Nature's Supreme Mechanism for Energy Extraction from Nonmaterial Aether

The story of how end-state neutron stars generate and emit extreme energy

Conrad Ranzan 2018

1. Introduction

The most remarkable feature of the energy-generating process herein described is that the main component —the universal space medium (aether)— possesses no energy of any kind! In agreement with Albert Einstein, the aether is nonmaterial. It exists as a subquantum essence devoid of mass and energy. And yet, all forms of intrinsic energy (that is, excepting those forms such as kinetic energy when dependent on arbitrary relative motion) can be traced to and are rooted in aether —as explained in the article *The Fundamental Process of Energy* (Infinite Energy #113 & #114, 2014). The various forms of energy, such as electric charge, electromagnetism, photonic, mass, gravity, and cosmic Lambda, all involve aether in one way or another. All have a fundamental connection to the universal aether medium.

Equally remarkable is the fact that this energy mechanism has never before been recognized. Nothing like it could be found in the scientific literature, despite it being Nature's most powerful energy generator, by far; despite the concept's perspicuity, with its workings as straightforward as they are compelling; and despite being based on sound physics, so much so that no one has found reason to challenge its viability.

What is this supremely powerful process? ... Broadly stated, the process is an energy-extraction-and-emission activity, at the heart of which is an energy-particle amplification operation. It is an ongoing activity in which photons and neutrinos become trapped, are amplified (gain energy), and then released, whereupon they produce astrophysical phenomena or simply spread throughout the universe.

In this supreme Mechanism, lies the explanation of several long-standing mysteries in astrophysics, including gamma bursts, x-ray bursts, the power source of astrophysical jets, and ultra-energy neutrinos. Let me put this into perspective. The following pages hold the resolution to the *biggest mystery in astrophysics*,^A the driving force behind astrophysical jets; and

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also the resolution to the *biggest mystery in particle physics*, the PeV-energy particles found in cosmic-source neutrino detectors such as the giant IceCube observatory built into the Antarctic ice. What physicists find so baffling about these neutrinos with peta-electron-volt energy is that they are more energetic, by orders of magnitude, than anything produced by the world's most powerful particle accelerators! Here were particles with over 1,000,000,000,000,000 electron volts of energy, particles with the energy of over *a million times the mass-energy of a proton*! According to Spencer Klein of the Lawrence Berkeley National Laboratory in California, "These neutrinos have energies more than a thousand times higher than any neutrinos that we have produced in particle accelerators." ¹ What stupendous prodigy could possibly be the cause?

To the uninitiated, to those unfamiliar with DSSU theory, a nonmaterial Aether must seem utterly remote as a driver of ultra-energy. But to the rest of us, the connection is simply the outcome of aether's dynamic motion —of a particular intensity and at a particular location.

The Mechanism occurs in only one type of environment. And this environment is found in only one type of structure end-state neutron stars.

2. End-State Neutron Star

An end-state neutron star is the final result of the gravitational collapse of any sufficiently massive star or stellar core. The collapse may occur as a single event (in accompaniment to a supernova for instance) or as a gradual accretion/merger of mass, say by dwarf stars. Its defining features are its maximally dense neutron mass and its pure-energy surface —a critical-state surface.

I will describe the surface in more detail in the next section; but first let me briefly compare the natural collapse scenario with the conventional version.

The view among relativists is that as the mass collapses, it reaches a stage of concentration at which the escape velocity is equal to the speed of light. The associated spherical "boundary" is, for obvious reason, called an *event horizon*. The collapse continues; it continues accelerating toward the center of gravity. The collapse ends as a singularity —a point of infinite density. The mass ends up sealed deep within an

^A Some might claim that *dark energy* is Astrophysics' number one problem. Not true. For the resolution see the article *Gravity and Lambda* –A Story of Opposites.

outer "boundary." The singular mass, along with its uncompromising one-way barrier, is called a *stellar black hole*. It is a most preposterous unnatural end-state. See Fig. 1a.



Fig. 1. End stage gravitational collapse. (a) Schematic of traditional gravitational implosion; the result is a singularity-type black hole. Its critical boundary is an event horizon located in free space. (b) Natural collapse results in a critical-state neutron star (Superneutron Star). Its critical boundary is a pure-energy layer located on the physical surface.

Under the Natural collapse scenario (Fig. 1b) the collapse halts at the instant the mathematical "escape velocity" equals lightspeed in conjunction with a maximally dense neutron state. (For a detailed discussion see $[^2]$ and $[^3]$.)

