Law of physics 20th-century scientists overlooked (Part 2): Energy generation via velocity differential blueshift

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Abstract: Theorists of the 20th century had failed to recognize an underlying law of physics governing the propagation of light: linearly propagating electromagnetic radiation (and neutrinos) is subject to the *Principle of velocity differential propagation*. The Principle, which is shown to rest on sound physics, has two manifestations: the second of these, the blueshifting of light (and neutrinos) within the internal portion of a gravity well, is explored. The Principle is applied to an end-state neutron star (a stable gravitationally collapsed body). Examined is its energy layer, the energy generation/amplification that takes place there, and the mechanism by which the energy escapes to the external world. Highlighted is the steady-state perpetual nature of the process; and its applicability in solving two of the most intractable problems in astrophysics. The implications for cosmology are profound and incontrovertible. © *2020 Physics Essays Publication.* [http://dx.doi.org/10.4006/0836-1398-33.3.289]

Résumé: Les théoriciens du XXe siècle n'avaient pas reconnu une loi sous-jacente de la physique régissant la propagation de la lumière: Le rayonnement électromagnétique (et les neutrinos) se propageant linéairement est soumis au *Principe de propagation différentielle de vitesse*. Ce Principe, qui repose sur une physique saine, a deux manifestations: La seconde, le décalage vers le bleu de la lumière (et des neutrinos) dans la partie interne d'un puits de gravité, est explorée. Le Principe est appliqué à une étoile de neutrons à l'état final (un corps stable effondré par gravité). L'examen est fait de sa couche d'énergie, de la génération/amplification d'énergie qui a lieu là-dedans, et le mécanisme par lequel l'énergie s'échappe vers le monde extérieur. La nature perpétuelle constante du processus est mise en évidence; et son applicabilité dans la résolution de deux des problèmes les plus difficiles à résoudre en astrophysique. Les implications pour la cosmologie sont profondes et incontestables.

Key words: Velocity Differential Propagation; Blueshift; Photon Propagation; Gravity Well; Aether; Energy Layer; Energy Amplification; Terminal Star; End-State Neutron Star; DSSU Theory.

I. INTRODUCTION

The very same law of physics that was used in **Part 1** to solve the century-old problem of the cause of the cosmic redshift will now be used to solve the mystery of astrophysical jets—the mystery of the underlying driving mechanism. Revealed will be the limitless energy source that empowers these cosmic beacons.

The discussion begins with the keynote principle of light propagation. Then, it establishes a gravitational framework necessary for explaining how this Principle manifests.

It will be proved that light and neutrinos propagating radially within the interior portion of a gravitating body will undergo wavelength contraction, that is, they will undergo blueshifting. Moreover, the contraction will occur regardless of radial direction. Both inbound and outbound particles will become blueshifted. Granted, it sounds counterintuitive; and, hence, may well be the foremost reason that the phenomenon was missed by 20th-century scientists.

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II. OVERLOOKED PRINCIPLE OF LIGHT PROPAGATION

A. The propagation law and its corollary

Essentially, the law governs the ongoing interaction between electromagnetic radiation and gravity gradients. It provides a rule for in-flight activity between lightwaves (and light quanta and neutrinos) and the gravitational environment. The law has two essential requirements: one, light propagates through a nonmaterial medium (called *aether* for convenience); light cannot travel through nothingness. Two, photons are spread out entities; photons are not point particles.

1. Law of light propagation

The law can be simply stated as the *principle of velocity differential propagation* (the Principle). It affects all electromagnetic radiation, quanta of light and the in-between gaps, and the photons that constitute neutrinos. The Principle applies to freely propagating light and neutrinos; it does not apply to confined photon(s), such as the self-orbiting photon that makes up the electron.

As detailed in the *Part 1* article, its most easily understood manifestation is the redshift associated with crossing gravity wells. Light waves and neutrinos traversing the external portion of a gravity well will intrinsically lose energy. They will lose energy during the inbound propagation AND during the outbound propagation. In short, light undergoes redshifting and neutrinos lose energy—*throughout the journey*. The effect accumulates, without limit, over multiple gravity wells; and it is the integral of all the wavelength stretching that is observable as the cosmic redshift.

Corollary: Light waves/pulses and neutrinos propagating radially in the interior of a gravitating body will *gain* energy during both the inbound direction AND the outbound direction. In other words, light undergoes blueshifting and neutrinos gain energy. This corollary effect is extremely important for "black-hole" physics.

The overlooked law of physics, the *principle of velocity differential propagation*, also manifests as a process of utmost importance. This process—whose theoretical basis rests on the corollary—has been given a unique name.

2. Fundamental energy amplification process

Photons and neutrinos trapped within any end-state neutron stars (also known as Terminal-state stars) continuously gain energy. These particles undergo amplification (gain energy by wavelength contraction) while propagating ***in-place*** in a zone of negative velocity differential.

The proof of the corollary is straightforward and follows shortly. Later, the fundamental energy amplification process will be explored.

The proof makes use of two features of light and one feature of the space medium (aether):

- Light quanta possess wavelengths. Photons are spread out.
- Light propagates as an excitation in (and *of*) the aether.
- The space medium—DSSU aether[b)]—is dynamic. The medium's dynamic nature manifests as the familiar gravity effect.

One more thing is needed: the aether flow profile of a representative gravity well.

B. Gravity well and aether flow profile

Consider a mass body of uniform density. Furthermore, imagine that this gravitating body is not rotating and is completely at rest within the space medium.

