Natural Mechanism for the Generation and Emission of Extreme Energy Particles

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Abstract: The discovery, in 2013, of the velocity differential spectralshift mechanism is revolutionizing astrophysics/cosmology. For instance, it provides for a superior understanding of the cosmic redshift. Moreover, it has recently been used to disprove the Sachs-Wolfe effect. In the present article, the new light-shifting concept is applied to resolving the mystery of the driving force behind astrophysical jets.   It is shown how a stellar type object known as the Superneutron Star (i) converts mass to trapped radiant energy, (ii) amplifies this energy, and (iii) leaks the energy to the outside world. The main purpose is to show how photons and neutrinos can gain energy, through a wavelength contraction process. Detailed is a mechanism, based on the velocity differential in the convergent flow of nonmaterial aether, for the production of gamma particles and PeV neutrinos.
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Résumé: La découverte, en 2013, du mécanisme de décalage spectral de la vitesse différentielle révolutionne l'astrophysique/la cosmologie. Par exemple, il fournit une compréhension supérieure du décalage vers le rouge cosmique. De plus, il a récemment été utilisé pour réfuter l'effet Sachs-Wolfe. Dans le présent article, le nouveau concept de déplacement de la lumière est appliqué pour résoudre le mystère de la force motrice derrière les jets astrophysiques. Il montre comment un objet de type stellaire connu sous le nom d'étoile Superneutron (i) convertit la masse en énergie radiante piégée, (ii) amplifie cette énergie, et (iii) fuit l'énergie vers le monde extérieur. L'objectif principal y est de montrer comment les photons et les neutrinos peuvent gagner de l'énergie grâce à un processus de contraction de la longueur d'onde. Un mécanisme, basé sur le différentiel de vitesse dans le flux convergent d'éther non matériel, pour la production de particules gamma et de neutrinos de PeV, y est détaillé.

Keywords: Extreme Energy; Neutrino, Photon Propagation; Velocity-Differential Redshift; Gravity; Nonmaterial Aether; Superneutron Star; Event Horizon; Energy Emission Mechanism; DSSU Theory.

1.   Introduction

1.1.   *Particles and Energy*

Nature's building-block particles —variously labeled as mass, atomic, radiation, and fundamental— come in a wide range of energy. The electron has a rest-mass energy of 0.511 mega-electron-volts (MeV). The proton has a rest-mass energy of 938 MeV. The most massive particle, the record holder within the Standard Model, is the *top quark*, with a rest-mass energy of 175 giga-electron-volts (GeV). The top quark contains the equivalent energy of 186 protons. By comparison, the Higgs boson particle has an energy of about 125 GeV, corresponding to the mass of about 130 protons.

Turning from mass particles to radiation-energy particles: Photons, particles of electromagnetic radiation, come in an extremely wide range of energy —from harmless radio waves through to lethal gamma rays. Theoretically, there is no upper limit to the energy that a gamma photon can possess. Another type of radiation-energy particle is the neutrino. Actually, there are three kinds of neutrino (plus their antiparticles) belonging to the three families of fundamental particles. Neutrinos are, by far, the most enigmatic members of the particle menagerie. They are also, by far, the most energetic particles that have ever been detected.

The most energetic particles observable are cosmic sourced neutrinos. Many are more energetic, by orders of magnitude, than anything produced by the world's most

powerful particle accelerators! Specially constructed detectors were recording PeV-energy neutrinos, 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]

These neutrinos, and their sister gamma photons, are in the realm of ultra-energy. But where did they originate? Ray Jayawardhana, professor of Observational Astrophysics at the University of Toronto, explains,

> *"At first, the researchers wondered whether collisions between highly energetic cosmic rays and oxygen or nitrogen atoms in the Earth's atmosphere were responsible for producing these PeV neutrinos. After further monitoring and analysis, they're now convinced that's probably not the case."* [1]

Francis Halzen, director of IceCube the world's biggest neutrino telescope, concedes that atmospheric collisions are not a causal factor; and believes we need to look to distant celestial sources to uncover the violent origins of these neutrinos.[1]

Physicists are now convinced of their origin as being of cosmic distance. In fact, researchers strongly suspect that the particles are coming "from powerful jets shot out by monstrous black holes at the hearts of galaxies, or from incredible explosions known as gamma ray bursts (GRBs), which appear to be even more potent than supernovae." [1] However, they have no plausible explanation of *how* ultra-energy particles are produced. It's nice to know where they originate, but for true understanding one needs to know the underlying cause.

Among the experts, the mystery remains: What forces could possibly produce a particle manifesting the equivalent energy of over one million hydrogen atoms!?

The purpose of this article is to explain the generating mechanism and to resolve the mystery. (In order to dispel the notion that this will necessitate speculative theories or untested ideas, let me state up front, the explanation lies within basic established physics.)

1.2. *Components and Principles*

Nature has a truly amazing yet marvelously simple mechanism for generating extreme-energy particles. The Mechanism can be divided into two parts. One involves the conversion of mass to energy (and is the subject of the next Section). But this is no ordinary energy conversion. This is not like mass-to-energy transformation that fuels stars. In

stars, the energy released when hydrogen "burns" to helium is 6 MeVs. Given that the mass energy of the hydrogen's proton involved in the burning is 938 MeV, the conversion efficiency is only about 0.64%. And yet, this is Nature's most efficient nuclear conversion reaction —excluding, of course, particle-antiparticle annihilations. What is to be explored herein is a 100% mass-to-energy conversion.

The second part of the Mechanism involves energy-particle amplification. It is detailed in Section 3. Nature also has a mechanism for the ballistic dispersion of its extreme energy particles. Several essential (and perfectly natural) conditions come together and, when they do, particle emission is enabled. This part of the story is presented in Section 4.

Space and aether: The three dimensional space of the Universe is not a region of nothingness. Space, all space, outer space and interstitial space, is permeated by aether. There are four things we need to recognize about aether.

Aether and photon propagation: First, Aether is essential for photon propagation. Einstein clearly stated, in his 1920 (May 5th) Leyden University lecture and in his 1922 book *Sidelights on Relativity*, that *without aether there would be no propagation of light*.

Aether defined: Second, a definition. After stating the condition that without aether "in such space there … would be no propagation of light," Einstein then makes it quite clear, "But this aether may not be thought of as endowed with the quality characteristic of ponderable media …" [2] In other words, Einstein's aether was *nonmaterial*. However, while Einstein believed the aether to be a nonmaterial *continuum*, the aether of the real world is a dense sea of discrete entities —nonmaterial, of course. It is these entities that are intimately involved in the conduction of electromagnetic waves/particles and plays the key role in the gravity effect.

Aether, then, is defined as the nonmass, nonenergy, mechanical (discretized), universal medium. Its definition and behavior is in accordance with the DSSU aether theory of gravity (details may be found at https://www.CellularUniverse.org).

Aether flows into mass: Third, it is essential to understand that aether flows towards and into mass —all gross mass and particulate mass. In fact, it flows into anything that has energy, namely energy particles and energy fields.

Aether flows into magnetic fields: Lastly, aether flows into magnetic fields. A magnetic field, by virtue of possessing energy, is an absorber/consumer of aether. The denser that the lines of magnetic force are, the greater is the localized absorption of aether.

Photon fact 1: The photon is not a point-like particle; the particle of light is an extended entity.

Photon fact 2: Gravity's influence on photons involves altering the propagation direction and changes to the wavelength. Gravity does this through the dynamic motion of aether.

Neutrino is a double photon: The neutrino is a pair of equal-wavelength 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 …"[3]

Those are the important components that enter into the explanation to follow. For some students and researchers, the use of the concept of aether may be distasteful, especially for those who have undergone a full indoctrination in this field. In that case, just consider the above defined aether as sort of a reification of the dynamic "fluid" of general relativity. They do, more or less, the same thing.

2. How Nature Converts Mass Particles to Pure Energy

Electrons and positrons, being antiparticles of each other, are able to convert their mass-energy to pure energy by a process of mutual annihilation accompanied by the production of a pair of gamma photons. There is, however, another way by which Nature converts these particles to pure energy.

2.1. Mass and Photon Connection

Consider the question: What happens to a mass particle as it is accelerated and forced to travel closer and closer to the speed of light? —the speed being relative to the universal space medium.

The layman would probably answer that it gains mass. The expert would say it gains momentum.

But what happens if the observer is moving with the mass particle? Then, one can no longer say that there is a gain in momentum within the observer-and-particle frame of reference.

The question boils down to *what is happening to the particle's mass, intrinsically*? The answer, it turns out, is that the particle's mass *decreases* with speed. The formal argument has been made by Harry Ian Epstein, in a 2009 article published in Physics Essays, in which he stated "It is reasoned that mass reduces with increasing proper velocity, and approaches zero as the coordinate velocity approaches the velocity of light. This is consistent with photons having zero rest mass traveling at that speed."

He further says "… *the mass of a moving object shall be interpreted as decreasing with velocity, as a real effect in the moving object's inertial frame* as opposed to increasing … This perspective [is] a search for what might physically be happening to the particle in its own inertial frame."[4] [Emphasis added.]

The crucial point is that the momentum of a particle/object depends on its motion within the observer's frame of reference. The momentum is not something intrinsic to the particle/object! **The intrinsic aspect is that the particle's mass decreases.**

Let us, then, continue with the intuitive logical argument.

The next question to consider: What happens when our speeding mass particle attains the speed of light? And let us overlook the fact that no amount of energy channeled to the particle can ever accomplish such a task; that no matter how much energy is applied to the task an electron, for example, can never reach the ultimate speed. For the moment, just consider it as a hypothetical question.

It may surprise many to learn that the answer was already understood back in the early decades of the 20th century. Here is how the Russian philosopher P. D. Ouspensky, writing during this period, described the situation:

> *"Einstein affirms that a rigid rod moving in the direction of its length is shorter than the same rod when it is in a state of rest, and the more quickly such a rod moves, the shorter it becomes. A rod moving with the velocity of light would lose its third dimension. It would become a cross-section of itself."*

And then Ouspensky added this pertinent statement, "Lorentz himself affirmed that an electron actually disappears when moving with the velocity of light."[5]

So, the electron "disappears" when moving with the speed of light and must emerge as a free photon in its place. The conservation of energy demands it.

The cross-section argument was reaffirmed in the 1960s by the eminent theorist John A. Wheeler, who wrote, "Any packet of energy that moves with the speed of light has zero rest mass."[6] So, once again, an electron, a packet of mass-energy, when traveling at lightspeed has zero mass.

According to Wheeler, "… in this extreme relativistic limit a particle of rest mass m behaves … in practically the same way as a photon."[7] The conclusion is that an electron, or any fundamental particle, compelled to travel at the speed of light with respect to the aether, will take on the characteristics of a photon —a massless pure energy particle.

If an electron attains lightspeed, it would have zero mass; its mass would have been converted entirely into pure radiation energy; the electron would have transformed into a high-energy photon (a gamma particle).

There is, of course, no particle accelerator —not in practice nor in theory— that can push mass to the ultimate speed. BUT there exists one environ where "mass" is compelled to exist as lightspeed particles. That is to say, mass at this locale is forced to exist as radiation —as pure energy. Once trapped in such a location, the subjected particles have no choice. Mass is forced to exist as pure energy particles —and in our world this means they must exist as photons and neutrinos (the only known particles able to convey energy at lightspeed).[8]

Time to take a closer look at the electron. The essence of the electron is a massless particle moving at lightspeed along a closed two-turn helix —a helical path that, in fact, traces the edge of a Möbius strip.[9] Since the electron possesses an external electric field, the massless particle that "generates" the electron must be a photon. It certainly can't be a neutrino —a particle exhibiting no external electromagnetic effects.

