions represent positive energy —including the negative solutions. Quoting from the textbook by David Griffiths and retaining his emphasis: “... we now interpret the ‘negative energy’ solutions as representing *antiparticles with positive energy*.”¹⁵

The physical interpretation of the Dirac equation, “while providing a wealth of information that is accurately confirmed by experiments, nevertheless, introduces a new physical paradigm that appears at first difficult to interpret and even paradoxical. *Some of these issues of interpretation must be regarded as open questions.*” [Emphasis added]¹⁶

In the modern interpretation, theorists made the assumption that the Dirac equation represents *positive* energy. However, they could just as easily have declared that the Dirac equation represents *negative* energy! But, of course, they did not. Which is unfortunate — unfortunate because it placed matter-energy in opposition to gravitational energy. In effect, it delayed the recognition of the connectedness between the two —the one was wrongly believed to be positive and the other was correctly believed to be negative.

Let us reverse the historical assumption. In the DSSU physical interpretation, matter is deemed to represent *negative* energy. There appears to be nothing preventing us from implementing the following interpretation as presented in Fig. 16.

With the revised interpretation, the electron and its twin, the positron, can be classified as negative energy. Since the Dirac formulation applies to all spin ½ quantum objects, they can all be classified as negative energy.

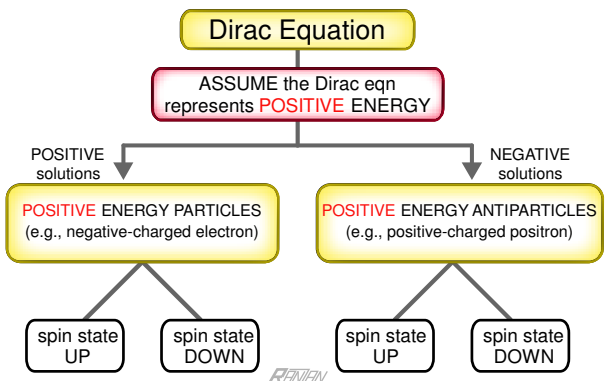


Fig. 15. Standard interpretation of the Dirac energy-state equation. The initial assumption is that the equation represents *positive* energy. The equation has two sets of solutions. The positive solution is associated with *particle* states. As for the negative solutions, physicist David Griffiths makes it quite clear, “... we now interpret the ‘negative energy’ solutions as representing *antiparticles with positive energy*.”

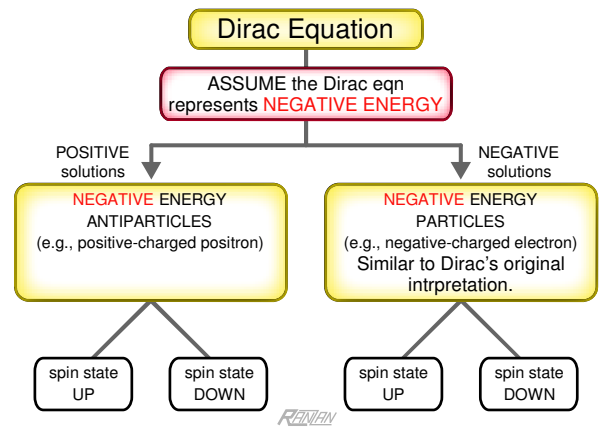


Fig. 16. DSSU physical interpretation of the Dirac equation. This time the initial assumption is that the equation represents *negative* energy. Both sets of solutions also represent *negative* energy. The positive solution is associated with *antiparticle* states. The negative solution is associated with *particle* states.

We are now in a position to draw two remarkable conclusions. (1) Noting that the electron represents negative energy and recalling that the electron is simply a confined package of radiation (a photon), we conclude that all electromagnetic radiation is *negative energy*. (2) Furthermore, with the extensive role of *photon confinement* in the structuring of the fundamental particles of matter (quarks), as appears to be the case, we may conclude that all matter and antimatter represent *negative energy*.

Balancing the Energy Processes

Unlike the balanced, but unstable, single-cell universe that Einstein had constructed in 1917 and its modern similarly unstable versions, the DSSU multi-cell universe is balanced *and* stable.

In a nutshell: In our balanced and stable cosmos, the energy processes are interdependent and self-adjusting.

Matter depends on a continuous supply of new aether via the cosmic-scale *source-energy process* (Lambda).

Lambda depends, in part, on a continuous cosmic-tension supplied by opposing matter aggregations.