The mass body has an associated aether-flow field—a symmetrical pattern of aether flowing inward. While Einstein's aether "flows" in a geometrodynamic sense, DSSU aether flows in the fluid-dynamic sense augmented by a self-dissipative process.[1] What this means is that the gravity well is essentially an *aether well*. Mass acts as a sink for aether. In fact, the continuous flow thereof sustains the very existence of the mass body. The rate of this flow, in accordance with the DSSU aether theory of gravity, is:[2]

$$v = -\sqrt{\frac{2GM}{r}}, \quad r \geq R \ (\text{external aether flow velocity}), \tag{1}$$

where G is the gravitational constant and r is the radial distance (from the center of mass M, radius R) to any external point of the gravity well. The equation represents a spherically symmetrical inflow field, and gives the speed of *inflowing aether* at any radial location specified by r.

The flow-velocity function for the interior portion requires a density parameter ρ. It is assumed here, for the sake of simplicity, that the density is uniform. Start with

$$v(r) = -\sqrt{\frac{2GM(r)}{r}}; \quad r \leq R \tag{2}$$

and substitute $M(r) = (4/3)\pi r^3 \rho$ and obtain

$$\begin{aligned} v(r) &= -\sqrt{\frac{8}{3}\pi G \rho r^2}, \\ v(r) &= (\text{constant}) \times r. \quad r \leq R \end{aligned} \tag{3}$$

Thus, for the interior portion, the velocity is a simple linear function.

Note that the aether is actually *accelerating* inward; in the exterior region, the acceleration is in proportion to the inverse-square law, in agreement with Newtonian gravity; in the interior (subsurface) region, the acceleration is constant. However, it is the velocity that is most convenient here and presented in the schematic graph (Fig. 1). The velocity scale in the graph is arbitrary, since specific values are not of importance in the proof.

In the previous Article, *Law of Physics 20th-Century Scientists Overlooked (Part 1): he velocity differential propagation of light*, it was proved that when light traverses a gravity well there will occur an energy loss during the inbound leg of the journey as well as during the outbound leg. An intrinsic redshift will be acquired throughout. What follows is a simple proof of an opposite effect, of *energy gain* that occurs in the subsurface portion of any gravity well.

III. PROCESS OF INTRINSIC BLUESHIFT ACCRETION—THE PROOF

Imagine that a tunnel has somehow been drilled clear through the center of the same mass body (as shown in Fig. 2). Light pulses are beamed through the tunnel.

Keep in mind, the gravity-well graphs herein use a radial coordinate system. The radius axes on the left side and on the right side are both *positive*. Thus, any motion away from the center of gravity is considered positive and motion toward the origin is negative. This approach is most intuitive. Needless to say, using a regular Cartesian coordinate system will give the same results.

[b)]Like Einstein's aether, DSSU aether is *nonmaterial* and *dynamic*; but unlike Einstein's aether it is not a continuum. Rather, it consists of discrete units; and it is kinetic. It turns out that the DSSU aether is the first ever DYNAMIC aether consisting of nonenergy, nonmass, discrete entities. In other words, the aether has the ability to manifest energy—yet its discrete units (when in the unexcited state) do not!

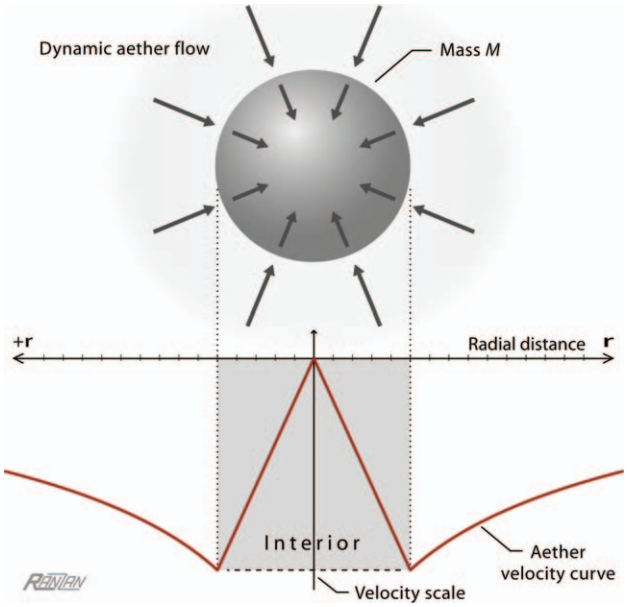

FIG. 1. Schematic of the gravity well (top) shows the flow of aether into the central mass. The body is not rotating and is not moving with respect to the surrounding space medium. The aether flow profile (bottom) is linear for the interior of the structure; this is because the density is being treated as constant.

A. Lightpulse during subsurface inbound journey

Consider the lightpulse propagating into the gravity well. It is moving in the same direction as the aether.

By simple inspection (see Fig. 2), it should be apparent that the front end of the pulse is moving inbound slower than the back end. It is a straightforward matter to show that the two ends are moving closer together.

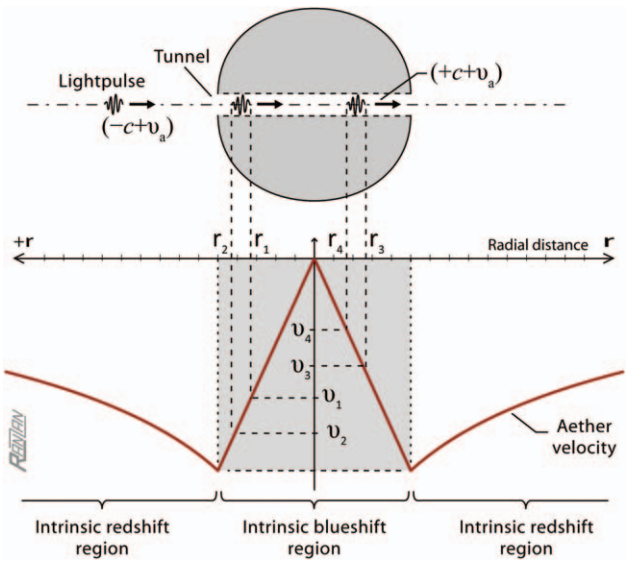

FIG. 2. Lightpulse located between r_1 and r_2 "experiences" a flow differential between its front and back ends. This differential tends to contract the pulse; the pulse undergoes an elementary blueshift process. The lightpulse positioned between r_3 and r_4 "experiences" the same effect—despite the fact that it is propagating AGAINST the flow of the aether medium. Blueshifting occurs during the entire interior journey. (Note, the cylindrical coordinate system; the radius axis is positive in both directions).