Another way to describe the electron is to say that it is a photon with toroidal topology. It is, according to the Williamson theory of particles, a confined self-looping photon, as shown in **Fig. 1**. The photon is polarized in such a way that its electric field vectors (its lines of electric force) are always pointing radially inward, while it courses through a double-loop orbit. As J. G. Williamson described it, the "model [is that] of a photon confined in periodic boundary conditions of one wavelength. The [toroidal] topology of this object, together with the photon electric field, give rise to a charge of the of the order of 10^{-19} Coulomb and a half-integral spin, independent of its size."[10]

Schematic EM wave (ribbon-like structure) and negative electric field

(a)

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(b)

Electron as a symmetrical electric-charge distribution

(c)

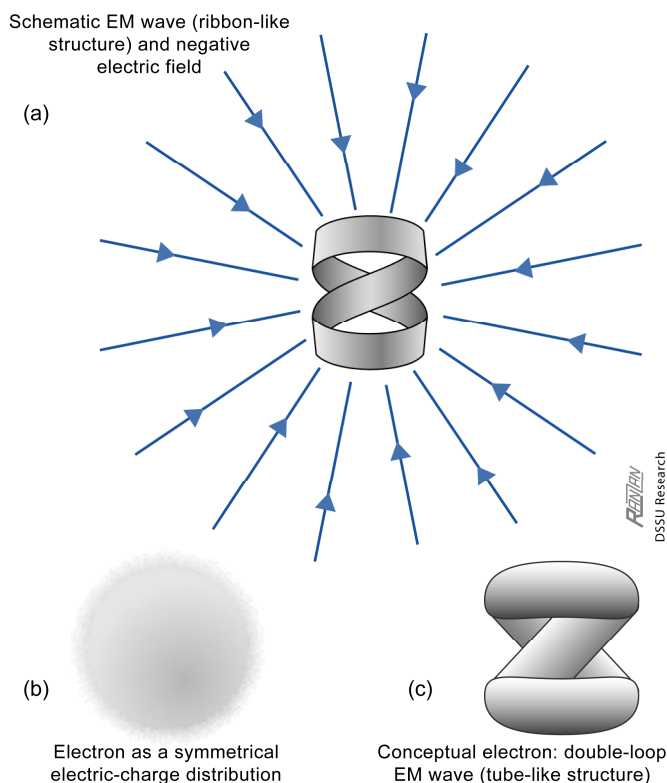Conceptual electron: double-loop EM wave (tube-like structure)

Fig. 1.   Electron is generated by a two-turn helical path traced out by a photon —a photon confined to a path length of one wavelength. The wave repeatedly reinforces itself with each pass along the double loop. The photon's electromagnetic wave is shown, in (a), spread out as a double-looping ribbon. The photon's polarization is such that the electric lines of force are always directed inward (and for the positron, they are directed outward). Part (b) shows the electron as a symmetrical electric-charge distribution. Part (c) conceptualizes the electron as a double-looping tube-like structure (within which the electromagnetic wave rotates as it propagates). Somewhat paradoxically, the electron is a mass particle consisting of a massless particle self-orbiting at the speed of light.

At a conference in 2008, Williamson affirmed, "the electron must be a purely electromagnetic particle."[11]

Using the electron as part of a thought experiment, let us revisit the above question. We imagine traveling alongside the electron as it accelerates. Picture it as a fuzzy ball and recognize that relativity does not enter here, does not complicate the picture. There is no relative motion! The only rule of relativity, applicable here, is the electron's speed with respect to the space medium (the aether). Now pretend, while continuing to travel with the electron, that our clock time and our biological processes are unaffected by relativistic motion through aether. Then, as we advance toward the ultimate speed, the electron transforms to reveal its pure-energy nature. Right before our eyes the electron transitions from a self-looping photon to a linearly propagating electromagnetic wave.

2.2. How Mass is Propelled to Lightspeed

This section describes how Nature imposes the lightspeed situation and, thereby, compels a critical transformation in mass particles.

It is useful to examine the "hidden" motion of mass —namely, mass that in the ordinary physical world appears quite motionless.

Imagine the Earth isolated from all external gravitational influence and resting motionless within the universal space medium. In accordance with the aether theory of gravity, the space medium flows into the Earth's surface with a speed of 11.2 km/s. It does this, with some variation depending on elevation and density non-uniformity, over the entire surface continuously. Any object resting on the surface experiences a vertical "head wind" of 11.2 km/s.[12]

If the Sun were similarly isolated from all external gravitational influence, the space medium would flow into its surface with a speed of 617 km/s. Any stationary surface particles would experiences a vertical "head wind" of 617 km/s.

Next, imagine the Sun compressed to the size of a white-dwarf star. If the Sun were to collapse to an electron degenerate state (with density 10^{11} kg/m³), its radius would be reduced to 1680 km. The surface inflow of aether would now be 12,570 km/s or about 4.2% of the speed of light.

And if the Sun were to collapse further (say to neutron density 1.6×10^{18} kg/m³), its radius would be only 6.67 km. The surface inflow of aether would now be 200,000 km/s or two-thirds the speed of light.

It's obvious where this is going.

Finally, if the Sun acquires sufficient additional mass (by sudden mass merger or by slow accretion), it will transform from a subcritical neutron star to what is defined as an end-state *superneutron* star. With the accumulation of the extra mass, the aether inflow eventually reaches the full and exact speed of light (~300,000 km/s). The physical charac-
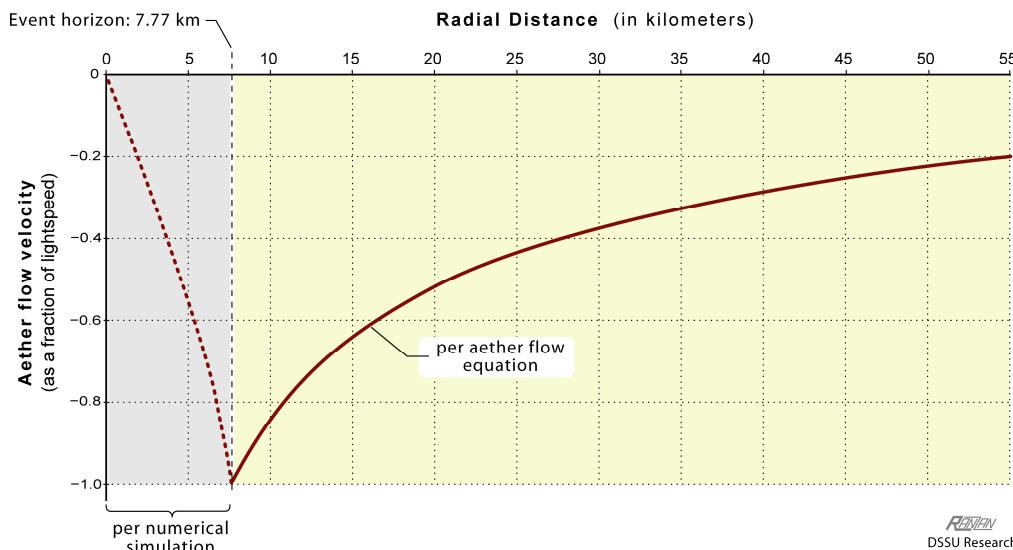
Fig. 2.   Aether flow velocity graph (or comoving velocity curve) for a critical-state neutron star. Mass density varies as a consequence of physical length contraction and causes a curvature in the interior portion of the aether flow curve (dashed). The interior portion of the graph represents the results of a numerical simulation of a super-neutron star (SnS). The exterior portion (solid line) represents the aether flow equation for the nonrotating SnS.

teristics of such a structure are derived and detailed in Refs. [12] and [13].

The velocity profile of the inflowing aether that we associate with the Superneutron Star (SnS) is shown in **Fig. 2**. And it is this velocity that is of key importance. Immediately note that, although the SnS is a mass structure, nowhere is there a violation of the speed-rule of Einstein's relativity. Nowhere is mass moving through the space medium at lightspeed. Nowhere does mass encounter an aether headwind at lightspeed. And here is the reason: The surface layer of the neutron star has transformed into its pure energy photonic state. This is so very important. This is why considerable time was spent, earlier, in explaining the mass-to-energy process.

The one place (the one radial distance) where the aether "wind" attains lightspeed is the place where matter exists in its pure energy (radiative) form. And matter in the radiative form necessarily travels at lightspeed.

No mass exists, or can exist, at (or in) the surface. Moreover, the intensity of gravity at the SnS's surface is the ultimate maximum that Nature allows. (The intensity of gravity is commonly expressed as the acceleration of freefall.) Thus, with energy particles squeezed into a thin film by the ultimate gravitational intensity, *the Superneutron Star surface becomes absolutely saturated with stationary photons and neutrinos.*

The instant the inflowing aether encounters the ultra-dense surface it slows down. The aether speed decreases because part of the flow is absorbed/consumed by the energy particles. Then, as it penetrates deeper and now traveling less than lightspeed, it is absorbed/consumed by the mass (presumably consisting of neutrons). (Understand that the aether actually sustains the existence of the SnS's mass and ener-

gy.) As the dotted curve in **Fig. 2** clearly shows, the deeper into the structure the flow penetrates, the slower the speed becomes. At the very center of the SnS, the speed goes to zero, the volumetric flow having been entirely consumed.

It is this property —the diminishment of the speed of aether inflow— that plays a crucial role in the amplification stage of the Mechanism.

3.   How Nature Amplifies Energy Particles

3.1   Embedded Outbound Photon

Let us consider a photon freshly embedded in the SnS's surface. 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. It is a "stationary" photon.

While trapped in the surface, the photon, whose original wavelength we will designate as $\lambda_{initial}$, undergoes contraction since there is a propagation velocity difference between the photon's two ends. The propagating "stationary" photon is shown in **Fig. 3**. The front and back ends are actually moving closer together.

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)

$$= \text{(vel of front end)} - \text{(vel of back end)},$$

$$= \left(c + \upsilon_1 \right) - \left(c + \upsilon_2 \right), \tag{1}$$

$$= c + \upsilon_1 - c - \upsilon_2,$$

$$= (v_1 - v_2) < 0. \tag{2}$$

Note that aether flow v_1 and v_2 are both negative. But because v_1 is more negative than v_2, the bracketed expression must be negative —indicating a converging situation.

Going a step further, we replace v_1 with its equivalent, minus-c. And since v_2, as shown in **Fig. 3**, has a magnitude less than c, we let its magnitude be $(c - \Delta v)$; and we re-place v_2 with the equivalent term $-(c - \Delta v)$. Then, redoing the above calculation, we have

$$(\text{vel of front end}) - (\text{vel of back end}) = (c + v_1) - (c + v_2),$$

$$= (c - c) - (c - (c - \Delta v)),$$

$$= 0 - (0 + \Delta v),$$

$$= (-\Delta v) < 0. \tag{3}$$

This confirms the previous finding. The negative result means the photon's two ends are moving towards each other; that is, the velocity of the back end of the photon is greater than the front end. Stated another way, the back end of the photon is moving slowly towards the front end, which itself has a zero velocity with respect to the SnS surface.