The significant difference: With a singularity-type black hole, the critical boundary is an event horizon located in free space. With a Natural collapse to a Superneutron Star (a more compact name for the critical-state neutron star), the critical boundary is a pure-energy layer located right on, or at, the physical surface.

The end-state neutron star has a *critical-state surface* —a physical one-way boundary.

3. Critical-State Surface

At the surface, aether is flowing into the structure at the speed of light. The cause of this flow is explained in the next section. For now, it is important to understand how the situation at the surface of the neutron star remains in compliance with special relativity. While the space medium is streaming inward at lightspeed, the particles that constitute the surface are propagating in the opposite direction, also at lightspeed. Undeniably then, the particles remain stationary — they remain as surface embedded particles.

Now, the next point is self-evident, but it is worth emphasizing: *only radiation particles can travel at lightspeed*. Thus, only radiation particles can exist at, or in, the surface.

Since only two kinds of radiant energy particles are known to exist, the surface, as shown in Fig. 2, must be saturated with photons and neutrinos. There are claims that neutrinos possess some tiny amount of mass, but the evidence for this is indirect, interpretation-dependent, and inconclusive. The argument hinges on the propagation speed of neutrinos. If neutrinos actually do travel at lightspeed, then they can have no mass. Their mass must be zero. As things stand, *no deviation from the full lightspeed has ever been measured*.⁴ (Because of their desperate and fruitless search to find dark matter, academic theorists have long attempted to pin the "mass" label onto anything with the most remote chance of having the label stick.)



Fig. 2. Maximally collapsed neutron star has a criticalstate surface where aether flows inward at exactly the same speed at which radiation is propagating outward (both equal the speed of light). The result is a surface layer in which radiation is effectively propagating in-place and, thus, remains trapped. There are only two kinds of particles able to travel through aether at the ultimate speed; it follows that the critical-state surface consists of just photons and neutrinos (as shown in the enlargement). (Thickness of trapped-energy layer is greatly exaggerated.)

After passing through the energy layer, the aether will have slowed down ever so slightly. This tiny incremental slow-down brings the speed below lightspeed. (Note the contrast to the conventional view which hypothesizes that the space medium exceeds lightspeed after passing through the critical boundary.) The reason for the slowdown is explained in the next section. The point to note here is this: By having the aether flowing now LESS than lightspeed, it can then "safely" pass through (and into) the neutron mass —without violating the speed rule of special relativity.

4. Relationship Between Mass/Matter and Aether

The really important thing to understand about mass (and massless particles) is its utter unalterable dependence on aether (the universal space medium). Matter simply cannot exist without aether. What this means ontologically, in simple terms, is that matter absorbs aether —it acts as a sink for aether.⁵ Matter exists by continuously absorbing and consuming aether. As described in Infinite Energy issues 113 & 114, matter exists as an excitation-consumptive process of an aether that exists in the form of subquantum units. In this "sustaining" process, aether units are constantly being activated, leading to a proportional vanishment. Remarkably, aether is used up, so to speak, in the process of sustaining matter. Consequently a constant inflow of surrounding aether is required.

Earth example: If we consider only the aether flow attributable to the Earth itself; in other words, if we remove, or simply ignore, the flow of the background aether and the flow due to the Earth's orbital motion; then the magnitude of the external aether inflow is given by

$$v_{\rm inflow} = \sqrt{\frac{2GM}{r}},$$
 (1)

which is based on the equation
$$v = \pm \sqrt{2GM/r}$$
. (2)

(For the derivation see reference $[^6]$). The general convention is: inward motion is negative, outward motion is positive. Since Equation (1) only gives the magnitude, the minus sign is omitted.

The maximum inflow occurs at the surface, where it is (in the absence of aforementioned components) 11.2 kilometers per second (Fig. 3a). During the aether's passage into the depths of the Earth, it is absorbed/consumed. Its speed diminishes and at the very center (at the Earth's center of gravity) it becomes zero.

If a similar analysis is done for the Sun, which has a mass of 1.99×10^{30} kilograms and a radius of 6.96×10^{8} meters, then the above equation gives a surface inflow of 617 kilometers per second (Fig. 3b). And again, if the background flow is "removed," the flow goes to zero at the center.

Now in the case of a critical-state neutron star (Fig. 3c), the background flow and the star's motion need not be "removed" or considered at all. The surface inflow speed is precisely c and the flow at the center is exactly zero. Always.



Fig. 3. (a) Aether inflow required to sustain the existence of Earth's mass (distributed within its nominal spherical size). (b) Aether flow required to support the existence of the Sun's mass (distributed within its nominal spherical size). (c) Flow needed to sustain the existence of critical-state neutron stars.