At the instant that the lightpulse is located at the radial position indicated as r_1 and r_2, its two ends will have velocities $-c+\upsilon_1$ and $-c+\upsilon_2$, respectively.

That is, the velocity of the pulse-end *lower down* in the gravity well is $-c+\upsilon_1$; while the velocity of the pulse-end *higher up* the well is $-c+\upsilon_2$. Next, subtract the two velocities: from the one *farther out* of the gravity well, subtract the one *deeper* in the well. An expression for the end-to-end relative velocity, then, follows:

$$\begin{aligned}&(\text{Relative velocity between ends of lightpulse})\\&\quad=(\text{vel. of farther end})-(\text{vel. of deeper end})\\&\quad=(-c+\upsilon_2)-(-c+\upsilon_1)\\&\quad=(\upsilon_2-\upsilon_1)<0,\end{aligned}\tag{4}$$

where υ_2 and υ_1 are the radial velocities of the aether flow. Both, of course, are negative; but, as plainly evident in Fig. 2, velocity υ_2 is more negative than is υ_1. Therefore, the expression must be negative. Hence, there is a velocity of approach between the two ends of the pulse.

Clearly, the pulse inside the tunnel and heading toward the center of gravity is having its wavelength shortened and, hence, is gaining energy. No surprise here. But watch what happens during the outbound leg.

B. Lightpulse during subsurface outbound journey

Next, consider a lightpulse propagating through the ascending half of the tunnel. It is now moving in the opposite direction as the aether flow.

So now it is the front end of the pulse that is moving slower than the back end (in the outbound direction). The front end is slower because it encounters a stronger headwind.

This may be easily confirmed by using the configuration and symbols in Fig. 2:

$$\begin{aligned}&(\text{vel. of back end})-(\text{vel. of front end})\\&\quad=(+c+\upsilon_4)-(+c+\upsilon_3)\\&\quad=(\upsilon_4-\upsilon_3)>0.\end{aligned}\tag{5}$$

By inspection, it is seen that υ_3 is more negative than υ_4, which makes the expression positive; thus, proving the back end propagates faster than the front (with respect to the coordinate system). So the back end is gaining on the front end.

It can also be shown that the two pulse ends are moving closer together (in a relative sense); this means simply proving that the two ends have a negative relative velocity.

At the instant that the lightpulse is located at the radial position indicated as r_3 and r_4, the two ends of the lightpulse will have velocities $+c+\upsilon_3$ and $+c+\upsilon_4$, respectively.

Subtract the two velocities: from the one *farther out* of the gravity well, subtract the one *deeper* in the well.

$$\begin{aligned}&(\text{Relative velocity between ends of lightpulse})\\&\quad=(\text{vel. of farther end})-(\text{vel. of deeper end})\\&\quad=(+c+\upsilon_3)-(+c+\upsilon_4)\\&\quad=(\upsilon_3-\upsilon_4)<0,\end{aligned}\tag{6}$$

where υ_3 and υ_4 are the aether velocities from Fig. 2. Since υ_3 is more negative than υ_4, the expression must be negative, which means that the velocity of the two ends is effectively toward each other. There exists a negative end-to-end *relative* velocity

This confirms the existence of an intrinsic energy gain. Moreover, the gain occurs during the entire cross-transit of the subsurface portion of the gravity well.

C. Argument based on gravity as a force/effect

As is well understood, the influence of gravity applies to electromagnetic radiation. It can cause a change in the direction of propagation and the spacing between light pulses and the wavelength of light itself. Gravity's ability to influence and accelerate light has long been known from the proven phenomenon of gravitational lensing.

The "force" argument, then, depends only on self-evident factors: light quanta are extended entities, in that they possess wavelengths; an understanding that a photon can change its dimension, its extension, unlike a mass particle; and further, that gravity "pulls" on photons (and neutrinos).

Turning to Fig. 3, the peak effect of gravitational acceleration is at the surface of the body. Go into the imaginary tunnel and the effect decreases. The greater the depth, the smaller will be the gravity effect. For a constant density structure, the force-effect decreases linearly. At the center, gravity equals zero.

For any spherical body, the standard expression for gravitational acceleration is: $a = -GM/r^2$.

For the external-to-body portion of the acceleration function, the mass M remains a constant.

But for the interior portion, the mass that actually determines the acceleration varies with the distance from the center of gravity. The relationship is found by expressing mass in terms of density ρ (assumed to be constant). Substitute $M(r) = (4/3)\pi r^3 \rho$ and obtain

$$\begin{aligned} a(r) &= -\frac{4}{3}\,\pi G \rho r, \\ a(r) &= (\text{constant}) \times r. \quad r \le R \end{aligned} \qquad . \tag{7}$$

Simply put, while for the external portion of the gravity well the magnitude of the gravitational acceleration is a function proportional to $1/r^2$; the magnitude of the internal portion of the well (assuming uniform density) is a function directly proportional to the radius r (see the schematic graph Fig. 3).

When the light pulse descends into the tunnel, the trailing end is "experiencing" a stronger force (a greater acceleration magnitude) than is the leading end (see Fig. 3). This difference, or differential, in the acceleration exists throughout the descent journey. It follows that, in the frame of the pulse itself (and in the frame of the coordinate system), there will occur a shrinkage between the two ends. A contraction of the wavelength will accrue.