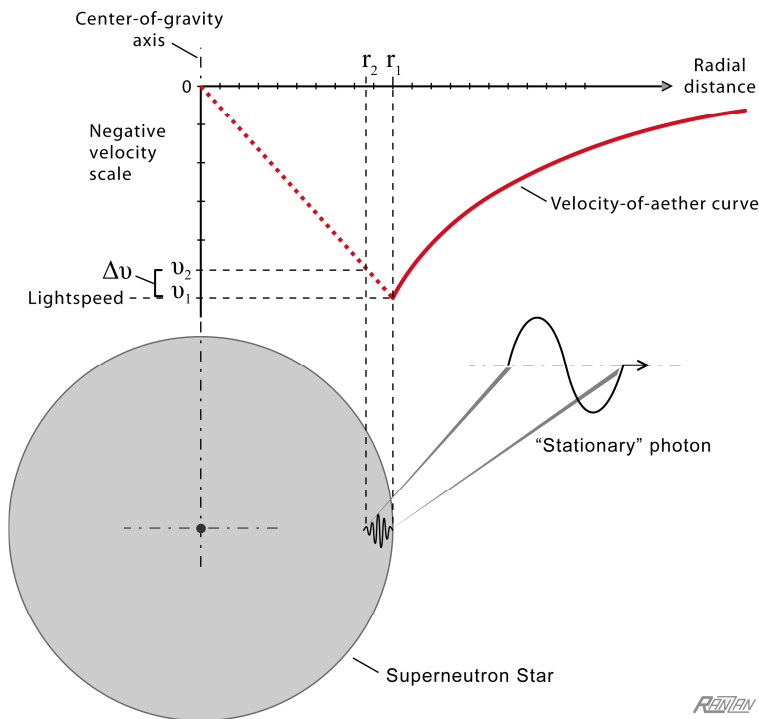This contraction velocity of the photon's wavelength can

Fig. 3.   Energy particle amplification. As explained in the text, 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. Essentially, it gains energy. The photon is being conducted by a space medium whose speed of in-flow decreases. As a result, the front and back ends of the photon "ex-perience" a flow differential. (The dashed curve approximates the in-terior aether-flow function.)

be expressed as $d\lambda/dt$. Furthermore, it is proportional to the wavelength λ itself. That is, $\dfrac{d\lambda}{dt} \propto \lambda$. Adding a parameter of proportionality we have

$$\frac{d\lambda}{dt} = k\lambda, \tag{4}$$

where k is the fractional time-rate-of-change parameter, and

$$k = \frac{1}{\lambda} \frac{d\lambda}{dt}. \tag{5}$$

For our representative photon, $\lambda = (r_1 - r_2)$ and $d\lambda/dt$ is simply the velocity difference between the photons two ends, which difference, according to **Fig. 3** is $(v_1 - v_2)$. Then,

$$k = \frac{(v_1 - v_2)}{(r_1 - r_2)}, \tag{6}$$

which, by definition, is nothing more than the slope of the dashed velocity curve (the aether-flow function). Since $(v_1 - v_2)$ is negative and $(r_1 - r_2)$ is positive, the value of k must be negative.

This means the photon is subject to a classic case of ex-ponential *negative* "growth," where the rate of change (of λ) is proportional to the amount (of length) present.

The wavelength, as a function of time, is found by simply integrating Eq. (4):

$$\int_{\lambda_{\text{initial}}}^{\lambda_{\text{final}}} \frac{d\lambda}{\lambda} = k \int_{t_1}^{t_2} dt, \tag{7}$$

$(\ln \lambda_{\text{final}}) - (\ln \lambda_{\text{initial}}) = k(t_2 - t_1)$, (as a sim-plifying approximation, k is treated as a constant)

$$\ln \frac{\lambda_{\text{final}}}{\lambda_{\text{initial}}} = k\Delta t.$$

This gives us an expression for the time it takes the surface-embedded photon (propagating in the positive direction) to change from its initial wave-length to some higher-energy wavelength (its "final" λ);

$$\Delta t = \frac{1}{k} \ln \frac{\lambda_{\text{final}}}{\lambda_{\text{initial}}}. \tag{8}$$

In order to make use of these equations we need the value of the slope k. And *that* poses a problem. Because of the cusp nature of the graph where it represents flow conditions at the surface, we really don't know what the slope is there. We lack an equation for the aether inflow through this micro-scopic region. The underlying reason is that there is

no way of knowing the actual density in the immediate vicinity of the surface. An additional complicating factor is that it is possible for the subsurface density to increase over time.

What we do know is (i) the slope is zero at the surface boundary; here the aether flow attains its maximum magnitude, i.e., lightspeed. (ii) On the interior side of the surface the slope is *negative* and photons are continuously blueshifted. (iii) On the exterior side of the surface the slope is *positive* and photons (attempting to escape) undergo redshifting.

The conclusion is that the aether velocity curve, relating to the surface, is not a cusp. On a microscopic scale, the surface-zone velocity graph is more realistically represented by a tight curve that transitions from a zero slope (at the minimum point) to the dramatic slope shown earlier in **Fig. 2**. For a schematic blow-up view of the surface, see **Fig. 4**.
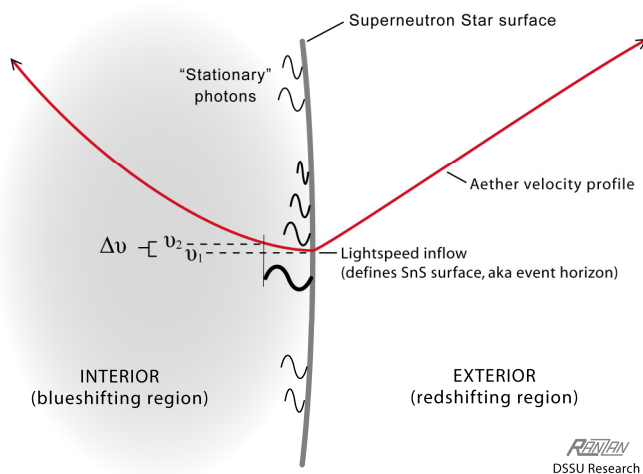

Fig. 4.　The slope of the aether flow graph tends to zero with nearness to the actual surface. (And so, slope k used in the equations in the text depends on the proximity to the surface.) **The drawing reveals:** (1) The longer the wavelength, the greater is the magnitude of the slope; that is, there is a bigger velocity difference between the photon's ends. (2) The slope diminishes as the wave contracts —as the photon is blueshifted. (3) The closer the photon is squeezed towards the surface, the nearer the slope tends to zero. This, in turn, means that the shorter the wavelength, the slower will be the energy amplification process (blueshifting) at the surface.

An obvious feature revealed in the drawing is that the shorter the wavelength, the slower will be any further shortening of the wave. Nevertheless, the redshifting process is relentless. As long as a photon is trapped within the underside of the surface, the photon's energy increases.

The energy amplification process depends on three factors: Slope, wavelength, and time.

- The more negative the slope, the faster the amplification proceeds.
- The longer the initial wavelength, the faster the amplification proceeds.

- The longer the time the photon is embedded, the greater will be the amplification.

With respect to the slope, the only thing we know for certain is that it is negative (in accordance with the argument given earlier). As for the "time" aspect, there is virtually no limit. A SnS has the unique property that it can never shrink and can never expand. It can exist for many billions of years.[12]

So, let us see what can happen to a "surface" electron that has been converted to its energy form as a 0.511 MeV-photon. If we assume an incredibly tiny slope, letting k equal -6.779×10^{-16} m/s per meter, then it would take a time of 1 billion years for the 0.511 MeV-photon to metamorphose into a 1.0 PeV-photon. It would require one billion years to undergo an amplification amounting to the difference in energy between a wavelength of 2.426×10^{-12} meter to a wavelength of 12.40×10^{-22} meter. (The shorter the wavelength, the higher is the energy.)

3.2.　Interior Photons Gain Energy

Wavelength contraction occurs in both directions of propagation —at least to the extent that a photon has some free path-length available to it.

A remarkable feature built into the Mechanism is that the direction of propagation does not matter! Free photons, within the neutron star, will gain energy —undergo wavelength contraction— regardless of direction of travel, inbound, outbound, even tangential.

The composition of a neutron star, in its most extreme density state, is described as a superfluid consisting of neutron-degenerate matter. The superfluid qualifier means this is a state of matter with no viscosity —a frictionless fluid. If the interior truly is a superfluid, then the neutron-degenerate matter, despite its extreme density, is essentially a neutron gas. In spite of the density, it would not be unreasonable to expect that a high-energy photon could propagate in this environment. Granted, constant interference would present a serious impediment. A somewhat comparable situation exists with our Sun; where photons are known to emerge from the very hot, very dense, core region; although it may take over 100,000 years to reach the surface.

It was shown earlier that photons gain energy when propagating in the outbound direction. And let me add, this gain is something quite contrary to what is expected under the conventional theory of gravity. Next, it remains to be shown that an interior photon propagating in the inward direction will also gain energy. The proof, which again makes use of the fact that the photon always travels at speed c with respect to the aether medium, simply shows that the photon's back end is moving faster than its front end. For an inwardly-directed photon (as shown in **Fig. 5**):
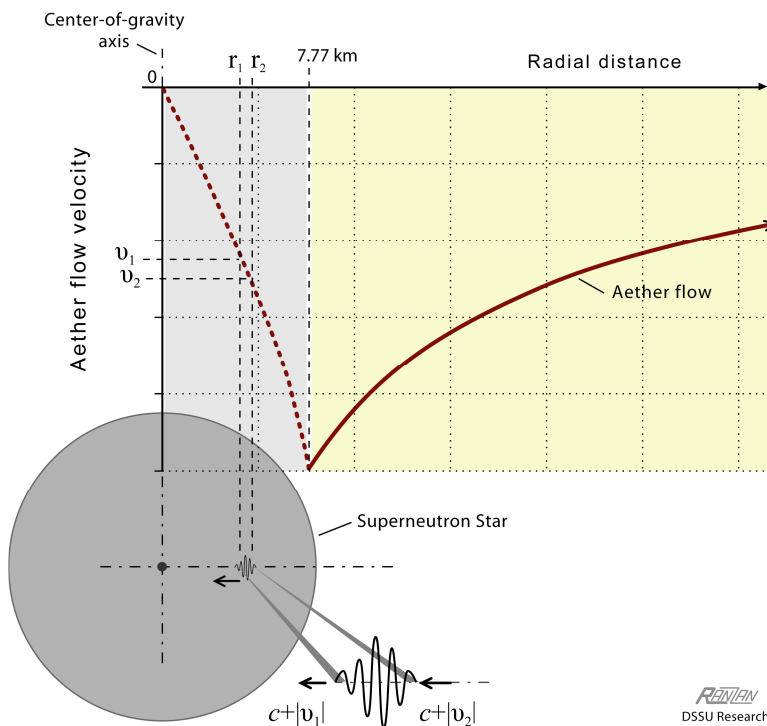
Fig. 5. Inbound photon gains energy. As shown schematically above and detailed in the text, the trailing end of the photon is moving faster than the leading end. The result is a wavelength contraction —a gain of energy. (A full analysis reveals that any free interior photon must gain energy regardless of its propagation direction.)

(Relative velocity between ends of photon)
$$= (vel\ of\ front\ end) - (vel\ of\ back\ end),$$

$$= \left[-(c + \upsilon_1) \right] - \left[-(c + \upsilon_2) \right], \quad (9)$$

$$= (-\upsilon_1 + \upsilon_2) < 0. \quad (10)$$

Two things to note: This time the photon is negatively directed, so we use minus signs for the "front end" and "back end" velocities in Eq. (9). And since υ_2 is more negative than υ_1, the expression in Eq. (10) must be negative —indicating a convergence of the two ends.

As long as the interior photon survives intact, and is not absorbed or transformed by some particle reaction (some reaction we can only imagine), it will gain energy. Its propagation will be highly erratic due to the density of the neutronium gas. Should it migrate to the SnS's subsurface, it would find itself trapped. It would then become a "stationary" photon.