With most astronomical bodies, the aether flow at the center is not zero because of background-flow components. But with our critical-state neutron star, we can be quite certain the surface inflow is 300,000 kilometers per second and there is no center-point flow. And there is something else we can be certain of —an important physical aspect of relativistic motion inherent in this situation and acting as the very cause of the *super-density* state.

5. Super-Dense Neutron Star

Now that we understand the underlying cause, let us examine the flow of aether for the end-state neutron star in more detail. As mentioned earlier, the aether, while passing through the energy layer, decreases in speed and passes into the mass with a speed that is less than, but very close to, lightspeed. This means that the subsurface mass is subject to extreme relative-to-aether motion and, therefore, extreme length contraction. It is a real physical effect —an effect causing radially-directed lengths to be less than they otherwise would be.⁷ The deeper the aether penetrates the structure, the slower will be the speed; and the less pronounced will be the



Fig. 4. Aether flow velocity graph (or comoving velocity curve) for a Superneutron Star (SnS). Mass density varies as a consequence of physical length contraction and causes a curvature in the interior portion of the flow curve (dotted). The interior portion of the graph represents the results of a numerical simulation of a SnS. The exterior portion (solid line) represents the aether flow equation (given in text) applied to the nonrotating SnS having mass equal to about 2.62 Suns.

length contraction. At the very center, of course, the flow speed diminishes to zero and the contraction effect is absent.

But there is another effect, one that is not so obvious. The mere fact of the aether slowing down has a profound consequence.

The interior flow configuration (dotted portion of the graph in Fig. 4) is responsible for two important effects:

1. The *great magnitude of the speed* causes physical length contraction, which in turn determines the density, the overall physical size, and the total mass content. The length contraction causes a nonuniformity in density (an inversion of the normal density gradient).

2. The *diminishment of the speed* of the aether flow causes energy amplification of radiation, most evidently within the energy layer.

The thing to note about the length contraction is its significant role in increasing the neutron structure's density. It provides the justification for attaching the name "Superneutron Star" (SnS).

But it is the *speed diminishment* that holds the profound repercussion and is of crucial importance for the discussion.

In order to more easily understand the energy amplification aspect of The Mechanism, we require some familiarity with the *velocity differential spectral shift*.

6. Velocity Differential Redshift and Blueshift

This spectral-shifting mechanism is wonderfully simple. It is based on three properties or factors. Their verity is incontrovertible.

- Radiation particles are axially extended entities; that is, they have a wavelength. The wavelength is inversely proportional to the particle's energy.
- The universe is permeated by a space medium. Call it what you like, the vacuum, the general-relativity fluid, the subquantum substrate, or the aether. Its name makes little difference. It is essential for the propagation of light (and much, much, more).
- Inverse relationship of gravity with distance.

Redshift. Let us first examine the loss of energy of any photon propagating along a radius in the exterior region. Consider a photon propagating radially outward against the flow of aether as shown in Fig. 5. The velocity of the aether is symbolized by v. Given that the photon always travels at speed *c* with respect to the aether medium, the following must be true.

(Relative velocity between ends of outbound photon)

$$= (vel of front end) - (vel of back end),$$
$$= (c + v_1) - (c + v_2),$$
(3)

$$= c + v_1 - c - v_2, = (v_1 - v_2) > 0.$$
(4)

Note that aether flow v_1 and v_2 are both negative (because the flow is inward). But because v_2 is more negative than v_1 , the bracketed expression must be positive —indicating a diverging situation. The two ends of the wave are moving apart; the photon is being redshifted. It is losing energy.

Now, some would say that the result is rather trivially selfevident and hardly worth the trouble; after all, the photon is unquestionably losing energy as it struggles against the "pull" of gravity. However, this intuitive argument fails completely, for it can be shown that if the photon travels in the opposite direction, in the same direction WITH the "pull" of gravity, believe it or not, it will still lose energy —it will still undergo intrinsic redshifting! Here is the proof:

(Relative velocity between ends of inbound photon)

$$= (vel of front end) - (vel of back end),$$

$$= [- (c + v_2)] - [- (c + v_1)], \quad (5)$$

$$= -c - v_2 + c + v_1,$$

$$= (v_1 - v_2) > 0. \quad (6)$$

Again, v_1 and v_2 are both negative; but since v_2 is more negative than v_1 , the algebraic sum must be positive indicating a wavelength elongation and a loss of energy.

For a quantitative analysis of this intrinsic redshift effect, see reference $[^8]$.

