Law of physics 20th-century scientists overlooked (Part 1): The velocity differential propagation of light

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Abstract: Theorists of the 20th century had failed to recognize the law governing the prolonged interaction between electromagnetic radiation and gravity gradients—they had overlooked the *principle of velocity differential propagation* (the Principle). Historical background is provided and includes the bafflement surrounding the discovery of the *cosmic redshift* and its interpretation. The Principle is presented. Its application to gravity wells reveals that light waves traversing the external portion of a gravity well will intrinsically lose energy. The energy loss occurs during the inbound propagation AND during the outbound propagation. In other words, light undergoes redshifting *throughout the entire journey*. Three proofs are detailed. Observational evidence (several examples) is presented. Highlights are given of the momentous misinterpretation that could have been avoided if only there had emerged cognizance of the Principle. Examined is the question, How could it have happened that scientists missed the Principle? The implications for cosmology are profound. © *2020 Physics Essays Publication*.
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Résumé: Les théoriciens du XXe siècle n'avaient pas reconnu la loi régissant l'interaction prolongée entre le rayonnement électromagnétique et les gradients de gravité - ils avaient ignoré le *principe de la propagation différentielle de vitesse* (le Principe). Le contexte historique est fourni ici et comprend la perplexité entourant la découverte du *décalage vers le rouge* cosmique et son interprétation. Le Principe est présenté. Son application aux puits de gravité révèle que les ondes lumineuses traversant la partie externe d'un puits de gravité perdront intrinsèquement de l'énergie. La perte d'énergie se produit pendant la propagation entrante ET pendant la propagation sortante. En d'autres termes, la lumière subit un décalage vers le rouge tout au long du voyage. Trois preuves sont détaillées. Des preuves observationnelles (plusieurs exemples) sont présentées. Des faits saillants sont donnés de la fausse interprétation capitale qui aurait pu être évitée si seulement la connaissance du principe avait émergé. La question examinée est la suivante: Comment aurait-il pu arriver que les scientifiques aient manqué au Principe? Les implications pour la cosmologie sont profondes.

Key words: Velocity Differential Propagation; Cosmic Redshift; Photon Propagation; Gravity Well; Aether; Cellular Cosmology; Redshift Distance; Edwin Hubble; DSSU.

I. HISTORICAL BACKGROUND

A. Discovery of the redshift-distance relationship

The early part of the 20th century witnessed the discovery of what was then called the astronomical redshift but, in time, became known as the cosmic redshift. Found was an unexpected phenomenon that altered the light spectrum of distant galaxies. The light had somehow been stretched and the degree of stretch increased with the distance of the source. During the 1910s and 1920s, the work of several astronomers, notably, Vesto M. Slipher (1875–1969), Carl W. Wirtz (1876–1939), Knut Lundmark (1889–1958), Milton Humason (1891–1972) and, of course, Edwin P. Hubble (1889–1953) firmly established the existence of a direct relationship between a galaxy's measured redshift and the galaxy's distance from Earth.

The relationship was quite unambiguous. The greater the measured wavelength elongation, the greater was the estimated distance to the source galaxy. Although only an empirical relationship, it was called the *redshift-distance law*, and because the redshift was interpreted as a measure of velocity it was also called the *velocity-distance law*.[b)]

B. Interpretations

Found was a correlation as remarkable as it was unexpected. How could it be explained? What mechanism was causing the almost universal redshifting of light?

The simple and familiar interpretation initially proposed was the straightforward Doppler effect. Galaxies were

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[b)]**Redshift-distance law:** (redshift index) = $(1/c) \times$ (empirical constant) $\times$ Distance $\rightarrow z = (HD)/c$, AND **Velocity-distance law:** (recession velocity) = (empirical constant) $\times$ Distance $\rightarrow cz = H \times D$, where z is the measured redshift index, c is the speed of light, H is the Hubble constant, D is the distance of the light source at the time of reception.

displaying their recessional motion through the vacuum of space. It did not take long to realize this cannot be right. If all distant galaxies were truly fleeing away from our location in the universe, it would mean our position must be at the center of the visible universe and, hence, a violation of the Copernican principle. Moreover, there was absolutely no way to explain what stupendous force could possibly propel whole galaxies to the speeds suggested by the redshift factor (eventually, data were acquired that suggested speeds close to that of light itself). The basic Doppler interpretation was quickly abandoned.

Not abandoned, however, was the belief that the *apparently* receding galaxies were *actually* receding. It so happened, there was another conceptual way to impart recessional velocities to galaxies. Intervening space was said to be slowly continuously expanding, increasing the distance to the galaxies, as those galaxies are carried by "space" farther and farther away. Einstein's geometric medium, spacetime, even allowed for this expansion (although it also allowed for contraction). The cause of redshift was self-evident; while the light travels through the expanding vacuum the light waves expand as well. Wavelengths and gaps undergo elongation during the cosmic journey. The consensus among theoretical astronomers settled comfortably on the belief that the cosmic redshift was really an *expansion redshift*. And so the velocity-distance law was replaced by the *expansion-redshift law*.[c)] The "best" part of this interpretation was that it made explicit the most exciting scenario imaginable for the evolution of the universe.

As might be expected, there were problems. Universal expansion was not at all compatible with growing observational evidence of systematic structure. Furthermore, when conceptually extrapolated into universe-wide expansion, one encounters violations of philosophical principles. It all leads to a very messy cosmology. In fact, the experts eventually, many decades later, called it the "Preposterous universe." But, at the time, in the enthusiasm inspired by the opportunity to explore a dynamic new hypothesis, the problems were for the most part ignored.