4.   Ultra-Energy Neutrinos

"Described quantum-mechanically, the neutrino is apparently a superposition of two wave packets …" [3]

4.1.   Neutrino Overview

The basic nature of neutrinos is their lack of charge —they exhibit no external electromagnetic effects. Neutrinos are therefore able to propagate through mass virtually unopposed. Characteristically, neutrinos have no mass —assuming they actually do travel at light-speed. Given that *that* is the case, that they travel through vacuum at the speed of light, neutrinos, categorically, cannot possess mass.

The basic structure of the neutrino is a pair of helically intertwined photons, as shown in **Fig. 6**. Some describe it as "a superposition of two wave packets."   In order to preclude the manifestation of any external electric or magnetic effects, the two photons (or wave packets) must be 180 degrees out of phase and share a common frequency.

Superneutron Stars, like all astronomical bodies, are subjected to a prodigious flux of neutrinos streaming from all directions. When a neutrino encounters a SnS there are only three possible scenarios.

▪ One, it can react with the surface and become trapped therein. The surface layer may be so extremely dense that not even neutrinos are able to penetrate. Once embedded within the surface, the neutrino undergoes the same blueshifting process discussed earlier for photons.

▪ Two, it can pass into the interior and become subject to a high probability of reacting with a mass particle. Conceivably it may be captured by a mass particle such as a neutron or a lepton.

▪ Three, a neutron somehow manages to pass through all the mass and becomes trapped within the surface at some distance from its entry point. If the entry is perpendicular to the surface and the trajectory undergoes no deviation (which seems highly unlikely), then the neutrino would pass through the center and end up on the far side; its path would represent a diameter of the SnS.

Scenario three comes with a caveat. Because the SnS's surface acts in some ways just like a conventional *event horizon*, a neutrino approaching this surface from the interior can never actually reach it. The neutron can only approach it asymptotically.

Once the neutron reaches the ultra-dense subsurface zone, it is subjected to continuous energy amplification and becomes, for all intents and purposes, a "stationary" neutrino. And we already saw what happens to stationary radiation.

But the blueshifting (the energy-gain process) begins the instant the neutrino first passes into the interior. And it is this aspect that will now be examined in some detail, as we follow a neutrino whose path takes it along a diameter.
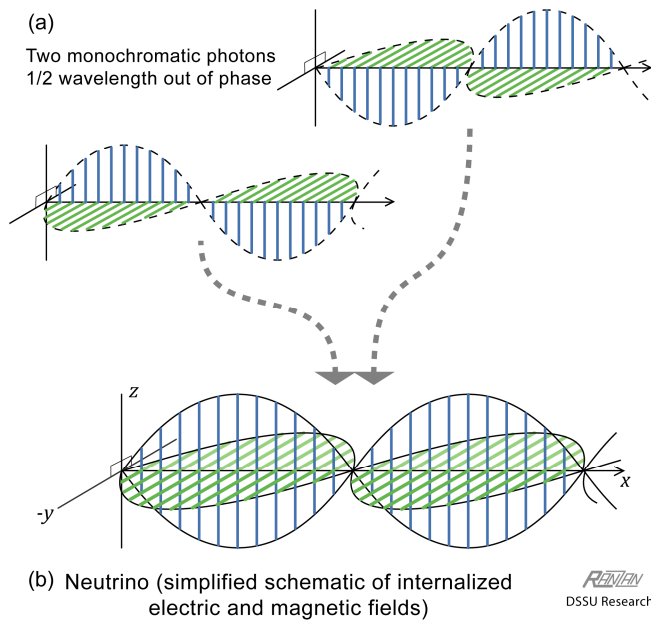
(a)

Two monochromatic photons
1/2 wavelength out of phase

z

x

$-y$

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

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Fig. 6. The neutrino is an energy particle consisting of two equal-wavelength intertwined photons that are 180° out of phase. The key property of neutrinos, the property that makes them so ghostly and undetectable, is the internal "cancellation" of the electromagnetic fields of the constituent photons. Essentially, there is a failure to produce any external fields (external electromagnetic effects). The result is a virtually invisible particle. In quantum mechanics, the neutrino is often referred to as a superposition of energy waves.

4.2. Energy Gain During Cross Transit

Just as with the photon discussed earlier, the relative velocity between the two ends of the radiation particle, the neutrino, is

$$\frac{d\lambda}{dt} = k\lambda, \tag{11}$$

where k is the fractional time-rate-of-change parameter and, for our purpose here, is simply a linear approximation of the aether-velocity curve interior to the SnS (**Fig. 7**).

If we integrate Eq. (11) as it stands, we would obtain the wavelength, as a function of time.

$$\int_{\lambda_{initial}}^{\lambda_{final}} \frac{d\lambda}{\lambda} = k \int dt. \tag{12}$$

But the time increment dt can also be expressed as a function of the neutrino's radial position.

And since we don't yet know how much time it will take to reach the SnS's center and beyond, it would be a good idea to replace dt with something equivalent in terms of the radius parameter.

The propagation time (using universal time and calculating distance with respect to Euclidean background space) is
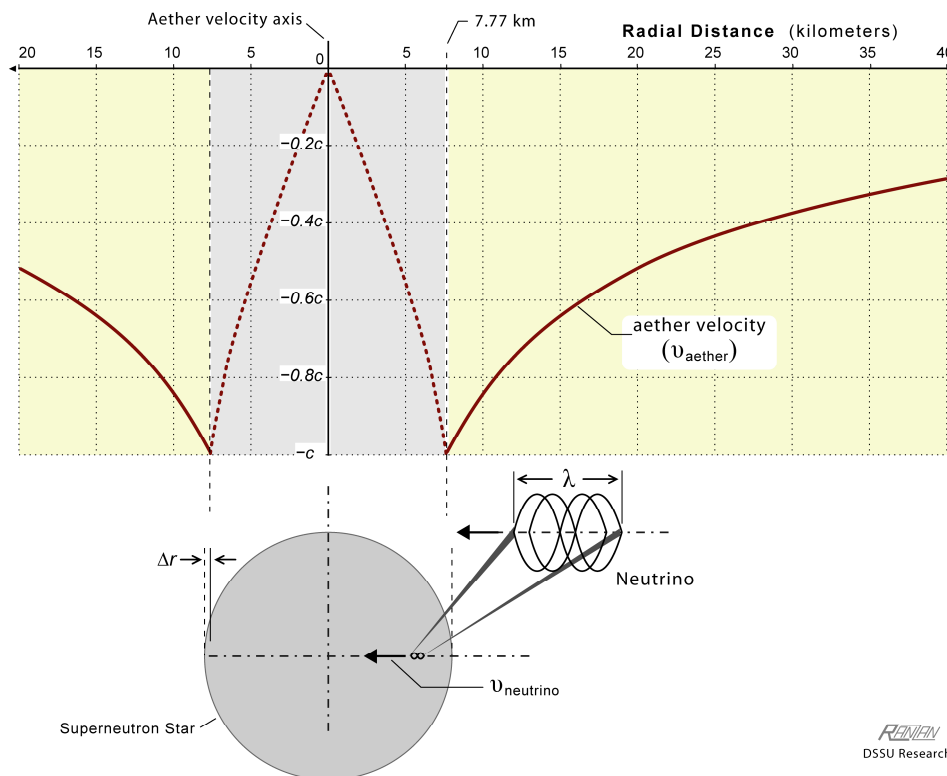
Aether velocity axis

7.77 km

Radial Distance (kilometers)

aether velocity
(v_{aether})

λ

Neutrino

Δr

∞

$v_{neutrino}$

Superneutron Star

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Fig. 7. Neutrino penetrating a Superneutron Star gains energy. During a neutrino's passage from one side of a neutron star to the other, its length λ undergoes considerable contraction. As detailed in the text, this contraction process (a manifestation of the *aether velocity-differential blueshift*) is responsible for the extraordinary energy-gain experienced by neutrinos. Remarkably, the analysis reveals that the energy gain occurs during both the descent and ascent portions of the transit.

$$dt = \frac{dr}{v_{\text{neutrino}}} . \tag{13}$$

(Note: v_{neutrino} is the neutrino's velocity with respect to background space.)

Now, the velocity of the neutrino is the sum of (i) the aether motion at r and (ii) the neutrino's motion with respect to aether and is presumed to have a magnitude of about light-speed, c. In equation form

$$v_{\text{neutrino}} = \left(v_{\text{aether}}(r) + v_{\text{n-wrt-aether}} \right);$$

$$v_{\text{neutrino}} = \left(v_{\text{aether}}(r) \mp c \right). \tag{14}$$

Note the signs. For the inbound portion of the transit the neutrino's intrinsic velocity (velocity with respect to aether) is in the inbound (negative) direction of the radius axis, hence we use $-c$. And for the outbound portion of the transit, which is in the positive direction of the radius axis, we use $+c$.

The aether-velocity function/term is given by the Figure-2 graph, and will be, here, approximated by a straight-line curve from the center point and out to the surface: $v_{\text{aether}}(r) = k \cdot r$. The slope k of that line is simply $(-c/R_S)$, but we won't need this until later.

The expression for dt applicable to the interior region then becomes

$$dt = \frac{dr}{k \cdot r \mp c}, \quad \text{where } 0 \leq r \leq R_S . \tag{15}$$

Back to the determination of the wavelength, this time making it a function of the *distance* traveled (from the point of entry through to the center PLUS from the center through to the opposite subsurface), Eq. (12) may now be expressed as:

$$\int_{\lambda_{\text{initial}}}^{\lambda_{\text{final}}} \frac{d\lambda}{\lambda} = k \int_{r_{\text{initial}}}^{0} \frac{dr}{k \cdot r - c} + k \int_{0}^{r_{\text{final}}} \frac{dr}{k \cdot r + c}; \tag{16}$$

$$\ln|\lambda_{\text{f}}| - \ln|\lambda_{\text{i}}| = \left(\ln|-c| - \ln|kr_{\text{i}} - c| \right) + \left(\ln|kr_{\text{f}} + c| - \ln|c| \right);$$

$$\ln\left| \frac{\lambda_{\text{f}}}{\lambda_{\text{i}}} \right| = \ln\left| \frac{-c}{kr_{\text{i}} - c} \right| + \ln\left| \frac{kr_{\text{f}} + c}{c} \right| = \ln\left| \frac{-c}{kr_{\text{i}} - c} \times \frac{kr_{\text{f}} + c}{c} \right|;$$

$$\frac{\lambda_{\text{f}}}{\lambda_{\text{i}}} = \left(\frac{-c}{kr_{\text{i}} - c} \right)\left(\frac{kr_{\text{f}} + c}{c} \right).$$

Next, we substitute $r_{\text{i}} = R_{\text{s}}$ and $r_{\text{f}} = (R_{\text{s}} - \Delta r)$; and for the slope, $k \approx -c/R_{\text{s}}$; and simplify.

$$\frac{\lambda_{\text{f}}}{\lambda_{\text{i}}} = \left(\frac{-c}{(-c/R_{\text{s}})R_{\text{s}} - c} \right)\left(\frac{(-c/R_{\text{s}})(R_{\text{s}} - \Delta r) + c}{c} \right);$$

$$\frac{\lambda_{\text{f}}}{\lambda_{\text{i}}} = \frac{1}{2} \times \frac{\Delta r}{R_{\text{s}}} . \tag{17}$$

In other words, the wavelength is reduced to one-half during the inbound trip; and that shortened length is further reduced down to a fraction, $\Delta r/R_{\text{s}}$; where Δr is a small interior distance from the surface and R_{s} is the radius of the SnS.