Then, when the pulse ascends the tunnel, it is the leading end that experiences a stronger force (a greater acceleration magnitude). The gravitational pull on the front end is ever so slightly more intense than is the pull acting on the back end. There exists a gravitational acceleration differential as evident in Fig. 3. The leading pulse-end "feels" a stronger backwards pull throughout the outbound propagation. Again, it follows that there will be an intrinsic shrinkage between the two ends—manifesting as wavelength contraction.

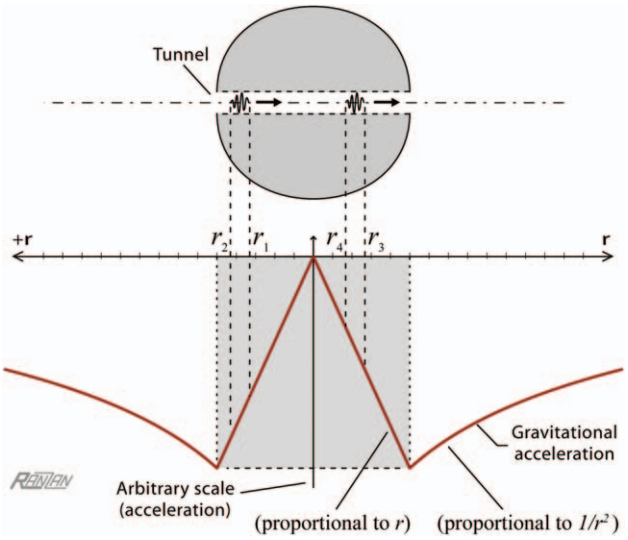

FIG. 3. *Light pulse transiting subsurface portion of a gravity well*. During the descent into the tunnel, the gravitational acceleration acting on the trailing end of the pulse is slightly more intense than the acceleration on the leading end. This differential in the acceleration manifests as an intrinsic foreshortening. During the ascent, the situation is reversed; the gravitational acceleration acting on the fore end is slightly *more intense* than what is experienced by the back end. In other words, the front end is being "dragged back" more than is the trailing end. Consequently, there is again an intrinsic wavelength contraction. Light acquires a blueshift throughout its subsurface propagation.

The argument is equally valid for a train of light pulses. It also applies to the spacing between mass objects (aligned along the tunnel axis and undergoing inertial freefall). Objects falling in tandem will, as a matter of fact, experience a decrease in their vertical separation. Such a scenario exhibits a basic effect due to a gravitational potential differential and serves as an analogy of a gravity differential *blueshift*—a blueshift going into the tunnel as well as coming out. The conventional view holds that the shift (gap closure or wavelength contraction) going in is cancelled by the shift (separation or wavelength expansion) coming out.

Clearly, there is a deep principle here that has been overlooked.

IV. ENVIRONMENT MOST FAVORABLE FOR BLUESHIFT-MODE PROPAGATION

Question: Do conditions exist where blueshifting actual manifests as a major factor? Are there structures to be found where the velocity differential effect—specifically the blueshifting aspect—is significant?

To answer this question, it helps to first consider the location where the more familiar process of redshifting

occurs. There are places where it manifests in the extreme. At or near the exterior surface of a neutron star, the phenomenon can radically alter the wavelength. For the penultimate situation, with aether streaming into the neutron star approaching the speed of light, any outbound photons/lightpulses would struggle to escape and would, in the process, undergo severe elongation. The subsurface region of such a structure would certainly provide the aether flow (a flow with a large velocity differential) to provide significant blueshifting; except that the neutron mass is surely far too dense to permit the passage of light particles no matter how energetic (no matter how deep in the gamma range of the spectrum).

But now consider the truly ultimate situation. Once the neutron star has accreted sufficient additional mass, it enters a critical state; it becomes an end-state neutron star, also called a *Terminal-state star*. In the process of transforming into a Terminal star, the additional mass causes the aether inflow velocity to increase, in accordance with Eq. (1). The speed is always maximum at the surface. When this speed attains the speed of light, the surface of the neutron star undergoes a transformation. The neutron mass at the surface, compelled by the laws of physics, transforms into pure energy. A thin layer of photonic energy manifests. In order to comply with the rule of special relativity (mass and aether can never have a lightspeed relationship), the surface consists ONLY of particles that travel at the speed of light. Only two such particles are known to exist—photons and neutrinos. Thus, the end-state neutron star is enveloped by a lightspeed boundary buffered by a thin layer of radially propagating photons and neutrinos.

The formation of Terminal stars is a remarkable story in itself. The details and the underlying physics are presented in Refs. 3 and 4.

However, a few comments are in order. When a sufficiently massive body collapses to the Terminal state shown in Fig. 4, a small quantity of the original mass undergoes a total conversion to energy. Only the surface mass is so affected. The 100% conversion of surface mass to energy should not come as a surprise, for it is simply the logical outcome of the fact that all mass particles are nothing more than trapped/confined energy particles (gamma photons and neutrinos)—albeit in highly intricate patterns which have yet to be deciphered. The electron is the exception; its photon confinement configuration is reasonably well understood.[5] So, the compelled mass-to-energy conversion is but the constituent energy particles being prevented from following subatomic looping patterns and, instead, having to propagate linearly (aligned perfectly along, and into, the direction of aether flow).

The important point for the present discussion is that these particles, photons and neutrinos, are propagating in-place at top speed; while going *nowhere*!