Blueshift. Let us consider a photon embedded in the SnS's surface (Fig. 5). It is propagating radially outward (at lightspeed, of course), while at the same time aether is flowing radially inward, also at lightspeed. Thus, with respect to the background Euclidean space and with respect to the SnS structure, the photon is propagating in-place. Given that the photon always travels at speed c with respect to the aether medium, the following must be true.

(Relative velocity between ends of photon)

= (vel of front end) $-$ (vel of back end),	
$= (c + v_3) - (c + v_4),$	(7)
$= c + v_3 - c - v_4,$	
$= (\upsilon_3 - \upsilon_4) < 0.$	(8)

Aether flow v_3 and v_4 are both negative; but since v_3 is more negative than v_4 , the bracketed expression must be negative —indicating a wavelength contraction. In other words, the "stationary" photon is being blueshifted.

I know this seems counterintuitive. I know it is contrary to all conventional expectations. However, the verity of the effect cannot be denied. And keep in mind, these are *intrinsic* changes of wavelength; they do not depend on the position or motion of any observer. Reiterating the three factors upon which the argument rests: (1) The photon, is an extended entity; it has a wavelength. (2) Empty space, vacuous space, is not a region of nothingness; the photon is, in some way, embedded in the space medium. (3) Wherever gravity manifests, there exists a potential-gravity differential; or in terms of aether, wherever gravity acts, there exists a velocity



Fig. 5. Velocity differential redshift and blueshift. Exterior energy particles (photons and neutrinos), shown schematically, are subjected to an intrinsic redshifting effect —amazingly this is true for both outbound *and* inbound directions. However, interior radiation particles are always subject to an intrinsic blueshift. The "stationary" photon/particle is being conducted by a space medium whose speed of inflow decreases. As a result, the front and back ends of the photon "experience" a flow differential. As long as the stationary photon/particle remains trapped in the SnS's surface layer (between r₃ and r₄), its wavelength will decrease, it will become "bluer." Its energy will be amplified. (Center of gravity is at "0" radius.)

differential of flowing aether. If one accepts their validity, then the conclusion must follow, the gain-(or loss)-in-energy effect must be real. To the best of my knowledge no one has ever stated outright denial of the validity of any of the three factors.

The velocity differential redshift⁹ was only "discovered" in 2013 and played a key role in proving the validity of the Dynamic Steady State Universe (DSSU) as the real Universe. See the article *DSSU Validated by Redshift Theory and Structural Evidence* [¹⁰]. In the present discussion, it serves as the amplification component of Nature's energy extracting mechanism.

7. The Mechanism

7.1. The Input of the Mechanism

The input for The Mechanism is whatever enters the SnS's energy layer. Generally, this is whatever falls onto the SnS.

The raw ingredients that Nature feeds into The Mechanism include: a wide range of electromagnetic waves, mass particles, and mass bodies. In fact, the input includes anything that falls into the SnS's gravity well and is captured by its intense gravity. If surrounded by an accretion disk, all the material contained therein will, given enough time, spiral inward and be digested (undergo processing). But even when there is no mass infall, there is always the ubiquitous cosmic background (CMB) radiation and a flood of cosmic neutrinos.

The abundance of neutrinos is staggering. It is said there are a billion neutrinos for every atom in the universe. When it comes to energy, their sheer number means they have an important role. The contribution of neutrinos to the cosmic energy budget is comparable to the conventional radiation of all the stars.¹¹ Our mechanism is immersed in a sea of cosmic neutrinos.

7.2. The Trapping Part of the Mechanism

For the obvious reason, no radiation can reflect off the SnS's critical surface (and no mass particles can rebound therefrom). Hence, the exterior appears totally black. All incoming photons (including CMB radiation) and neutrinos must pass into the energy layer. Consider what happens to photons that have entered. They are in the energy layer but cannot go deeper; unable to penetrate Nature's ultimately-dense mass they are immediately reflected. They thus become trapped within the surface film —the pure-energy layer.

As for the neutrinos, I think it is reasonable to assume that the density is so exceedingly great that even neutrinos (which normally can easily pass through a lighyear-thick barrier of lead) are unable to penetrate much beyond the depth of the SnS's energy layer. They too, like the photons, may undergo immediate reflection and become trapped within the surface film. There is of course no way to test this. If, on the other hand, one argues that neutrinos do pass readily through the neutronium mass, then the neutrinos that penetrate to the interior will, sooner or later, arrive at the energy layer at some other location —and then become trapped. In other words, if the neutrinos are not trapped on initial reflection from the neutron mass, then they will become trapped after passing through the interior and again arriving at the energy layer.