If we set Δr equal to 1.0 centimeter (or 0.01 meter) and the SnS radius equal to 7770 meters, then

$$\frac{\lambda_{\text{f}}}{\lambda_{\text{i}}} = \frac{\lambda_{\text{c}}}{\lambda_{\text{i}}}\frac{\lambda_{\text{f}}}{\lambda_{\text{c}}} = \frac{1}{2} \times \frac{0.01m}{7770m} = 6.4350 \times 10^{-7}; \tag{18}$$

where λ_{c} is the wavelength at midpoint of the journey, at the star's center.

This tells us that a neutrino's wavelength will be reduced to ½ of its original length during its descent journey to the center of the SnS, and *that* shortened neutrino is then further reduced to (1/777,000) of its length during the ascent. The total ratio of final to initial wavelengths is (1/1,554,000).

The overall **energy-gain factor** is 1,554,000.

Now for the corresponding blueshift: From the definition of spectral shift, $z = \frac{\lambda_{\text{final}} - \lambda_{\text{initial}}}{\lambda_{\text{initial}}} = \frac{\lambda_{\text{f}}}{\lambda_{\text{i}}} - 1$, the total blueshift is calculated to be:

$$z_{\text{total}} = \left(\frac{\lambda_{\text{f}}}{\lambda_{\text{i}}} - 1 \right) = \left(\frac{\lambda_{\text{f}}}{\lambda_{\text{c}}}\frac{\lambda_{\text{c}}}{\lambda_{\text{i}}} - 1 \right), \text{ where } \lambda_{\text{c}} \text{ is the wave-}$$

length at the midpoint of the trip;

$$z_{\text{total}} = \left(\frac{1}{2} \times \frac{0.01}{7770} - 1 \right) = 6.44 \times 10^{-7} - 1$$

$$= -0.999,999,356 . \tag{19}$$

For the inbound portion of the trip, the blueshift is

$$z_{\text{inbound}} = \left(\frac{\lambda_{\text{c}}}{\lambda_{\text{i}}} - 1 \right) = \left(\frac{1}{2} - 1 \right) = -0.50 . \tag{20}$$

In terms of energy, halving the wavelength effectively doubles the energy of the neutrino. This is because of the fundamental relationship $E = fh = (c/\lambda)h$; which makes it clear that when the wavelength is reduced by one-half, the energy of the wave-packet is doubled.

For the *outbound* portion of the trip, the blueshift is

$$z_{\text{outbound}} = \left(\frac{\lambda_{\text{f}}}{\lambda_{\text{c}}} - 1 \right) = \left(\frac{0.01}{7770} - 1 \right) = -0.999,9987 . \tag{21}$$

This represents a ¾ million-fold gain in energy. That is, when wavelength is reduced to a fraction of its prior length, by the calculated fraction (1/777,000), then, according to the relationship $E = (c/\lambda)h$, the energy increases by a factor of 777,000.

Here is a quick check on the blueshift calculations:

$z_{\text{total}} + 1 = (z_{\text{inbound}} + 1)(z_{\text{outbound}} + 1)$;

$$z_{\text{total}} + 1 = (-0.5 + 1)(-0.999,9987 + 1) = 6.44 \times 10^{-7};$$

$$z_{\text{total}} = 6.44 \times 10^{-7} - 1 = -0.999,999,356;$$

which agrees with Eq. (19).

What about the time … how long does all this take? During the inbound journey when the neutrino propagation and the aether flow are in the same direction, the trip would obviously take only a very small fraction of a second. Besides, the distance to the center is a mere 7.77 kilometers. The calculated propagation time (cosmic time) is only about 0.018 milliseconds for the inward trip. During the outbound journey, however, the neutrino must propagate in an upstream direction, against the aether flow. It takes considerably longer, about 20 times longer. (And as already noted, it never actual reaches the surface). The calculated propagation time for the outward trip (to go up from the center) to within 1.0 centimeter of the surface is 0.35 milliseconds. However, keep in mind the unrealistic assumption in this exercise.

The main point is that neutrinos, if able to travel unhindered, undergo enormous amounts of energy gain during passage through the interior of neutron stars. During the time it takes a neutrino to span a SnS (0.368 milliseconds), it may gain 1.5 million times as much energy as it had when it started. This makes the SnS a potentially powerful energy amplifier indeed. But bear in mind what is being assumed; it is surmised that neutrino propagation is, for the most part, unimpeded. However, we really do not know how efficiently neutrinos can propagation within these ultra-dense bodies.

Once a neutrino climbs up the gravity gradient and reaches the subsurface layer, it is trapped —trapped just below the surface layer of gamma photons. There, the energy-gain process continues. There, ultra-energy particles are stored until they partake in Nature's most extraordinary energy release mechanism.

Recapping the possible sequence of events following a neutrino-SnS encounter: If an incoming neutrino is trapped within the SnS surface, it will gain energy. It will do so, for as long as it remains there. If the neutrino penetrates deeper, becomes captured and re-emitted, it will gain energy. And if it should pass through the ultra-dense mass, the neutron will become trapped in the subsurface on the other side or some random location —where it will continue to gain energy. In all cases, the process responsible is the *velocity-differential blueshifting* of the particle's wavelength.

5. How Nature Ejects Energy from Superneutron Stars

"**The traditional wisdom that nothing can escape a black hole is too simplistic.**" [Bold in original]
–Physicist Juan Maldacena, Scientific American 2016 Nov

The density of the pure-energy layer is the ultimate density that Nature has to offer. No process of any kind, whatsoever, rivals the potency and intensity of that which takes place within a SnS's surface layer.

The extraordinary energy density produces a powerful lateral pressure. But as it stands, under the circumstances so far described, all this ultra-energy is trapped —laterally and radially. The energy is trapped laterally because the SnS structure is spherically symmetrical. The energy is trapped radially by the fact that the surface acts just like an event horizon as is characteristic of hypothetical *black holes* —virtually nothing escapes. Aether flows inward at lightspeed; simultaneously, energy particles struggle outward with the same lightspeed. The velocities cancel each other; the particles remain "stationary." The surface photons and neutrinos seem to be permanently ensnared. And in the absence of rotation and the magnetic field that invariably accompanies rotation, such would be the case. The energy would be trapped, have no way to escape, end of story.

5.1. Escape Portals

It turns out, despite the existence of a one-way lightspeed barrier, there are two portals to the external world.

For the explanation we need to back up a bit. Consider a neutron star before it becomes critically massive, that is, before it reaches the state at which it acquires the "event horizon" barrier.

A neutron star, in simple terms, is a mass of neutrons. Individual neutrons, in addition to possessing the obvious property of mass, also have an internal electric field. And, and this is important, they possess the property of spin. Spin is an internalized form of rotation. But what is even more important is the property produced from their combined action, from the combination of electric field and spin. The neutron's internal electric field is subjected to the spin motion (the neutron's intrinsic angular momentum) —the result, according to established physics, is an external magnetic field.

> *"The neutron possesses an intrinsic angular momentum and a magnetic moment —i.e., it behaves like a minute magnet in ways that suggest that is an entity of moving electric charges."*
> –Encyclopædia Britannica (15th ed. vol.8)

Although neutrons display no external electric field, they do display a magnetic field. Each neutron behaves as a miniature magnetic dipole. There is spin and an internal electric
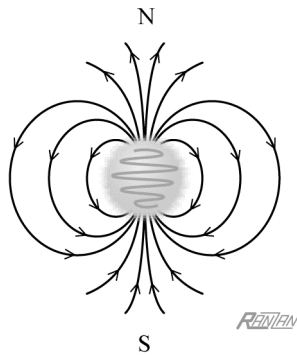
Fig. 8. Schematic of a neutron and its external magnetic field. The combination of an internalized electric charge and a spin-like motion produces the neutron's magnetic field. The particle acts like a miniature dipole magnet with N and S poles.

field; and, whenever you have a spinning electric field, the result is a dipole pattern of magnetic lines of force (**Fig. 8**). And it is these energy manifesting lines that are essential to the functionality of the ensuing escape mechanism.

It is an established fact that when magnetic dipoles are close enough to "sense" each other's fields and free to rotate to any orientation, they will align themselves parallel to some common magnetic axis. Under normal conditions neutrons are too far apart for their dipoles to effect a coherent alignment. Neutrons when locked within atomic structures have randomly oriented dipoles. The neutrons in the nucleus of one atom do not align with the neutrons of a neighboring atom —the distance is too great and the intervening field of the electron clouds is too strong.

However, when neutrons are part of a collective degenerate state, they are in a super-dense superfluid environment. The neutrons are then in close contact, extremely close contact, with no disruptive electric fields; and under these conditions they are free to synchronize their orientation. And that is exactly what they do. The neutrons, for whatever reason, tend to favor an orientation that approximates the alignment of the axis of rotation of the structure in which they find themselves. (If the axis of rotation subsequently changes, say as the result of a collision, the alignment of the magnetic field need not necessarily maintain correspondence with the new rotation axis. In other words, a stellar neutron structure can have more than one axis of rotation; it can wobble.)

A neutron star is a dense aggregation of neutrons in the degenerate state. The aggregation includes protons that have had their positive charge suppressed and have been transformed into neutrons; that is to say, the protons were forced, due to the enormous pressure, to combine with electrons and become neutrons, indistinguishable from all the other neutrons. Taking advantage of the negligible viscosity of the superfluid state, the neutrons' tiny magnetic dipoles align themselves. The end result is a neutron star with a powerful magnetic field. The magnetic field extends beyond the main structure, which I should point out, is understood to be a

basic neutron star and does not yet have a one-directional barrier. And the structure's rotation, invariably present to a lesser or greater degree, causes collimation of the field's lines of force.

Our neutron star now has a collimated magnetic field, but as yet it does not have a one-directional barrier. For that, it will need more mass. Before adding the mass that will impose surface criticality, we need to understand a key property of the magnetic field.

The next important element in the "escape" explanation centers on the fact that a magnetic field has energy. A simple rule is that the more crowded together the lines of magnetic force are, the more energy there is. That is, the denser the force lines are packed in a specific region, the greater is the energy within that region. Obviously then, the energy is greatest in the region of the magnetic poles —the region where the force lines funnel together. Moreover, the line density is exacerbated by rotation of the structure. This outwardly-extending energy concentration is of vital importance during the final-collapse moments when the aether inflow rises to the critical velocity and a no-escape horizon blankets the neutron star's surface.

The question is *How does the magnetic field affect the aether inflow?* Or more specifically, *How does the energy of the collimated portion affect the aether flow?* Recall from earlier discussion, aether flows into mass and various forms of energy and specifically magnetic fields. According to DSSU theory, energy, at the most fundamental level, is a process involving aether. The energy process, in general, always entails a localized quantitative change in aether units/entities. And this change is always, with but one exception, a quantitative reduction, either by excitation-annihilation or by self-dissipation, of the units of the space medium (defined as a nonmaterial aether).

Mass is a form of energy; an excitation-annihilation of aether —there is a reduction of aether as the aether comes into contact with mass. This also applies to particles of radiation.

A gravitational field is a form of energy; a self-dissipation of aether —there is, again, a reduction of aether. The reduction amplifies the intensity of the primary gravity effect.[14]

Electric and magnetic fields are forms of energy and they too excite and annihilate aether.

When aether flows into a non-radiating mass body, there are only two manifestations of energy that influence the aether flow. One is the gravitational field, which must always be present —otherwise there would be no gravity. The other is the magnetic field. The gravity field is, for the most part, spherically symmetrical; the dissipation of aether occurs in accordance with this spherical symmetry. The gravity itself (that is, the internal or external gravity of the structure) does not cause holes to form, nor sustain holes, in connection with a no-escape horizon. The magnetic field, however, does.