The formation of aether from this process is balanced by the annihilation of aether. The balance is continuous, *not* cyclical. The “balance” is summarized as a flowchart in Fig. 17.

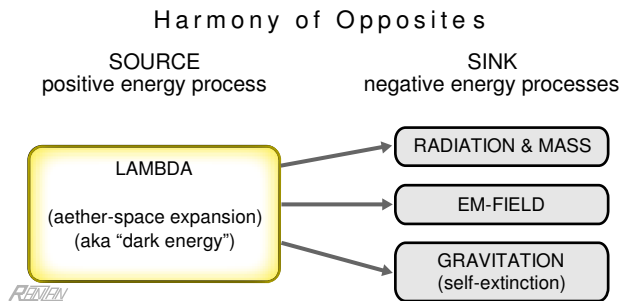


Fig. 17. *Energy processes are in continuous balance.* In the 5th Cosmology, there is a balance between the *source-of-aether* process and the several *sink* processes. There exists a harmony between the process of aether “production” (a quantitative increase in the essence substance we call aether) and the processes of aether “consumption” (involving a quantitative decrease in the essence medium).

Sir Martin Rees’ grave concern over the fateful imbalance (expressed in the above quote) applies, quite rightly, only to the world of the 4th Cosmology, of which he has been a committed participant. Professor Rees should rest assured that *our* Cosmos will *not* blow itself apart and all life will *not* be terminally chilled. Rest assured that the Universe and life are perpetual — *perpetual as processes*.

The good professor has overlooked a profound principle of an intellectual predecessor from among the Ancient Greeks.

A Heraclitean Harmony of Opposites

The balance is between the energy manifest in the process of aether “production” (a quantitative increase in the essence substance we call aether) and the energy manifest in the process of aether consumption (absorption, self-dissipation).

Can anything be more beautiful in nature than uncovering another instance of the *harmony of opposites*? But this is more than “just another instance.” This is a *harmony of opposites on a cosmic scale* — a balance between the positive and negative energy of the Universe. What is truly profound is that we have here much more than a balance between two quantities (of two classes of energy). It is much more indeed. It is a harmony of opposite processes! It is a harmony of opposite *perpetual* processes! Thus it is a balance that extends into past and future infinities. Pause and reflect ... Metaphorically, this veritable harmony *sustains the perpetual dance of existence*.

Energy Balance for an Infinite Universe

To say that there is an energy balance in our infinite universe, although true, is not very useful. Infinite quantities are notoriously difficult to work with. It is within the domain of the cosmic cells defined by primary, secondary, and tertiary gravitation where the concept of energy balance is most applicable.

Energy balance in an infinite universe is meaningful only in a universe that is intrinsically and cosmically (large scaled) cellularly structured.

12. The Energy that is not Energy: Vacuum Energy

The Problem

This section is about the *energy-of-space problem* — also known as the greatest quantitative error in the history of science. In the words of Sir Martin Rees, “the worst failure of an order-of-magnitude guess in the whole of science.”¹⁷

Back in Section 10, Lawrence Krauss expressed his puzzlement over the vacuum energy problem this way: “... no one understands why empty space should have energy. It’s the weirdest idea in the world!” How “weird” does he mean? Professor Krauss continues:

“Our current understanding of gravity and quantum mechanics says that empty space should have about 120 orders of magnitude more energy than the amount we measure it to have. That is 1 with 120 zeroes after it! How to reduce the amount it has by such a huge magnitude, without making it precisely zero, is a complete mystery. Among physicists, this is considered the worst fine-tuning problem in physics.”¹⁸

So, how are we to resolve this?

“When we solve this problem, we’re going to have to explain why the number that we measure is 120 orders of magnitude smaller than we would expect it to be. No one has an idea how to do that. And that’s why it’s the most exciting thing in physics.”¹⁹

No one has any idea of how to solve this problem!? Exciting indeed. But wouldn’t it be far more exciting if someone does have some idea, or the hint of a resolution, or, best of all, access to the correct puzzle pieces? ...

Welcome to the 5th Cosmology.

VACUUM ENERGY Versus vacuum energy

The vacuum energy of cosmology theory is the Lambda energy described in Section 10. Depending on one’s theory of the universe, it (cosmic vacuum energy) can be used to blow-up the universe (as does the Big-Bang model); it can be used to collapse the universe (as does the Big-Bang Big-Crunch model); it can be used to give the universe an unstable balance (as does our now familiar Einstein’s 1917 model, the “equilibrium” universe); and, if extreme reality is the goal, it can be used to give the universe a stable balance (as does the DSSU).