7.3. The Conversion Part of the Mechanism

An initial **mass-to-energy** conversion occurs during the formation of the SnS. During the emergence of the criticalstate surface, surface mass particles are compelled to travel (with respect to aether) at the speed of light. This means they must transform to their pure photonic-energy form. According to gravity expert John A. Wheeler, "... in this extreme relativistic limit a particle of rest mass *m* behaves ... in practically the same way as a photon." ¹² Surface particles, then, be they electrons or other elementary particles, will take on the characteristics of a photon —a massless particle of pure energy.

A sufficiently massive neutron star collapses to become a SnS while its surface transforms into an intrinsically lightspeed environment —forcing the mass there to exist as pure energy. The general rule is that when mass is forced to exist as pure energy particles it means they must exist as photons and neutrinos —the only known particles able to convey energy at lightspeed.¹³

What about additional mass? Infalling mass particles and small objects are converted to energy on impact. It is an effect tied to reflection or rebound from the subsurface; and the above general rule applies. The steady infall from an accretion disk is a major source of this kind of conversion. However, with large clumps of mass infall, only a small portion is converted to energy.

When large masses are involved, there is a momentary outward shift in the energy layer, an outward shift at the location of the infall. There is also a corresponding loss of mass at the center of the SnS structure. Recall, matter deprived of aether cannot sustain its existence (and this *aether deprivation*, hence mass loss, only occurs at the center).

7.4. The Amplification Part of the Mechanism

In a real sense, The Mechanism is a stupendous energy amplification process. Anything trapped within the energy layer, for as long as it remains trapped, will be subject to the *velocity differential blueshift* (as detailed in Section 6). Conceivably, energy particles may propagate (in-place) for billions of years —never leaving their starting point— while constantly gaining energy. The particles have their wavelengths decreased and frequencies increased.

As explained in the simple proof, in Section 6, the surface embedded photon is subjected to wavelength contraction. By virtue of propagating within a zone of decelerating aether, the surface photon undergoes continuous blueshifting. The stationary photon is being conducted by a space medium whose speed of inflow decreases. As a result, the front and back ends of the photon "experience" a flow differential. Essentially, it gains energy.

The amazing thing about this process, this "amplification" Mechanism, is that energy is extracted from aether WITHOUT aether itself possessing energy! The discrete units of the DSSU mechanical aether possess no mass and no energy. Furthermore, it has no limit (other than the supply of aether itself).

What about the amplification of neutrinos? ... The thing to understand about neutrinos is that they are actually paired photons (Fig. 6). Typically, a neutrino is a pair of equalwavelength photons helically intertwined in such a way that their electric and magnetic fields are in direct opposition. The fields effectively cancel but the energy of the photons, as defined by frequency or wavelength, is retained. It was famed particle physicist, Steven Weinberg, who stated, "Described quantum-mechanically, the neutrino is apparently a superposition of two wave packets ..."¹⁴ And so neutrinos gain energy in the same way as do the lone photons —via the



(b) Neutrino (simplified schematic of internalized electric and magnetic fields)

Fig. 6. The neutrino is an energy particle consisting of two equal-wavelength intertwined photons that are 180° out of phase. (In quantum mechanics, the neutrino is often referred to as a superposition of energy waves.) This means that neutrinos are subject to the same spectral shifting process as are individual photons. They gain energy via the same stationary blueshifting process within the SnS's energy layer.

stationary blueshifting process that is unique to the SnS's energy layer.

Needless to say, the energy extraction process would be of little interest if it could not, in some way, escape to the outside world —the world external to the lightspeed boundary.

7.5. The Emission Part of the Mechanism

Neutron stars are known to possess powerful magnetic fields. The source of the field is the neutron particles, each of which behaves as a miniature magnetic dipole. The dipole, in turn, is produced by the spin of the neutron particle's internal electric charges.

The Encyclopædia Britannica (15th Ed. Vol.8) states, "The neutron possesses an intrinsic angular momentum and a magnetic moment —i.e., it behaves like a minute magnet in ways that suggest that it is an entity of moving electric charges." Although the neutron displays no external electric field, it does display a magnetic field.

The star's macro-scale field is the collective effect of a multitude of tiny dipoles —magnetic dipoles that have selforganized to a common alignment. Neutronium, although exceedingly dense is believed to be a *superfluid* gas and, therefore, is virtually devoid of viscosity. With the near absence of viscosity, the individual neutrons readily adjust their alignment and, thus, produce an enormously powerful collective field.