Let me explain the effect that the polar lines of force have on the aether flow by turning to a simple thought experiment. Imagine a tall stone column standing on the surface of a basic neutron star (**Fig. 9a**). Pretend that it is not immediately crushed by the intense gravity —intense enough to crush it to a uniform thickness spread over the star's entire ball-bearing smooth surface.

Next, take into account two simple and relevant facts about aether flow. We already know these, but here they are again: As aether flows towards the neutron star, *it speeds up* (it accelerates). The closer to the neutron structure one chooses to "measure" the speed, the greater the speed will be. And when aether penetrates the surface and flows through the mass, *it slows down* (it decelerates). This, of course, is true not just for neutron stars but for any gravitating body.

The normal state of affairs is that the maximum aether speed is attained when the aether reaches the surface —and below the surface its speed will decrease. But with our thought-experiment column the maximum speed occurs at the top of the column —and what is most important is that this speed is *less* than the surface speed experienced elsewhere. The aether enters the top of the column and immediately begins slowing down as some of it is absorbed by the column's mass.

For the final step in the thought experiment, we make the velocity critical, so that the body's surface is transformed into a critical-state boundary. But the aether velocity magnitude at the top of the column is always less than it is at the surrounding surface. Thus, if the surface aether races in at lightspeed, the speed at the top of the column must be less than lightspeed —and also less than lightspeed through the base of the column. What we have, then, is a neutron star with an imperfect lightspeed boundary —a lightspeed boundary with a hole.

In the real world, a column consisting of magnetic lines of force behaves in much the same way (**Fig. 9b**).

When mass accretion becomes great enough, the surface speed reaches the speed of light —but not within the polar magnetic columns, the aether absorbing-annihilating bundles of energy. What we end up with is a Superneutron Star with a hole to the outside world at each magnetic pole. The magnetic-lines-of-force column (**Fig. 9c**) serves as a conduit for escaping energy particles.

Thus, the gamma photons and ultra-energy neutrinos —crowded into the surface layer— have a way out. The
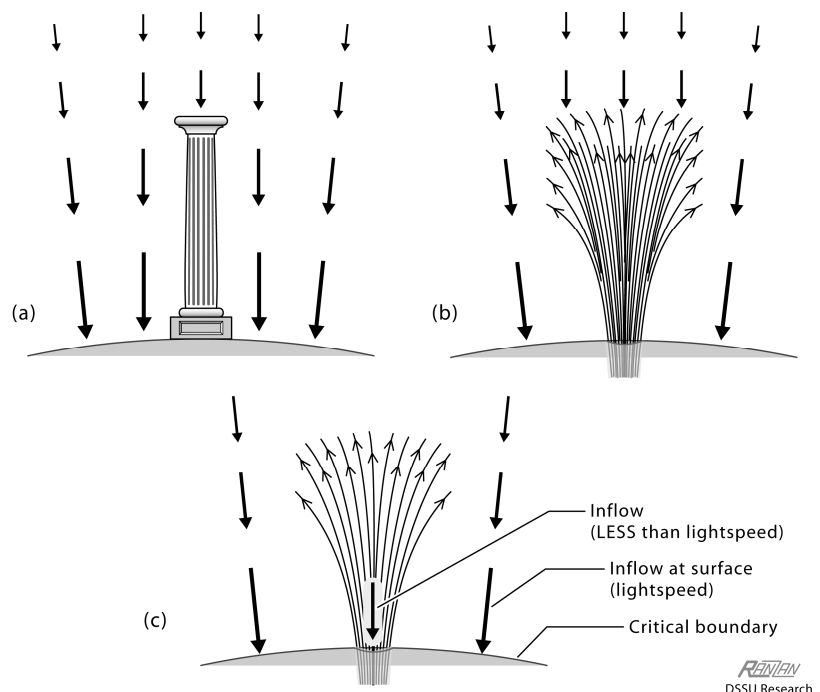

Fig. 9. Aether flowing through the columns undergoes a retardation of its speed. In (a), it is the mass of the column that consumes/annihilates some of the aether passing through its length. In (b), it is the energy of the magnetic lines of force that consumes/annihilates some of the aether passing through. The result: aether that has flowed through a column will have a lesser speed than that of the aether penetrating the surrounding surface. Part (c): When mass accretion becomes great enough, the surface speed reaches the speed of light —but not within the region of the aether absorbing-annihilating column. The magnetic-lines-of-force column acts as a hole in the critical boundary.

holes in the no-escape horizon serve as wellsprings of ultra-energy.

These elements, acting together, comprise the emission-beam engine —the engine that drives what are known as *astrophysical jets*.

5.2. *Energy Emission Mechanism*

The energy layer just underneath the lightspeed boundary contains Nature's most energetic electromagnetic waves and neutrinos. The layer holds Nature's densest state of radiation per unit area. It is a domain absolutely saturated with energy waves —a domain totally inaccessible to investigation from the outside world, so that the enormous density can only be imagined. And here is where the lateral pressure comes into play. The gamma particles, along with the neutrinos, are pushed toward the edges of the polar portals, as shown in **Fig. 10**. 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.
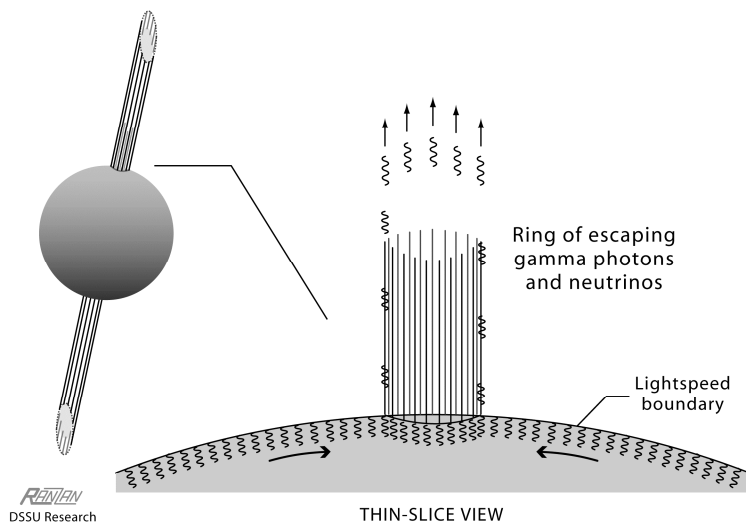
Fig. 10. Escape mechanism of gamma photons and neutrinos. The magnetic field (whose lines of force are not shown) is the origin of the openings in the lightspeed boundary. The channels are maintained in the "open" state by the collimated magnetic field and the high-energy particle beam, both of which 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 gamma and neutrino particles toward the edge of the polar portals 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 helically twisted, but is not shown in this schematic.)

Anything that disturbs the star's surface, disturbances associated with infalling objects —things like comets, gaseous material ripped from an accretion disk or from some orbiting body— will cause considerable variation in the outgoing radiation. The primary radiation particles are the gamma photons and ultra-energy neutrinos. 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.

The energy of the beams (and the jets of matter they drive) is heavily dependent on the intensity of the magnetic field. (This is yet another reason why the magnetic field is so important. Previously it was explained how the magnetic field is the origin of the openings in the lightspeed barrier and how, thereafter, they help to maintain them.) The more intense the magnetic field is, the greater will be the absorption/consumption of aether (in the polar lines-of-force "column"), and the more effective will be the slowing of the aether inflow speed. This is important because it reduces the intensity of the gravity within the shaft of the escape columns. As the gamma and neutrino particles climb out of the SnS's gravity well they lose energy (a simple case of gravitational redshifting). So, the slower the aether inflow speed,

the easier it is for them to escape; and the easier it is for them to retain more of their launch energy.

In other words, the slower the speed of the inflowing space medium (at the portals), the more energetic will be the escaping particles. And the intensity of the magnetic field is the determining factor. As mentioned earlier, rotation tends to twist the magnetic fields into a tight spiral thereby increasing the number (the density) of force-field lines that are present within the escape shaft. Thus, the rate of spin of the SnS also plays a role. The higher the spin rate, the greater is the energy of the emission beams.

On the other hand, if conditions are unfavorable, if the above factors do not adequately attenuate the aether inflow speed, then the gamma photons will lose most of their energy in the struggle to escape the gravity well. The primary gamma radiation will undergo a more drastic reduction of it wavelength. Depending on the extent of the loss, the primary radiation could be progressively weakened to the point where it becomes detectable as x-rays, ultraviolet light, visible light, infrared waves, microwaves, or even radio waves. This covers a wide range of the electromagnetic spectrum; all have been observed in association with the emission jets from neutron stars.[A] Neutrinos are similarly affected, but their detection is notoriously difficult.

As for the generation of secondary emission, there is a vast amount of dust and gas present in the interstellar medium and the accretion-disk environment. This material is usually in a hot and ionized state and is, therefore, readily channeled by the magnetic field towards the magnetic poles. It tends to follow the field lines and, in doing so, must pass through the curtain of outward bound gamma radiation. When high-energy photons strike electrons in the presence of a magnetic field, there is a high probability of positron-and-electron pair creation. All these conditions exist along the beams proximate to the superneutron body. And when there is a generous supply of dust and gas, interactions will occur in abundance resulting in powerful jets of positron-electron plasma.

Any charged particles, created within the primary beams or merely drawn into them, will be accelerated by the magnetic field and become part of the combined emission beam and particle jet. Positively and negatively charged particles, such as positrons and electrons, when accelerated, are known to produce x-rays. So it is not surprising to learn that x-rays are commonly detected in the vicinity of the jets.

Returning to the primary radiation, gamma particles also function as a source of momentum, adding significant kinetic energy to any mass particles found along the path of the jets.

[A] Wikipedia: *Neutron star*. https://en.wikipedia.org/wiki/Neutron_star (accessed 2016-7-5)

(Einstein, long ago, discovered that photons carry transferrable momentum.) The gamma photons transfer momentum to the dust, gas, and plasma, impacting and propelling such matter to significant speed and great distance. Jet speed, evidently, can attain a good fraction of the speed of light; and the length of stellar jets can reach several thousands of lightyears.[B]

6. Implications and Conclusions

6.1. The Profound Difference: Direct Versus Indirect Energy Extraction

Let me emphasize the momentous feature of this mechanism. The primary source of the energy comes *directly* from inside a totally collapsed mass structure. (It does not come from the energy of the magnetic field; and it does not come from the energy of the rotation.) The gamma photons and neutrinos come from inside the structure —from the reservoir of these particles present *in the structure's surface*. This is revolutionary. Our simple mechanism drives the jets that have baffled physicists for many decades, the jets they associate with their flawed concepts of stellar black holes, the jets for which they have no satisfactory explanation.

Needless to say, this mechanism's powerful energy source —the combination of intense magnetic field and gamma rays— is completely unrecognized, totally outside the conventional thinking, entirely incompatible with Schwarzschild black-hole theory.

Without an awareness of the nuts-and-bolts operation, it has proven to be extremely difficult to make sense of a wide assortment of observations in connection with extreme neutron stars. Imagine trying to make sense of the broad range of wavelengths found in the emissions and the sporadic nature (the sudden bursts) of the emissions, without having some knowledge of how certain neutron stars generate and emit energy. Consider, for example, the long-standing "problem of gamma ray bursts, the mysterious flashes of high-energy radiation"; they were first detected in the 1970s and periodically pop off in the sky for reasons no one yet understands. The presumption was (and remains) that they came from some sort of violent process involving matter crashing down onto the surface of a superdense neutron star.[15] But why would the impact of matter generate gamma beams? What is known is that the gamma bursts were coming from all directions; they were cosmological. The experts are familiar with these effects and possess abundant astronomical measurements, but are baffled by underlying causes.