What do we have? We have a subsurface zone where gamma particles travel "in-place" endlessly. We have a subsurface region where the aether inflow produces blueshifting (Fig. 4). These are the necessary and sufficient conditions for the amplification of energy by the velocity differential

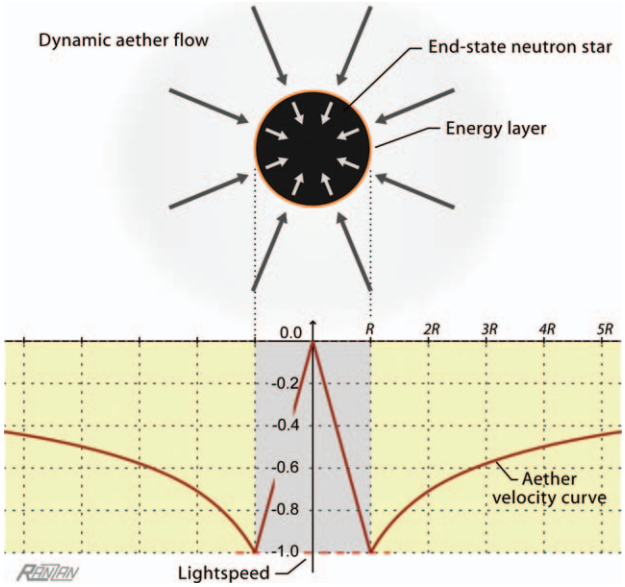

FIG. 4. End-state neutron star (or Terminal star). It is the stable structure that results when gravity compresses a sufficient quantity of mass to its maximal density state. It has a surface aether-inflow speed equal to lightspeed; and it is enveloped by a thin layer of pure energy. Here, within the energy layer, photons and neutrinos propagate "in place"—*trapped within a blueshifting environment*. Notice that the aether velocity attains lightspeed only at the neutron star's surface. The velocity then rapidly decreases to zero—all within a radial distance of about 10 kilometers. (Aether-flow scale is marked off proportional to lightspeed.)

blueshifting mechanism. These are the conditions for producing staggering amounts of energy.

The gravitational collapse of a gaseous star to form an end-state neutron star is not the only possible way to produce the "ultimate situation." It is possible for a massive dwarf star in a binary system to accrete sufficient mass over time and attain the critical state. Another scenario may involve a merger of a pair of orbiting massive dwarfs. The critical state may also be attained as the result of the simple collision of massive dwarfs. In other words, the collapse of a gaseous star is not an essential element in the argument. It does, however, serve as an understandable simplification—a convenient thought experiment of a controlled collapse.

It has also been argued, most notably by Professor Pierre–Marie Robitaille, that conventional stars are not balls of gas. As he explains in an online video (*How are Stars Formed? The Standard Model: Gravitational Collapse, Black Holes, and the Big Bang!* https://www.youtube.com/watch?v=LoqsG7V13G8, Published 26 July, 2017) "stars are condensed matter and form through condensation reactions." When they exhaust their internal energy they collapse by reconfiguring their internal lattice structure to become massive dwarf objects.

Regardless of how the end-state structure comes about, the environment most favorable for blueshift-mode propagation is where aether flow attains lightspeed and is decelerating. That is where one finds the environment for the *fundamental energy amplification process*.

V. THE TERMINAL NEUTRON STAR AND THE AMPLIFICATION PROCESS

A. Calculating the size of the Terminal neutron star

The maximum density that mass can have is taken to be $1.66 \times 10^{18}\,\mathrm{kg/m^3}$; this is the nominal maximum state of compression that Nature is able to impose on mass. The numerical value corresponds to the basic density of ordinary nucleons, protons and neutrons. So, for the end-state neutron star, this is the density of its maximally packed neutrons.

With the two requisite properties, neutron density and lightspeed inflow, it is a simple matter, using the earlier derived Eq. (3), to calculate the size of the Terminal neutron star,

$$\upsilon(r) = -\sqrt{\frac{8}{3}\pi G\rho r^2};$$

$$\upsilon_{@\mathrm{surface}} = -\sqrt{\frac{8}{3}\pi G\rho_{\mathrm{neutron}} R^2};$$

$$R_{\mathrm{Terminal.star}} = \frac{\upsilon_{@\mathrm{surface}}}{-\sqrt{\frac{8}{3}\pi G\rho_{\mathrm{neutron}}}}.$$

Substitute $\upsilon_{@\mathrm{surface}}$ equals lightspeed (-3.00×10^8 m/s); $G = 6.67 \times 10^{-11}\ \ \mathrm{N{\cdot}m^2/kg^2}$; $\rho_{\mathrm{neutron}} = 1.66 \times 10^{18}\,\mathrm{kg/m^3}$; and obtain,

$$R_{\mathrm{Terminal.star}} = \frac{-3.00 \times 10^8\ \mathrm{m/s}}{-\sqrt{\frac{8}{3}\pi\left(6.67 \times 10^{-11}\,\mathrm{N{\cdot}m^2/kg^2}\right)\left(1.66 \times 10^{18}\,\mathrm{kg/m^3}\right)}},$$

$$R_{\mathrm{Terminal.star}} = 9850\ \mathrm{m}.$$

Thus, the Terminal neutron star has a radius of about 10 km, which does not change. The end-state neutron star is a stable structure and *cannot collapse further*.[4]

B. Amplification process

Energy generation via velocity differential propagation: as long as radiation particles are trapped within the energy layer (Fig. 5), their respective wavelengths will undergo contraction, all in accordance with the proof given in Sec. 3. This is the *energy amplification process*—a process that can take a cosmic background photon and boost it into the gamma range. It may take a billion years, or longer. No matter. The process runs continuously. This energy generating process is a manifestation of the principle of the velocity differential propagation of radiation.

Both the process and the Principle were completely overlooked by scientists of the 20th century.