Extremely important to the functionality of The Mechanism is the intensity of the magnetic field at or near the polar axis —crucial is the density of the magnetic lines of force projecting from the poles. Here is where rotation enters the picture. Rotation causes the star's polar magnetic lines of force to become twisted and simultaneously the polar extensions of the magnetic field become highly collimated (Fig. 7a).

Now remember what I said about mass and energy? They both require a flow of aether to sustain their existence. The greater the mass density, the more aether must flow into the same volume; the greater the energy density, the more aether must flow, etc. The collimated magnetic field represents an extraordinarily high energy density and is, therefore, a prodigious consumer of aether. And this voracious extraction of aether is of key importance —it precludes the formation of a critical-state surface at the poles (Fig. 7b).

The superdense polar magnetic field prevents the localized formation of a light speed barrier. It allows an escape portal (one at each pole) to exist while the rest of the SnS is enveloped in an uncompromising one-way boundary.



Fig. 7. Aether flowing through the magnetic-lines-of-force bundles undergoes a retardation of its speed. (a) Rotation causes collimation of the Superneutron Star's magnetic field, thereby greatly increasing the field's energy density. (b) The energy of the polar "columns" is sustained by inflowing aether. This involves the absorption and consumption of aether, which is thereby prevented from attaining speed criticality within the columns. The result is a pair of escape holes through the SnS's surface.

It is easy to imagine two emission drivers. The SnS's surface layer holds Nature's densest state of radiation per unit area. It is a domain absolutely saturated with energy waves.

Envision the enormous lateral pressure. The gamma particles, along with the neutrinos, are pushed toward the edges of the polar portals, as shown in Fig. 8. Once they reach the opening, they escape. They shoot out at lightspeed; but note, this speed is not with respect to the surface but, rather, with respect to the inflowing aether. Collectively, they form a curtain around the opening —a cylindrical shaft of high energy blasting into deep space.

The second driver relates to any disturbances associated with infalling objects. Things like space rocks, planetoids, and gaseous material ripped from an accretion disk or from some orbiting body, will cause surface vibration and considerable variation in the outgoing radiation.



Fig. 8. Emission mechanism. Radiation —gamma photons and neutrinos- escapes through the polar portals facilitated by the extreme magnetic flux density. The magnetic field (whose lines of force are not shown) is the origin of the opening in the lightspeed boundary. The channels are maintained in the "open" state by the collimated magnetic field and the high-energy particle beam, both of which are voracious absorbers of aether. Both retard the aether's flow. The lateral pressure, due to the extreme density of the SnS's surface, drives the energy particles toward the edge of the portal from which they emerge as a ring of radiation. The streaming of escaping energy is a continuous phenomenon -sustained by the ongoing energy-generation process of the interior (as described in the text). (Note: Actual emission beams are helical, but is not shown here.)

Primary radiation drives secondary radiation. The primary radiation particles are the gamma photons and ultraenergy neutrinos escaping through the polar portals. Some of this radiation produces secondary radiation (including mass particles); this production occurs during passage through the magnetic field in accordance with the rules of particle physics. Variation in the primary radiation causes variation in the secondary emissions and provides the natural explanation for the surges and glitches frequently observed and reported by astronomers.

8. Thermodynamics Considerations

No theory deserves credibility unless it can, in some way, avoid contravening thermodynamic laws, namely energy conservation and the entropy rule. Conventional thermodynamic laws apply strictly to closed-and-isolated systems (nothing is allowed to enter or exit, and no external forces act on the system). But the DSSU is uniquely different. Our Dynamic Steady State Universe is, essentially, divided into cosmic-scale gravity domains. These gravity domains are stable and autonomous. They are the reason our universe is intrinsically and observationally a cellular universe. The critical point is that they are not closed systems (the reason for the "not closed" designation will become clear in a moment); and, although autonomous, they are not totally isolated (radiation freely passes in and out). Although the gravity domains/cells are not in the strict sense closed and isolated, they are *balanced* systems —self-balancing systems no less. And there is a straightforward way to apply thermodynamic rules to the cosmic-scale gravity domains.

First let me define "energy" at the most fundamental lever. **Energy (intrinsic energy) is a process.** The manifestation of any form of *intrinsic energy* always involves a localized quantitative change in the aether —an increase in the subquantum units of aether, in the case of positive energy, and a decrease in the units of aether, in the case of negative energy. Energy, both mass-energy and radiation-energy, at the most fundamental level is manifest in the absorption-annihilation of units of the *space medium*, defined as a *nonmaterial aether*. Without this active process, neither mass nor radiation can exist.¹⁵

Now, the cosmic cells (the gravity domains) of the real world (the DSSU) are not closed systems and only quasiisolated; and yet their total energy content remains constant. Within the domains, energy can change form, mass can convert to radiation, and radiation can convert to mass, but the total amount of energy does not change.