Having the primary source of the energy coming directly from inside a totally collapsed mass structure makes the DSSU Mechanism radically different from the conventional thinking. Conventional theories invoke external factors. They fall into two categories (first two rows in **Table I**).

In one, the energy is extracted from *external* magnetic fields —generated by the rotation of an accretion disk diffused with charged particles. An example is the *Blandford–Znajek process*.[16] Two major weaknesses: the extraction method cannot explain the presence of jets for objects that have no accreting mass; and cannot explain the truly extreme energy, the ultra-energy.

In the other, the energy is extracted from the rotation of the collapsed body itself. The logic here is that the angular momentum (the energy of the rotation) of the black hole's mass is conveyed to the external world by way of *frame dragging*. Then the external environment responds by somehow producing jets. But if the mass exists as a singularity, then the logic fails. The problem is that no one has ever figured out how a point mass, for which the radius equals zero, can possess rotational momentum. Nevertheless, not surpris-

Table I.   There are only three categories available for explaining the energy source for the jets associated with critically-collapsed stars (commonly called *stellar black holes*): Energy derived from an external magnetic field (by way of an accretion disk); Energy derived from the external effects of rotation; Energy derived directly from the collapsed structure (from its very interior). Note, DSSU theory offers the first and only method for powering jets that does not require rotation or an accretion disk.

Explanatory Theory	Source of Energy	Mechanism
Conventional view requiring an ACCRETION DISK:	Magnetic fields associated with the dynamics of an accretion disk surrounding a stellar black hole.	Various complex relativistic and electromagnetic effects involving the rotating disk and its charged particles. Example: *Blandford–Znajek process*. Problem: fails to explain the jets of disk-free objects.
Conventional view requiring significant ROTATION:	Energy is derived from the rotation of a black hole. This would have to be the energy of the mass's angular momentum. The rotation causes frame dragging, which then somehow causes jets.	The frame dragging is caused by the rotation of the singular mass; but there is no plausible explanation of how a singularity —a point mass of zero dimensions— can possess angular momentum or rotational kinetic energy! Example: *Penrose mechanism*.
Superneutron Star (DSSU theory):	Processes WITHIN the Superneutron Star; inside the "event horizon."	Generation mechanism: **Velocity differential blueshift** acting on photons and neutrinos. Escape mechanism: Via bipolar magnetic portals.

[B] Wikipedia: *Astrophysical jet*.
https://en.wikipedia.org/wiki/Astrophysical_jet (accessed 2018-2-25)

ingly, mathematicians do find ways. The *Penrose process*[17] is a prime example. Needless to say, it fails in the absence of rotation. (And, as we will see in a moment, stellar jets do exist when there is negligible spin!)

The main point is that under both categories, all radiant energy is generated in the *external* environment.

With the SnS we have the first mechanism ever devised that does not depend directly on the presence of rotation or an accretion disk —it does not even depend on the acquisition of additional mass.

6.2. *Interpretations, Infinity Capitulation, Infinity Circumvention*

Although I do not wish to belabor the well-known "Crisis in Physics" (per Scientific American cover story of May 2014), I believe much can be gained by pointing out some contentious issues as they relate to energy and mass and their interconversion.

(1) Critically important to the DSSU paradigm is the hypothesis of a fundamental process of energy and the existence of only one fundamental-energy particle. Conventional physics has nothing comparable. More on these in a moment.

(2) The equations of relativity are very much subject to interpretation. For example, Einstein and many relativists interpret the momentum and kinetic energy equations to mean there is an actual increase in inertial mass with increase in speed; while others, including the author, take the more realistic view that the equations are representative of the external energy required to accelerate the particle/body to attain such speed. It makes much more sense to say that no vast amount of energy could propel a particle/body to lightspeed, than it is to say that its mass approaches infinity as its speed approaches lightspeed!

(3) To repeat, the equations of relativity are subject to interpretation. The young Einstein chose to permit mass to increase with speed. (The mature Einstein, according to a private 1948 letter, decided it is best to keep mass constant.) Others have chosen the opposite, arguing that mass *decreases* with speed.[4] The DSSU model is compelled to accept the mass-decrease-with-speed interpretation —simply because of its key postulate governing energy and mass particles. In other words, the Model not only requires that the property we call mass decreases with increased speed but also predicts this.

(4) Two fundamental equations of special relativity (equations of total energy and momentum) clearly support the claim that when a material particle is compelled to travel at lightspeed its mass goes to zero.[18]

(5) Interpretation of the basic energy equation. Some hold the view that mass and energy are radically different, "completely different physical quantities." Citing the lack of compelling experimental evidence of the conversion of mass to energy (and vice versa) they interpret $E = mc^2$ as a simple proportionality relationship between mass and energy, and not as an equivalence of the two. Ling Jun Wang gives extensive arguments to support this view in his article *A critique on Einstein's mass-energy relationship and Heisenberg's uncertainty principle*.[19]

(6) Since conventional physics lacks a unifying theory for mass and energy particles, it is not surprising that L. Wang would consider the difference between mass and energy so enormous that he outright denies interconvertibility. He considers experiments showing particle-antiparticle pair creation and annihilation as being insufficiently convincing, and so maintains mass cannot be converted to energy; and instead, champions a strict interpretation of the original separate laws of conservation of mass and of conservation of energy —with priority over interpretation of the relativity equations.

(7) However, a strict adherence to the separate conservation laws will not work either. The redshift phenomenon of light is a loss of energy —a clear violation. No one, who insists on a narrow interpretation, knows where the energy goes. The blueshifting of light, such as occurs in the energy amplification process detailed in Section 3, is a gain of energy —an even more blatant violation of energy conservation. (Since no one disputes the reality of energy changes associated with spectral shifts, then obviously there is something more fundamental going on.)

(8) The biggest shortcoming in physics undoubtedly is the failure to draw distinctions among the three types of fundamental motions: Motion *through* aether, motion *with* aether, and ordinary *relative* motion. They require different interpretations of equations; and may lead to radically different results. A dramatic and generally unrecognized example is the total cancellation of the centrifugal effect. Without recognizing the difference between motion through aether and with aether, significant astronomical rotation cannot be understood (hence the invention of dark matter). Another example is the difference between apparent and intrinsic radiation energy. The wrong interpretation here has trapped proponents of the Sachs-Wolf effect—an hypothetical process that has recently been disproved.[20] What had long thought to be an energy gain of photons during segments of their cosmic journey was actually an intrinsic energy loss!

(9) Space medium. Conventional Physics essentially confines itself to a mass and energy level of existence. At the bottom, is the quantum level of existence inhabited by photons, neutrinos, and quarks; all embedded in an energy-possessing spacetime (with some ambiguously defined properties). The DSSU paradigm is not so confined. It extends the domain of reality and exploits a subquantum level of existence —a clearly-defined space-permeating medium. In its static state, it possesses no energy. The "no energy" feature of aether simply follows from its subquantum state of existence. This medium makes possible TWO unifying principles.

(10)   The principle that unifies mass, energy, and aether. The very existence of mass particles; the very existence of energy particles; whatever the state of motion of those mass particles (or bodies); whatever the state of motion of those energy particles (photons and neutrinos); they all involve *the excitation and subsequent vanishment of aether units* (the fundamental fluctuators that comprise the subquantum mechanical aether). This is the fundamental unifying process that underlies all mass and all intrinsic energy manifestations. (This principle, with slight augmentation, also encompasses the energy of convergent gravity and divergent gravity.)

(11)   And here is the final link: The principle that unifies mass and energy. *All mass particles are spatially confined photons*; that is, *all mass particles are configurations of one or more self-looping electromagnetic particles*. It is this revolutionary postulate that precludes the absurd notion of mass becoming infinite at lightspeed; rather, it allows —and under certain conditions *requires*— mass particles to transform into their pure photonic (energy) state. All that is necessary is for the mass particle to acquire lightspeed motion through aether. And as described in Section 3, there is only one environment where this occurs. Just one and no other. Sadly, this scenario is unrecognized among physicists whose lack of awareness of the Mechanism is a contributing factor in the Physics Crisis.

A corollary to the principle is that mass is an intrinsic property (observer independent) of a particle/object, and depending on the aether referenced speed, its value may vary between the *rest mass* and zero.   (While, as pointed out earlier, under the relativity-theory interpretation, mass is not an intrinsic property but can vary from rest-mass value to infinity.)

(12)   Evidence? There is reasonable evidence to be had: For the particle-antiparticle conversion to energy and vice versa, look to the abundant lab experiments. For the conversion via the SnS mechanism, look to the astrophysical jets and the ultra-energy neutron emissions. There really is no other mechanism —proven or theoretical or conceptual— capable of the energy levels involved here. No collision, no interaction, no nuclear process, has ever been proposed as a serious explanation for such mind-boggling levels of energy.

(13)   Unique environment. Once it is established that mass is a configuration of self-looping energy particles, then all one needs is the appropriate conditions or environment where the conversion can take place. The environment, essential as it is unique, is not a part of the physics used by experts such as Ling Jun Wang. The conversion requires the total gravitational collapse of a star; the conversion takes place on the "surface" during the process of the stars end-stage collapse. This collapse comes to an end —and the "surface" transformation from the mass-state into the energy-state reaches completion— the very instant the star attains the Superneutron Star state-of-contraction. This is the end state of all sufficiently massive stars.

However, under the strict interpretation of Relativity, under an unrealistic extrapolation of its equations, under an interpretation that Einstein himself refused to accept, total gravitational collapse means a descent through the Schwarzschild sphere and ends with something called a black hole. The question of energy-and-mass conversion fades to irrelevancy. The problem is the singularity —the mass or mass-equivalence at the black hole's center. The problem is another theory-devastating infinity —and another contribution to the Crisis.

Now it is time to choose.

With these various conflicting interpretations available, with wildly differing outcomes, some with unrealistic conclusions, it becomes exceedingly important to choose the right set of assumptions —the "right theory" so to speak. The wisest course of action towards resolving the Crisis in Physics —including resolving the issue of energy-and-mass conversion— would be to adopt the most probable theoretical framework with the most favorable outcome.

Here are the relevant options:

The primacy of processes versus the primacy of mathematics.

Inclusion of a subquantum level of existence versus exclusively particles and fields.

A unifying principle for mass and energy versus categorical distinction. To my mind, reverting to the concept that mass and energy are fundamentally distinct, divided by some impassable barrier, as proposed by L. Wang, represents a step backwards along the path leading to a comprehensive theory of Nature —a theory of everything.

Two mechanisms for mass-to-energy conversion versus only one mechanism (the 100% conversion involving particle and antiparticle).

A well-understood mechanism of redshifting and blueshifting versus the *mystery of the photon's lost energy* (pertaining to the cosmic redshift).

Infinity circumvention versus infinity capitulation. DSSU theory is free of infinities; while the conventional view is plagued by the infinity of relativistic mass, the infinity (or near-infinity) of vacuum energy, and the infinity of total gravitational collapse (infinitely dense mass within an infinitely small space).

Ontology versus phenomenology. So, which paradigm is true —is valid over a broader domain? And which one is not true or only partially true —and has been applied beyond its legitimate domain? No one would deny: A theory that explains more and lacks infinities is superior to a narrower theory burdened by red-flag infinities. Which paradigm explains, which merely describes? … Lastly, which is a font of truth with the power to reveal yet deeper truths?