On the question of layer thickness. The energy layer probably has a depth of a few centimeters, but possibly may extend to several meters.[2] Here is the reasoning. As the aether passes through the energy layer, a portion of it (the aether) is absorbed/consumed by whatever is trapped therein; this absorption/consumption reduces the quantitative flow of

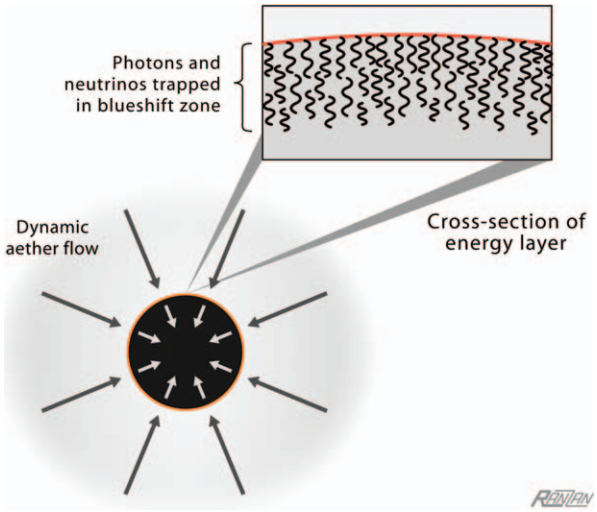

FIG. 5. The end-state neutron star has a unique surface layer. It is a thin zone consisting of photonic energy (gamma photons) and neutrinos. These particles are propagating outward; but because the aether is flowing inward with the same speed, the photons and neutrinos simply remain stationary within the energy layer. The crucial aspect is that the propagation is happening within a *blueshifting region* (in accordance with the Principle of velocity differential propagation). Consequently, the particles undergo energy amplification—they slowly gain energy.

aether causing it to slow down to subluminal speed. Since the energy layer holds Nature's densest state of matter (in the form of radiation), the consumption rate must be staggeringly high. So then the question is: How do lightspeed particles remain stationary within aether flowing slightly less than lightspeed? Not a problem; photons can and do propagate at less than their normal speed in vacuum. (In standard physics, for instance, the photon's speed is related to the index of refraction). Although the radiation is NOT propagating *through* the energy layer, just the fact of the extreme density slows their speed—permitting the radiation particles to remain stationary despite a subluminal aether headwind. Unfortunately, the relationship between propagating speed and density is not known, and so neither is the depth of the pure-energy layer.

It is important to realize that there are no mass particles within the surface layer. No particle having mass can travel at the speed of light; not through aether, not through space, not through whatever. The matter particles that existed in the pre-collapsed surface had undergone a transformation. It was a transformation that required no energy input; it only required an extreme change in the gravitational environment. When Nature imposes the ultimate gravitational environment, mass particles unravel—quite literally. They do so in accordance with the photonic theory of particles, which holds that ALL particles are either free photons or some configuration of one or more photons. No exception. The concept is beyond brilliant; it means there is only one true fundamental force particle.

Here is the picture so far: a stable neutron star with the usual stuff falling in (things like stray atoms, microwave background, thermal photons, gamma particles, neutrinos, space rocks, etc.); but with nothing coming out; nothing whatsoever. The structure has an energy layer, in which

photons and neutrinos continuously gain energy; also, additional energy is constantly being added from the external environment. However, the picture presented up to this point, has *not* included rotation.

What happens to this ever-growing bottled-up energy? For the answer we must take rotation into account.

VI. ROTATING TERMINAL NEUTRON STAR

A. Magnetic channels

Generally speaking, all rotating structures are surrounded by magnetic fields. Rotating neutron stars possess extremely powerful external magnetic fields. When neutron stars collapse to the Terminal state, they do not lose their magnetic fields. The external magnetic fields do not participate in the end-state collapse. The explanation for this is straightforward.

Two things happen during the collapse that morphs a mass body into the end-state. One, rotation rate speeds up, as a consequence of angular momentum conservation. Two, the magnetic field becomes ever more twisted and collimated. The faster the collapsing neutron star rotates, the more collimated will be the polar lines of magnetic force [Fig. 6(*a*)]. The result is a pair of polar cones, or columns, possessing extraordinarily high energy density. It is these energy filled columns that prevent the inflowing aether from attaining lightspeed and "sealing off" the surface.

As aether streams down these energy-intense columns, a significant proportion is consumed. Remember, all energy and matter sustains its existence by the absorption/consumption of aether. Naturally then, the inflow acceleration and speed will be less than they otherwise would be [Fig. 6(*b*)]. This state of affairs is in effect during the collapse and continues after collapse. Therefore, the velocity at the surface—at the column bases—is always very much less than lightspeed. Meanwhile, the rest of the structure continues to experience the maximum inflow speed that Nature allows.

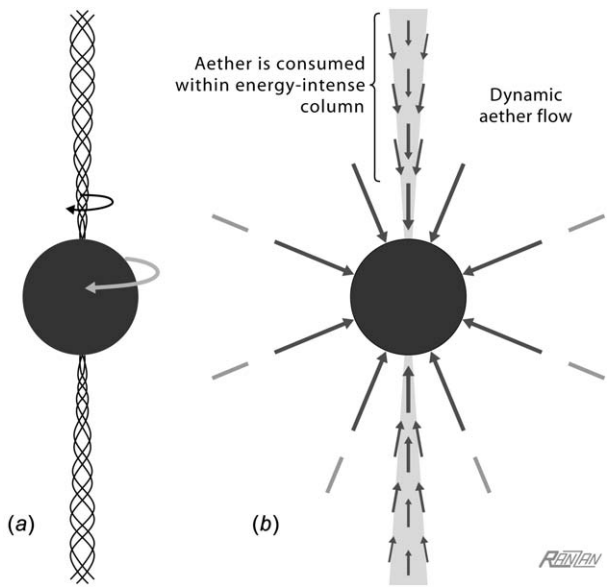

FIG. 6. Rotation causes collimation of the magnetic force-lines of the Terminal neutron star, as shown in part (*a*). The rotating structure, thus, possesses two beams (or columns) with very high magnetic energy density. Part (*b*): as aether streams down these energy-intense columns, a large proportion is consumed. As a result, its acceleration and speed are seriously affected. Although acceleration and inflow speed still *increase* with proximity to the structure, these are greatly attenuated. Hence, the velocity at the surface—at the column bases—is very much less than lightspeed.