As Sir James Jeans long ago pointed out, in reference to conservation laws, "the law of 'conservation of X,' whatever X may be, means that the total amount of X in the universe remains perpetually the same." Then he says, "Every such law is of necessity hypothetical"; by which he means there is no way to experimentally prove it.¹⁶

In our case, X is the volume-quantity of aether. The amount of aether that continually emerges is balanced by the amount consumed and self-extinguished. A similar balance applies to matter. Moreover, the balance, in conjunction with matter, is self-sustaining, self-adjusting. The important point: It is not the substance or entity itself that is conserved but rather the total *quantity* —notably the total quantity within each cosmic gravity domain.

The DSSU domains are thermodynamically "open" in the sense that *new* aether axiomatically enters in one region of the system and eventually exits (leaves the system) wherever negative energy manifests. Aether enters, aether leaves. (Never forget, the aether constituent entities possess no mass and no energy. So thermodynamically, we are on safe ground.) The positive emergence is in harmony with the negative consumption-disappearance. Or as Einstein expressed it when he attempted in 1916 to build a stable universe: the positive Lambda effect is balanced by the negative gravity effect.

Clearly, the SnS is not a conserving system. When in steady-state mode, it spews out far more energy than it takes in. It is but the terminal end of a vastly larger domain; and that domain *is* a conserving system (in the sense of maintaining energy, or aether, balance). Since the total system energy remains constant, there is no violation of thermodynamic law on the macro-scale.¹⁷

The second thermodynamic law, the entropy rule, is simply that a designated closed-and-isolated system/domain must not have a net decrease in entropy, or disorder. For the DSSU, we modify the rule ... we simply change the precondition but uphold the predicate: An autonomous perpetual self-balancing system/domain must not have a net decrease in entropy, or disorder. In practice, it means the cosmic-scale gravity domains are *steady state* systems —they do what they do perpetually, past, present, and future. System entropy never changes; the domain remains always in compliance.¹⁸

Incidentally, in general relativity cosmology the source of low entropy is the expansion of the entire universe. All the while, the entropy is said to be forever increasing for the universe as a whole; however, this increase is incompatible with the Big Bang accelerating universe and actually leads to a paradox. In DSSU cosmology, much more reasonably, the source of low entropy is the perpetual emergence of new aether (balanced, as noted earlier, by a compensating loss of aether).

9. Solved: Five Great Mysteries

The mysterious singularity of Black Hole Physics. The gravitational collapse scenario that leads to The Mechanism solves the dilemma that had confronted Albert Einstein and Arthur Eddington in their rejection of unrestrained collapse as implied by Karl Schwarzschild and predicted by Julius Robert Oppenheimer. Both Einstein and Eddington had objected to the unnaturalness of unrestricted collapse, had opposed the idea of the singularity that would ensue, and had dismissed the reality of the unlimited density that a singularity represents. The SnS concept essentially solves the "singularity" problem that has long plagued standard black-hole physics. It destroys what is probably the biggest misconception about the real world: the belief that there is mass hidden deep inside the event horizon and is point-like; the belief in the reification of a mathematical oddity. The notion is so outrageous and outside the realm of natural physics that it really doesn't need elaboration.

The mystery of electromagnetic radiation bursts. The problem here is that standard astrophysics has yet to incorporate The Mechanism into their thinking; and hence, cosmic-sourced radiation bursts (the blasts of electromagnetic energy ranging from radio signals to gamma waves) are automatically assumed to be caused by some great explosions or collisions. However, the available cataclysmic-andexplosive theories fail when the radiation bursts are of a repeating nature. As stated by a Cornell University astronomer involved in the detection of radio bursts in 2017, "The detection of repeating bursts ruled out, in a single stroke, a wide range of explosive and cataclysmic theoretical models for the origin of FRBs (Fast Radio Bursts), ..."¹⁹[Emphasis added.] Supernovae events and merger collisions are quite inadequate as originators. Cataclysmic and explosive models fail for repeating radiation bursts.

The SnS Mechanism works for all kinds of radiation bursts: continuous or intermittent, high energy or low energy, synchrotronic or non-synchrotronic.