Lambda is the generic term for the cosmic vacuum energy. The theory-specific names commonly used for Lambda are (in the order in which the related models are mentioned above): (1) dark energy; (2) negative cosmological constant; (3) positive cosmological constant; and (4) source energy and Λ expansion. Although they represent, more or less, the same vacuum energy, they impart radically different outcomes.

(1) Vacuum energy takes the guise of *dark energy* in the Big Bang model and, supposedly, causes the expansion of the universe. It is further claimed that it causes an *acceleration* of the expansion of the universe! (2) In its negative form, dark energy can just as hypothetically cause the contraction and collapse of a big-bang universe—a speculative scenario often called the oscillating universe. The negative form of the cosmic vacuum energy is also called the negative cosmological constant. (3) The vacuum energy that started the whole business was Einstein’s positive cosmological constant. It was used to adjust the curvature of his general-relativity model of the universe. It failed to fulfill its design specifications for a stable system. (Ironically, it was replaced by an unstable system that can best be described as the mother of all unstable systems.) (4) And lastly, vacuum energy takes the guise of *source energy* and Λ expansion. Having a small positive value it is used to model a harmoniously stable cellularly structured universe.

The point is this: The cosmological form of vacuum energy is a valid, based-on-reality, concept (albeit misappropriated in entirely unrealistic ways!). Consider it big VACUUM ENERGY.

However, there is another type of vacuum energy to be aware of—the vacuum energy of particle physics.

Think of this as small vacuum energy. This type of vacuum energy does not exist. The definition of energy, what this entire paper is about, precludes such existence. I know this is a bold claim, but bear with me.

According to string theory, the fine grain structure of space, i.e. the space medium, consists of vibrating loops. Now keep in mind these are vibrating entities at the very smallest scale of the structure of the space medium. According to string theorists, *there are no smaller entities.*

It is these vibrating loops (and their variations such as vibrating segments and membranes) that theoretical particle physicists associate with vacuum energy. Their ingrained reasoning is that any vibration is a manifestation of energy; and so the vibrating strings must represent a form of energy. Within the domain of 20th century physics, it makes perfect sense. But they are wrong. In this case, theorists could not possibly be more wrong.

There are three aspects to the disastrous misconception of the vacuum energy.

First, physicists believe that the micro vacuum energy, the energy of string theory, is the theoretical equivalent of the *cosmic* VACUUM ENERGY!

Instead of the cosmic tension described earlier as being the cause, string theory and particle theory are supposed to provide the explanation for Lambda! However ...

“String theory has yet to explain why the universe’s vacuum energy is as small as we know it to be. Particle physics has no answer to this problem either.” –Lisa Randall²⁰

I should point out that Lisa Randall is not some theory-bashing Luddite. Dr. Randall is “a leading theoretical physicist and expert on particle physics, string theory, and cosmology. She works on one of the two main competing models of string theory in the quest to explain the fabric of reality ...”²¹

The point not grasped is that the energy of the space medium itself is not at all the same as the energy of the expansion (or contraction) of that medium.

The second aspect is observational. Theorists, like Dr. Randall, are confronted with the biggest mismatch in the history of all science! And the experts do not know why—why the enormous discrepancy? You can almost feel their despair as revealed in this brief passage from *Warped Passages*.

The question of why the energy density is so extraordinarily tiny [compared with what theory predicts] is an entirely unsolved problem. Some physicists believe that there is no true explanation.²²

Not wishing to add to their despondence, but maybe it is time for particle physicists to discard those many extra dimensions of string theory and heed the warning of

Steven Weinberg, “...the worst sort of mistake a scientist can make: not recognizing success when it happens.”²³

The third aspect. The vibrations in the structure of space —whether that structure consists of looped strings, coiled springs, folded membranes, or our DSSU essence entities— are *not* vibrations identifiable with energy (see Fig. 18). *They are not energy.* The fundamental vibrations manifest at a level that is below (or prior to) *physical energy*. Just as Einstein’s aether is not material, just as DSSU aether is not material, so too the vibrations of the fine structure of such aether is not energy. Now pause, reread, underline, and highlight that statement.