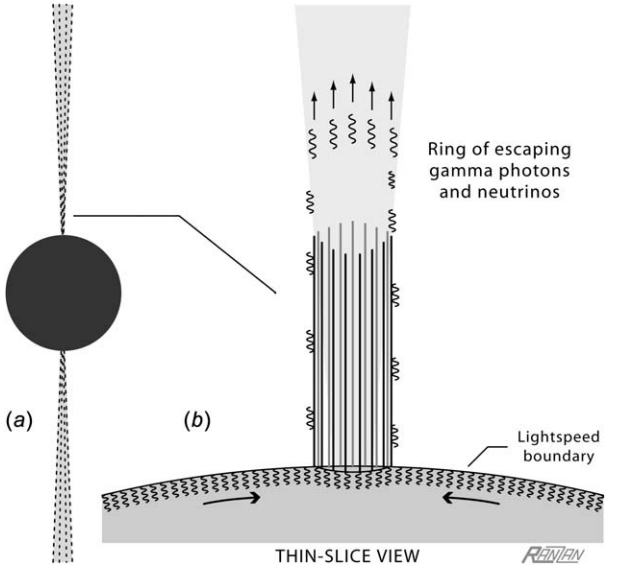

FIG. 7. Energy escape mechanism of Terminal neutron stars. Gamma particles and neutrinos make their escape through the polar portals and outward along the magnetic channels. Part (*a*) shows the bipolar emission beams. Part (*b*) is a thin-slice schematic of the escape portal and its cylindrical beam of escaping photons and neutrinos. The extreme density of the energy layer produces a lateral pressure that continuously pushes surface-embedded particles towards the portals where they then escape at lightspeed (speed with respect to the aether medium).

Recapping, when a rotating neutron star transforms to the Terminal state, the polar magnetic channels remain in place. An energy layer forms and finalizes the collapse. The neutron star's surface, thus, becomes sealed off everywhere over its surface—everywhere *except* at the polar magnetic channels.

B. Escape mechanism

The *energy escape/emission mechanism*, like everything else in the DSSU Worldview,[c)] is perfectly natural.

The energy layer just underneath (and touching) the lightspeed boundary contains photons and neutrinos—including Nature's most energetic of such particles. The layer holds Nature's densest state of radiation. Here is a domain absolutely saturated with electromagnetic energy waves—a domain totally inaccessible to investigation from the outside world, so that the enormous density can only be imagined. Extreme density, naturally, is matched by extreme lateral pressure. The lateral pressure pushes the particles toward the two places where the stationary energy layer is absent. As shown in Fig. 7(*b*), the radiation particles are pushed toward the edges of the polar portals. Once they

[c)] **DSSU theory** is, by far, the most successful problem-free cosmology. For instance, it does not require so-called *dark matter*—not for galaxies, not for galaxy clusters, and not for the Universe.

reach the opening, they escape into the external environment [Figs. 7(*a*) and 7(*b*)]. 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 ultra-high energy blasting into deep space.

Thus, photons and neutrinos make their escape through the polar portals and along the magnetic channels.

The lateral displacement of photons and neutrinos and their escape at the portals never diminishes the surface-layer's energy density. There are two reasons. One is the ongoing intake of new particles; the other is the ongoing energy amplification. Lost photons are endlessly being replaced by infalling mass undergoing mass-to-energy conversion as well as by the capture of incoming radiation. There exists the cosmic background radiation (including microwaves and a wide range of wavelengths); it provides a staggeringly abundant stream of relatively low energy photons. Neutrinos, too, are replaced, as the cosmic background radiation of neutrinos provides for an equally abundant source for replenishment. Then there is the process that actually pumps energy into all those surface-trapped particles. This is the process whereby energy is generated via the velocity differential blueshift—a proven natural mechanism. It plays the key role in fueling the system. The blueshifting of the trapped photons and neutrinos is the driver.

Thus, thanks to constant replacement and ongoing energy amplification, the streaming of escaping energy from any Terminal neutron star is a *continuous phenomenon*.

C. The Question of Energy Conservation

Does the Blueshifting process violate thermodynamic laws?

It may be argued that the described process violates energy conservation law in the sense that the Terminal structure behaves as what is known as a "perpetual motion machine of the first kind"—it produces more energy than it absorbs. Here is a system where low energy photons are constantly streaming in, while, at the same time, high energy photons are streaming out at those polar portals. Viewed in isolation, the system stands as a serious violation of energy conservation (and also the second law of thermodynamics). But this is only the case if the Terminal star is treated as an isolated system.

However, these end-state structures are but components of a much larger system. Within that larger system, there is no violation of the conservation law and no violation of the entropy rule.[6]

It should be pointed out that within cosmology theories the conservation of energy is handled differently. Most physicists and philosophers assert that such restriction does not apply to cosmic regions; others treat it as something unknowable or simple evade the issue altogether. Cosmologist Edward Harrison, for instance, claims outright "[it] is obvious: Energy in the universe is not conserved."[7]

DSSU theory, however, does have a unique way of assuring compliance to the rules. How energy conservation is achieved and how natural processes manage to maintain entropy stability will be discussed in some detail in a planned Part 6 of this series of articles.

VII. IMPORTANCE OF THE BLUESHIFTING AMPLIFICATION PROCESS

The blueshifting process solves two of the most perplexing problems limiting our understanding of the Universe. One is the mystery of the driving mechanism associated with astrophysical jets. The other is the complete bafflement as to the source of ultra-high energy particles.

A. The driver of Astrophysical Jets

The energy amplification process is the heart of the mechanism driving astrophysical jets. Here is a mechanism whereby energy actually escapes from the interior of a gravitationally collapsed body; moreover, it escapes in prodigious limitless amounts. The superiority of this mechanism over all others is that it requires neither an accretion disk nor rotation.[3] To repeat, the Terminal star's mechanism powering astrophysical jets requires neither an accretion disk nor rotation. The combination is nothing less than revolutionary: escape from total gravitational collapse, no dependency on rotation, no dependency on infalling mass.