The mystery of the ultra-energy neutrinos. Solved is the mystery of the source of PeV-energy neutrinos, the ultraenergy neutrinos (known to be of cosmic source). Solved is the method of how aether, under appropriate conditions embodied in The Mechanism, is able to amplify radiant energy. The Mechanism breeds neutrinos with a staggering amount of energy —more than a million times the mass energy of the hydrogen atom, more than a thousand times the energy of anything created in the most powerful terrestrial particle-accelerators. As long as an individual neutrino is trapped within the SnS surface, its wavelength will contract, its energy will increase —a direct consequence of the aethervelocity-differential effect.

At the most fundamental level, The Mechanism reveals how energy is extracted from nature's elusive essence —the aether. It elucidates a process whereby trapped photons and neutrinos gain energy from a nonmaterial, nonenergy, aether.

The mystery behind astrophysical jets. The source of the energy driving astrophysical jets has been a longstanding conundrum. Existing theories are not at all compelling. They fall into two categories.

There are existing theories that attempt to explain the driving power of jets by using the gravitational potential

energy of mass from an accretion disk —by using the energy that is released by the infalling mass.

There are other existing theories that attempt to explain the driving power by using the energy stored in the rotation of the central body; this is also known as a frame dragging effect. But it only works for extreme spin rates —about one thousand rotations per second.

But consider a worst case scenario. What if there is virtually no mass accretion AND negligible rotation? What theory should then be used? ... No conventional theory exists for such a situation. (And the reason is because there is no conventional theory for extracting energy from the interior of a totally collapsed body —it is simply not possible with general relativity black-hole physics.) This puzzling scenario actually exists. It is known as pulsar IGR J11014-6103; and it has no mass accretion and negligible rotation.²⁰

The SnS Mechanism does not need mass accretion and does not depend on rapid rotation. It works for all situations. The Mechanism resolves the mystery of the jets associated with objects of the type represented by pulsar IGR J11014-6103.²¹

Although the concepts that have been presented apply specifically to mass that is contiguous and solve the mystery of the source of the energy driving polar jets, those concepts have been extended for supermassive-type regions. See Chapter 8 in *The Nature of Gravitational Collapse*.²² They have been extended to apply to Supermassive Black Regions (aka supermassive black holes) and provide an equally compelling explanation for galactic-scale emission beams/jets.

The greatest mystery of them all. The Mechanism solves the mystery of how Nature extracts energy from the interior of an end-state collapsed star —from the forbidden side of the lightspeed boundary (conventionally called the *event horizon*).

There is a profound difference between the old and new views of the way energy is extracted: indirect versus direct energy extraction. Among accredited physicists the most popular belief is that the emission beams are somehow launched from a black hole's *ergosphere* —this is a region immediately external to the event horizon where "space" flows faster than lightspeed, but the inward component of velocity is still less than lightspeed.²³

Astronomers have observed jets closer and closer to the collapsed structure. One report stated, "The researchers were able to resolve the jet structure ten times closer to the black hole in NGC 1275 than what has been possible before with ground-based instruments, revealing unprecedented details of the jet formation region." ²⁴ But under the conventional paradigm, they are not permitted to consider the possibility that the emission stream is actually connected to the structure, actually touching its surface.

In conclusion, a new —vastly superior— paradigm in astrophysics/cosmology is available, part of which has been advanced herein. It is a worldview that does not violate physical laws, does not hold unrealistic assumptions, and does not need hypothetical ingredients. In short, no *thermodynamic* contravention, no *singularity*, no *dark matter*.

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About the Author:

Conrad Ranzan:

Founded the cosmology known as Dynamic Steady State Universe (Munich Symposium 2002);

Revealed how the Theory of Heraclitus Solved the Dark Matter Mystery (*Physics Essays* 2010);

Conceived and developed The Fundamental Process of Energy, thereby unifying aether, energy, mass, and gravity (Infinite Energy 2014);

Originated and proved the velocity-differential mechanism of cosmic redshift (AJAA 2014);

Discovered the causal mechanism (the origin and progression) of ellipticity in comoving galaxies (AJAA 2015);

Expounded the processes of gravitation, the causes and mechanism of gravitation, (JMP&A, 2014) and (AJAA 2016);

Resolved Olbers' Paradox for our nonexpanding infinite Universe (AJAA 2016);

Discovered the natural mechanism key to the revolutionary unification of gravity theory, (*International Journal of Astrophysics and Space Science*, V.6, No.5, 2018);

Conrad Ranzan is the Director of DSSU Research, Niagara Falls, Canada.

Email: ranzan@CellularUniverse.org