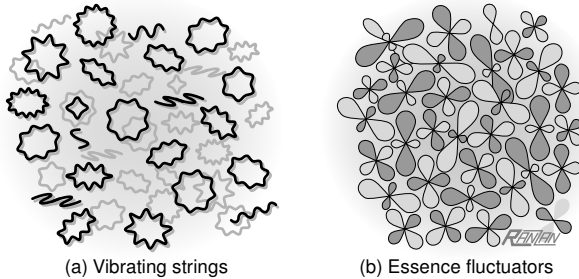


Fig. 18. The fine-grain structure of space does not represent energy. It does not matter how one describes, illustrates, or conceptualizes the structure of aether-space. It does not matter *how* the space-structure units are vibrating. It does not even matter *what* is vibrating at this smallest-of-small scale. What is of greatest importance is that the pulsations, oscillations, vibrations, ethereal motions, ... *do not represent* energy. In themselves, they are not manifestations of physical energy.

Just as Einstein’s Leyden-lecture aether is non-material (non-ponderable), its basic structure is likewise non-energy.

If the Leyden Lecture aether is non-material and the DSSU essence medium is non-material (that is, in plain English, it is not made of any matter), then there is no logical way to attribute energy to the medium itself.

And here is why the micro vacuum energy is not energy. Based on the string-theory model, the vibrating loops are the smallest entities in, or of, space. As they oscillate there is no *essence* substrate for them to excite, there are no aether quanta to absorb-annihilate. *Without an essence-medium interaction there can be no energy manifestation.* It is so by logic (as stressed above). It is so by definition (as discussed in this essay). And even more fundamental, it is so by axiomatic necessity (but *not* discussed in this essay).

Let me hasten to add, this does not necessarily mean that string theory is wrong. It simply means that if it is assumed that those tiny filaments *do* possess energy, then they cannot represent the lowest-level structure of the space medium. On the other hand, if it is assumed that those tiny filaments are truly the smallest entities of the space medium, then they *cannot* be treated as a form of

energy; their vibrational activity, then, will not represent energy.

Hopefully string theory may evolve to become part of a much needed theory of the formation of matter.

In any case, the vacuum-energy mystery is readily resolved by applying the energy process definition.

We are left with one simple conclusion: the vacuum energy of string and particle theory *is not energy.*

13. Addressing Some Loose Ends

The historical failure in recognizing the true nature of space. It was always believed that *the vacuum* was somehow connected to energy, but no one it seems ever made the proper connection!

In the modern search for the properties of the vacuum (the aether) —a search spanning most of the 20th century and now well into the 21st century— researchers have failed to heed Einstein’s crucial message. With one exception, all the models that have so far been proposed invoke the property of mass and/or energy often in highly imaginative ways; the “particles” comprising the aether, supposedly, possess mass and/or energy. The result: Instead of extracting from the aether medium a non-energy characteristic (with which to then define energy) they have, instead, bestowed the aether with a new form of energy. A new complication, a new misunderstanding.

Instead of using the aether as the medium with which to define energy, researchers have turned it into energy! thereby perpetuating a mistake the great Poincaré made when he “had assumed that there exists energy in the aether — there exists a non-electric energy fluid at each point in the aether.”²⁴

What I find sadly ironic is that Einstein did not follow his own intuition and conviction. Although he clearly stated in his Leyden lecture (and elsewhere), “space without aether is unthinkable,” he never developed nor applied this view. The further irony is that the success of his relativity theories, with their highly abstract, relativization, of space, was a powerful hindrance in pursuing what, in essence, was an opposing model.

Aether and the constancy of the speed of light. Let me address a common concern. Doesn’t the presence of a light conducting medium (aether) lead to an invalidation of Einstein’s relativity theory? Einstein had postulated that for any observer, whether stationary or uniformly moving, the measured speed of light is invariant. But DSSU theory holds that the speed of light is constant with respect to the aether which conducts it.

Which is it? Constant with respect to the aether, or to the observer?

The somewhat surprising answer is *both*.

The speed of light is *physically constant* because of its connection to the aether medium.

The speed of light is *illusory constant* because of the real length contraction which affects almost all attempts at measurement.^{25, 26}

On the “graininess” of the aether. Quantum theory requires that the space medium be grainy at the smallest scales. The question is *how fine is the fine structure of space?* Until about 2011 it was generally believed that the discreteness of space should manifest at what was considered the smallest theoretical scale —the Plank length (a minuscule 10^{-35} of a meter). Recent evidence reported by the European Space Agency (ESA) indicates that the scale of discreteness is vastly smaller.