6.3. *Revolutionary Astrophysics*

The mechanisms described in the earlier sections compellingly resolve several long-standing problems in astrophysics and cosmology.

Taken together the mechanisms provide a new understanding of stellar-type black holes —not as singular "points" of infinitely dense mass, but rather as neutron stars (having maximal density and maximal mass content for a contiguous body) with a surface of pure energy. They also give us a new understanding of the "event horizon" concept —not exclusively as a "barrier" in space, but rather as an actual surface of pure energy, the energy of photons and neutrinos.

The event-horizon surface limits the dimensional size of a contiguous mass in the collapsed state, thereby providing for a compelling interpretation of how Nature implements Albert Einstein's prescient assessment. The new picture gives credence to his well-known opposition to unlimited astro-implosions. In 1939 Einstein published a paper in which he showed, using arguments based on special relativity, that matter could not be so condensed, or compressed, that the Schwarzschild radius would fall outside the gravitating body and thus become a reality.[21] In other words, a mass, he asserted, could never collapse to the extent that it would actually end up somewhere in the interior of its Schwarzschild sphere. *A contiguous gravitating mass could never collapse to actually end up somewhere inside its surrounding event horizon*. Einstein strongly believed some yet-to-be-discovered mechanism would prevent such an occurrence.

The influential Sir Arthur Eddington (1882-1944) shared Einstein's view, believing that some unknown mechanism prevents the continuing collapse of matter. In Eddington's words, "I think that there should be a law of nature to prevent the star from behaving in this absurd way." Eddington had recognized the preposterousness of what some leading scientists (such as J. R. Oppenheimer) were proposing and wanted a law of nature forbidding such nonsense. If not a law, then at least something that might intervene and prevent unrestricted implosions would have sufficed.[22]

Turning to the escape mechanism. It is revolutionary astrophysics that resolves the long standing mystery of what drives the astrophysical jets, of what powers the relativistic ejecta, of what gives the matter its collimated intensity, of what makes the emission so inexhaustible. Something is generating energy by a process of unparalleled profligacy and by a mode never before conceived. This profoundly changes our understanding of the strangest objects of the universe. The presentation of the escape mechanism has revealed the secret of how particulate energy circumvents the lightspeed barrier and how it is able to escape to the external world. This is indeed revolutionary astrophysics.

Resolving the problem of pulsar IGR J11014-6103: No conventional theory —not even a hypothesis— exists for one class of objects. Mainstream astrophysics has no explanation for emission beams, or jets, emanating from end-state collapsed stars (popularly called black holes) having negligible rotation and no accretion! With the near absence of spin, theories based on the extraction of energy from rotation fail. With the absence of surrounding mass, theories based on the extraction of energy from gravitational potential energy of infalling mass fail. With the absence of intrinsic magnetic fields, *as must be the case for conventional black holes*, theories based on the extraction of energy via magneto-dynamic processes must also fail. A Schwarzschild black hole is forbidden from possessing an intrinsic magnetic field, therefore, rotational energy cannot be withdrawn by some magneto-hydrodynamic mechanism and used to drive the external jets. This class of objects (possessing jets with no apparent driving force) is so inexplicable —as it simply does not fit their conception of black holes— that theorists are forced to group such objects with neutron stars.

The Milky Way Galaxy is home to a pulsar known as IGR J11014-6103 (a 2012 photo can be found at http://chandra.harvard.edu/photo/2012/igrj11014/). It has the largest jets observed (in the x-ray band) in our galaxy. The main jet is aligned with the pulsar rotation axis (and is perpendicular to the pulsar's trajectory) and extends out to a distance of over 37 light years. The estimated jet speed is a substantial fraction of the speed of light —$0.8c$. There is good evidence that this pulsar was created from a massive implosion-explosion supernova event about 10–30 thousand years ago. Astronomers have not been able to determine its mass. Which means, on the usual basis of mass content, IGR J11014-6103 cannot be categorized. It might be a black hole or it might be just a neutron star.[c] [23]

The baffling thing about IGR J11014-6103 is its lack of accretion material and paucity of spin. Originally, the assumption was that it just had to be rapidly spinning, but later measurements indicated the rotation rate is only 15.9 Hz.[24] This is considered comparatively negligible in a world with millisecond pulsars. Clearly, the rather slow spin rate and the lack of accretion material meant the jets are not powered by rotation or accretion. Theorist had no choice but to class it as a neutron star. With a neutron star there may be some as-yet-unknown way to extract the jet-driving energy. With a black hole, theorists knew, there simply was no way —they would only be blocked by the irresolvable problems discussed earlier. In the case of Pulsar IGR J11014-6103, black-hole theory fails and neutron-star models are inadequate.

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[c] Wikipedia: *Astrophysical jet*.
https://en.wikipedia.org/wiki/Astrophysical_jet (accessed 2016-5-23 & 2018-3-15)

Pulsar IGR J11014-6103 is not a point-mass black hole. It is not a conventional neutron star. It is a Superneutron Star.

The Superneutron Star is the only type of structure that will work here. It is not directly dependent on rotation and emphatically needs no accretion disk (or any form of mass accretion). Moreover, the SnS mechanism —deriving its functionality, as it does, from DSSU's aether theory of gravity— is the only theory that will work here and in all situations of the final collapsed state.

In the context of the standard theory of gravitational collapse, IGR J11014-6103 is an anomaly in that its jets are quite inexplicable. The combined pieces of evidence —very little spin, no mass accretion, and jets— make no sense. However, the same evidence does support an alternate theory. Moreover, the very unexpectedness (under the old view) of the evidence, while resolving (under the new view) the Pulsar anomaly, adds confirmation to the resolving hypothesis. It has been said that *the more unexpected a given bit of evidence is apart from a given hypothesis and the more expected it is according to the new hypothesis, the more confirmation the evidence confers on the new hypothesis*.[25] Because it can accommodate a wider range of evidence, the resolving hypothesis is a broader, more powerful, theory.

Resolving the mystery of gamma-ray bursts: The Mechanism explains both long duration emissions and sporadic bursts of radiations. It provides a natural explanation for what are known as gamma-ray bursts (GRB), as well as explosive flashes of x-rays, radio waves, and visible light. Anything that falls onto a SnS —things such space rocks, space debris or matter in-spiraling from an accretion disk— will affect the emission beam. In extreme cases, there may be collisions or mergers with other compact bodies, other neutron stars. In simplified terms, the mass immediately upon impact converts to energy, spreads laterally, and escapes through the only available route —the bipolar portals. The newly-formed energy feeds the emission beams. In quick response to the impact, or sequence of impacts, the energy escapes in bursts. The escape through the portals comes at a cost. Particles lose a certain fraction of their initial energy during the ascent up the column and out of the gravity well. This loss is essentially due to the gravitational-redshift effect. The extent of the loss depends on the particular characteristics of the columns, notably the density of magnetic lines of force and the density of the emission beam itself. The greater these densities are, the less will be the aether headwind, and the less will be the energy lost (to the gravitational-redshift effect).

It should be mentioned that when major collisions are involved, a certain amount of mass is lost by a process not discussed here, but is detailed in *The Nature of Gravitational Collapse*.[12]

Active galaxies. Not surprisingly, the Mechanism has deep implications for the study of active galaxies —galaxies emitting unusually large amounts of energy from a very compact central source. There is now a way to explain the energy source of the cosmic-scale jets associated with active galactic nuclei.

At the center of this kind of galaxy, at the center of its dense active core, there exists a *supermassive black region* (popularly called a supermassive black hole). Our SnSs, the ultra-energy generators, can and do exist inside this region. From inside the "black region" a multitude of individual energy emission beams feed into a pair of *super emission beams* —the energy shafts piercing the supermassive black region's polar portals. Emanating from the core of active galaxies, these super beams drive the cosmic jets that have long fascinated and bewildered astronomers. (Links to the details may be found at www.cellularunivers.org/B2/B2.htm)

The incongruity of treating the self-evident as being revolutionary. Given that the ultra-energy mechanisms are constructed on self-evident concepts, how does one explain the failure of the orthodox picture? What in the world prevented the many experts in the field from uncovering the remarkably straightforward solution? There is, to be certain, no shortage of brilliant minds and unconventional thinkers. But it seems all were distracted by the allure of the exotic and its possible rewards. (Whether unrestrained implosions of "black holes" or the runaway explosion of the "big bang," such conceptual speculations are attention grabbers and headline makers —exciting and hard to resist.) All were distracted from re-examining the basics. It is a question I often ponder, the question of not recognizing what should be self-evident. I am always left amazed and convinced of the utter importance of adopting sound principles and realistic assumptions in theory construction. Yet amazingly, when it comes to gravitational collapse, the glaringly unrealistic view dominates; why, for instance, would anyone adopt a singularity into their constructions?

Dead-ended by an invalid principle: Unfortunately, physicists have long committed themselves to an invalid principle. They believe that a compact body cannot have both an intrinsic magnetic field AND an "event horizon" type of boundary. Their general relativity theories of black holes demand that magnetic fields and event horizons be mutually exclusive. The Penrose process, mentioned above, is conspicuously devoid of an inherent magnetic field. Nothing is allowed to violate their event-horizon barrier (but they do make an inexplicable exception for gravity). This flawed principle (or false belief), like so much in the astro-sciences, is related to the failure to understand the underlying mechanism of gravity.

The failure of the astrophysics community to recognize the true power-source of jets —the actuality of energy beams emerging from a totally collapsed structure— can be attributed to the following misconceptions.[26]

There is the misconception that the space medium on the inside (on the interior side of the event horizon) must be

flowing inward FASTER than the speed of light. The assertion of space-medium flow faster than lightspeed is, in itself, not a problem. However, it automatically leads to the conclusion that nothing from the inside can escape. Academic physicists really have no inkling of how anything below the event horizon can possibly escape to the outside world.

There is the misconception that stellar black holes and supermassive black holes have functionally-identical boundaries. Astro-theorists have failed to grasp the full nature of the lightspeed boundary/horizon. The view that the event-horizon boundary divides two regions, where the medium flow on one side is less than lightspeed and on the other side is greater than lightspeed, is quite valid when applied to *supermassive black regions*. However, *it does not apply to end-state neutron stars*. In the latter context, they have failed to appreciate its nature as a photonic surface, a physical energy surface, *a perpetual generator of gamma photons*. The restricted view of the boundary caused them to miss the source of the energy feeding the jets.

The biggest misconception is the belief that the mass hidden deep inside their event horizon is point-like. The notion is so outrageous and outside the realm of natural physics that it really doesn't need elaboration.

In summary: Three revolutionary mechanisms have been presented.

The first is a halting system governing end-stage gravitational collapse. It is a completely natural process that prevents the formation of singularity-type black holes and avoids the associated embarrassing paradoxes. The key lies with the photonic nature of all particles —all particles are either combinations of free photons or patterns of confined photons.

The second is for the generation of heretofore inexplicable ultra-energy particles, namely Peta-electron-volt neutrinos and gammas. The key, the veritable mainspring, of the mechanism is the velocity differential spectral shift.[27]

The third is for the release of the limitless energy generated internally by end-stage neutron stars. It is a process involving the passage of energy from interior to exterior despite the presence of an event-horizon-type lightspeed barrier. The key to its functionality is the DSSU aether theory of gravity, whose validity is documented in the journal-published work entitled *DSSU Validated by Redshift Theory and Structural Evidence*.[28]

In conclusion, a new —vastly superior— paradigm in astrophysics/cosmology is available, part of which has been advanced herein. All has been done without violating physical laws, without unrealistic assumptions, and without the need for hypothetical ingredients. No *thermodynamic contravention*, no *singularity*, no *graviton*, no *dark matter*.

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