The no-dependency-on-infalling-mass should be self-evident from the nature of the mechanism. But the no-dependency-on-rotation may not be. Consider this "what if" scenario: What if the rotation were somehow stopped, or canceled, would not the magnetic field (and the collimated force lines) simply collapse, thus causing the polar portals to close and seal off any further emission? No. If two Terminal stars collide or combine in such a way so that their separate rotations cancel each other and the combined structure is left with no rotation or negligible rotation, the energy escape mechanism and the driving force behind the astrophysical jets would in principle be unaffected. Take away the collimated magnetic field. Throw it aside. What remains are two columns of energy—beams of electromagnetic energy and neutrinos. They consume aether; they attenuate the aether inflow; they keep the portals open. Thus, the polar energy outflow continues. It is unstoppable.

A brief examination of the old 20th-century view. In particular, there is the failure of the astrophysics community to recognize the reality of jets coming from inside a totally collapsed structure. This failure can be blamed on three misconceptions.

- They believed, and their theory demanded, 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 had no inkling of how anything below the event horizon can possibly escape to the outside world. (But, of course, anything can be claimed as possible if one is willing to dreaming up fantasy worlds and parallel universes.)

- They failed to grasp the full nature of the lightspeed boundary/horizon. The view that their 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; it actually applies to supermassive black regions. However, *it does not apply to end-state neutron stars*. In the latter context, they 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 was 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.

As a broad critique, under the old physics view, there is no plausible mechanism for linking the interior mass—mass which everyone knows is causing the gravity, but is wrongly believed to reside in a point-like "structure"—with an external magnetic field! Since magnetic lines-of-force cannot travel faster than light, the magnetic field of the point mass cannot manifest, cannot extend to the event horizon, and cannot reach through it. Even a hole in the horizon fails to resolve this problem.

B. Source of ultra-high energy particles

The remarkable thing about the blueshifting taking place within the energy layer is that it has no limit. As long as they remain embedded in the surface layer, the photons and neutrinos will gain energy. There is no upper limit on how much energy can be conferred to the trapped particles. This provides the natural explanation for ultra-high-energy particles—particles that have been repeatedly detected, particles whose energy is far beyond what can be produced by any known mechanism and any theoretical process and any imagined action.

The energy amplification process explains the PeV neutrinos often detected by the IceCube Neutrino Observatory located on the Antarctic continent. These are neutrinos in the peta-electron-volt (or quadrillion electron volt) range, corresponding to about a million times the mass-energy of a proton! As American physicist Spencer Klein points out, "These neutrinos have energies more than a thousand times higher than any neutrinos that we have produced in particle accelerators." Canadian astrophysicist Ray Jayawardhana perspicaciously states, "we may have to look to distant celestial sources to uncover the violent origins of these neutrinos."[8]

Another example. The basic mass energy of a proton is about 10^{10} electron volts. Yet protons have been detected with energy *ten billion times greater*![9] How does Nature generate such ultra-extreme energy protons? How does one explain cosmic-ray particle with an astonishing energy of 10^{20} electron volts? … Again, the energy amplification process provides the answer.

Here is what happens. Photons, as is well known, possess momentum and can transfer momentum. The greater the photon's energy, the greater will be the energy that can be transferred. Any mass particles that happen to be in the path of the emission beams (Fig. 7) will be struck repeatedly by the photons constituting the beams. Since these emission-beam photons include the MOST energetic gamma particles that Nature is able to generate, any protons encountered will acquire truly enormous momentum. Protons can, thus, emerge from the Terminal star's polar jets with ultra-extreme kinetic energy.

It makes reasonable sense to treat the evidence of ultra-energy radiation (extreme gammas, neutrinos, and protons) as the "experimental" proof of energy amplification outside the constraints of the ordinary rules of energy conservation. What other choice do we have? There really is no other mechanism—proven or theoretical or conceptual—capable of the energy levels discussed here. No collision, no interaction, no nuclear process has ever been proposed for such mind-boggling levels of energy.

VIII. SUMMARY

Scientists of the 20th century failed to recognize an underlying law of physics governing the propagation of light. Linearly propagating electromagnetic radiation (and neutrinos) is subject to the *principle of velocity differential propagation*.

The Principle has two manifestations: the redshifting of light (and neutrinos) in the external portion of a gravity well; and the blueshifting of light (and neutrinos) in the internal portion.

The Principle rests on three factors:

(i) The fact that light quanta are extended entities. Light has an associated wavelength.
(ii) The fact that aether is the conducting medium of light. Put another way, light is embedded in the aether medium.
(iii) The fact that aether is not static but is involved in a dynamic flow, in accordance with the aether theory of gravity.

Combine these factors and you end up with a velocity difference within a lightwave. This velocity difference along a wavelength is the consequence of the constancy of the speed of light with respect to the conducting medium *whose own velocity is not exactly the same at the front and back ends of the photon*. In general, any gradient in the motion of aether, will impart a spectral shift.

The most unexpected aspect of the Principle is that lightwaves are intrinsically redshifted when entering a gravity well. (The view had always been that redshifting only occurred when climbing out of the gravity well.)

The most practical aspect of the Principle is its ability to solve the mystery of astrophysical jets. The Principle 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 plausible explanation.

The most profound implication. The Principle's blueshifting process leads to what the previous century would have deemed impossible: the limitless generation of energy.

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 blueshifting, the energy amplification process, is a perpetual activity taking place in a surface layer—continuously fed by mostly low energy photons and neutrinos. The high energy end-product of the process is blasted out through the poles. Yet the supply of gamma photons and neutrinos never diminishes. The energy flow is without limit.

This is revolutionary.

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