Observations from Integral (the ESA’s gamma-ray observatory) are about 10 000 times more accurate than any previous and show that *any quantum graininess must be at a level of 10^{-48} m or smaller!* The observations involved the search for differences in the polarization of photons (gamma type) of different energies. The source of these high energy photons was GRB 041219A (an emitter of one of the most powerful gamma-ray bursts, or GRBs, ever seen) whose distance is estimated to be at least 300 million light years. The high-energy gamma rays should have a rotated polarization that is more than the lower energy ones, and the difference can be used to estimate the size of the grains.²⁷

“This is a very important result in fundamental physics and will rule out some string theories and quantum loop gravity theories,” says Dr. Laurent.²⁸

And, Christoph Winkler, an Integral Project Scientist, noted that “[Integral] has allowed us to take a big step forward in investigating the nature of space itself.”²⁹

The unexpected experimental results imply theory malfunction. While the theoretical experts are busy re-examining and patching their theories, we simply note this:

The *essence fluctuators* are unimaginably small.

Why the balance of energy is so important.

According to Noether’s theorem (named after German mathematician Amalie Emmy Noether) there is a *conserved quantity associated with every continuous symmetry of a physical system.* Energy is understood to be a conserved quantity; and in the conventional interpretation it cannot be created nor destroyed, only converted from one form to another.³⁰ A point well taken is that without symmetry there can be no corresponding conservation law.³¹ (Physicists, already perplexed by the energy imbalance in their own Worldview system, would not tolerate a lack of symmetry in a new theory of energy. Hence, I offer the following explanatory compliance to the spirit of Noether’s theorem.)

So, what is it in the DSSU theory that is being conserved? It is the quantity of aether that is conserved — although never the same aether for it is continually being renewed. And what is the “continuous symmetry of the physical system”? It is the perpetual balance of the flow of energy: from the source process of Lambda, the *fons et origo* process, to the “sink” processes of radiation, mass, field electrostatics, and gravitational self-dissipation.

The connection between energy and forces.

Conventionally, energy is the activity of a force. It is what accompanies an active force. But what is a force?

In his book, *The Failure of Pure Science*, researcher Jean de Climont states: “We speak of forces of nature because we have no knowledge of the cause of their action.”³²

The conventional view is that energy is the result of a force —leaving one to wonder what is the *cause* of the force. The new-physics view is that the fundamental energy process is the cause of a force. The causal problem is resolved.

In a unified theory —in which the energy process is *a priori*— a force is simply the effect that accompanies the energy process.

When we observe an instance of the energy process (any quantitative change in essence fluctuators) what do we see? We see either a form of energy or the manifestation of a force. We see mass (frozen energy), radiation (free energy), charge (electrostatic force), binding energy (nuclear forces), gravitation (apparent attractive force), and Lambda (apparent repulsive force).

14. Reflections

Newton’s profound view. As one of the three possible causes of gravity, Newton came up with an astonishingly profound view. Gravity, he believed, is caused by the consumption of aether. “In a letter to Oldenburg of 1675 he allows himself to speculate upon an aether hypothesis ...” Physicist and historian Mary B. Hesse goes on to discuss the letter’s content,

*“Perhaps gravitation is due to a ‘gummy tenacious and springy’ part of the aether which continually condenses in the pores of the earth, its place being taken by air, exhalations, and vapours rising from the earth, for nature is ‘a perpetual circulatory worker.’ Gravitation between the sun and the planets might be explained similarly: the sun ‘feeds’ on the aetherial spirit, which conserves [sustains] its shining, and whose sunward motion draws the planets with an attractive force.”*³³

The sun feeds on the aetherial spirit, which sustains its shining, and whose sunward motion draws the planets inward —a remarkable concept from long ago.

The unifying process. The process that unifies light, mass, charge, “dark energy” and contractile gravitation is aether annihilation.

The utterly simple unifying idea. It is the idea, the underlying principle, which Heraclitus of Ephesus (530-470 BC), the Ancient Greek participant in the second revolution in cosmology, had warned that men continually fail to recognize though it manifests itself everywhere: The harmony of opposites.³⁴

The secret of the Universe. Let me underscore the significance of the two key features of the DSSU discussed herein. The *energy manifesting process* and the *essence process* are the essential processes that drive everything —they are the clockwork of the Universe. Knowledge of these two processes may well be the

closest thing we have —and may ever have— to knowing the secret of the Universe.

* * *

“To my mind there must be, at the bottom of it all, not an equation, but an utterly simple idea. And to me that idea, when we finally discover it, will be so compelling, so inevitable, that we will say to one another, ‘Oh, how beautiful. How could it have been otherwise?’” —American physicist and gravity expert John Archibald Wheeler from a 1985 interview with Timothy Ferris³⁵

□

DSSU Glossary

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

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.

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: The electromagnetic force field is 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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