But not quite by everyone.

Consider the remarkably perspicacious warnings of the foremost redshift expert himself, the eminent Edwin P. Hubble: "[L]ight *may* lose energy during its journey through space, but if so, we do not yet know how the energy loss can be explained."[1]

He expressed serious doubts about the universal expansion concept: "… this [is a] dubious world, the expanding universe of relativistic cosmology, …"[1]

Hubble spoke of the dilemma facing astronomers confronted with the two interpretations available at the time and the need for a better theory. The choice between Doppler and Expansion was "a dilemma, and the resolution must await improved observations or *improved theory* or both." (Emphasis added)

"If the nebulae [galaxies] are not rapidly receding, redshifts are probably introduced between the nebulae and the observer; they represent *some unknown reaction* between the light and the medium through which it travels."[1] (Emphasis added)

Hubble concluded his 1937 book, The Observational Approach to Cosmology, with these words:

> "But the essential clue, the interpretation of redshifts, must still be unraveled. The former sense of certainty has faded and the clue stands forth as a problem for investigation." … "We seem to face, as once before in the days of Copernicus, a choice between a small, finite universe, and a universe indefinitely large plus **a new principle of nature**."[1]

It was his conviction that cosmic redshifts "represent some unrecognized principle of nature."

Decades later, beginning in the 1960s, the astronomer Halton Christian Arp (1927–2013) began expressing strong doubts about the hypothesis of receding galaxies. He had amassed evidence of galactic redshifts that could not have been caused by recession velocities. Conventional-thinking astronomers implied that his controversial anomalous observations of distant galaxies "violated the known laws of physics" and must therefore be wrong. Galactic redshift, they asserted, was the measure of recession—deemed to be so by consensus (and thus elevated to official law). Responding to the skepticism and criticism from fellow astronomers, Halton Arp stated that their attitude was akin to saying "At this moment in history we know all the important aspects of nature we shall ever know."[2] Arp accused his critics of presuming that the then-known laws of physics were the only laws we will ever know; there are no other laws to be discovered. A scientist, he argued, reasoning deductively only from known laws will never discover anything new.

The controversy continued throughout the 20th century. The phenomenon was called the cosmological redshift, but its cause was repeatedly questioned. Universal expansion was just too radical an idea. Alternate interpretations were sought, advanced, and debated. For the most part, they fall into two categories, the gravitational shift and the various tired light proposals.

C. Gravitational spectral shift

Some researchers turned to Einstein's general relativity, according to which there exists a time dilation effect within any gravity well and this could manifest as a change in the wavelength of light. The effect is called a gravitational spectral shift, sometimes called an Einstein Shift; and what it does is weaken the light climbing out of a gravity field and strengthen the light entering a gravity field. Right away one can see a serious problem in trying to apply this theory to the universe. The universe, obviously, is full of gravity fields/wells. Whenever light descends into a gravity well it will be subjected to the Einstein Blueshift; and whenever light ascends a gravity well it will be subjected to the Einstein Redshift. Clearly, the two tendencies applied over cosmic

[c)] **Expansion-redshift law:** is expressed by the Friedmann-Lemaître expansion-redshift equation, $z = (R_0/R) - 1$, where R is the value of the scaling factor at the time of emission of the light at the source and R_0 is the value at the time of reception.

distances will, more or less, cancel out. Any net shift would be negligible.

The Einstein's gravitational spectral shift has the advantage of being a proven effect. It was confirmed, by J. W. Brault in 1954, for spectral lines emanating from the Sun.[3] The laboratory proof came in the early 1960s with the work of R. V. Pound, G. A. Rebka, Jr., and J. L. Snider; and involved the remarkably precise Mössbauer effect.

There was also Fritz Zwicky's Gravitational Drag model from the 1920s and 1930s. But, whatever the reason, it never became a serious contender as an explanation for the cosmic redshift.

D. Tired light

The catch-all category in the debate is tired or fatigued light. It was probably Fritz Zwicky (1898–1974) who was the first person to propose the tired-light idea. The interpretation is that light from distant galaxies might somehow become fatigued on its long journey to us, in some way expending energy during its travels. The loss of energy is reflected in the stretching of the wavelength. Although there was considerable speculation by accredited experts (George Gamow, to name one) intrigued by the tired-light idea as they sought explanations by altering the laws of Nature and adjusting the constants of Physics, a convincing cause for the energy loss was invariably missing. In some versions, the light during its extended journey through space is required to interact with something along its path—encounter some perturbation, disturbance, or interaction that in one way or another robs the photons of some of their energy. The longer the duration of the journey, the greater is the energy loss. The problem is that any type of interplay will inevitably cause a deviation in the flight path of the light. Even if the deviations are ever so slight, the image of the emitting object would acquire a degree of fuzziness. However, to the detriment of the tiredness idea, there is no such evidence; on the contrary, high redshift objects appear as clear and sharp as low redshift objects. As astrophysicist Edward Wright has stated, "There is no known interaction that can degrade a photon's energy without also changing its momentum, which leads to a blurring of distant objects which is not observed."[4]

But there is an even worse problem. Even if the energy-loss mechanism can be made to work, there is a critical feature that simply cannot be explained. There is no way to explain the increased delay between weakened pulses; the increased time intervals between redshifted light pulses. No explanation for the elongation of the "gaps" between photons!

During the second half of the 20th century, astrophysicists such as G. Burbidge and Halton Arp, while struggling to explain extreme redshifts associated with quasars, tried to exploit the weakened-light idea but were simply unable to accommodate the essential time-stretch feature. The photons may become tired, but not those in-between gaps.

E. Cosmic redshift overview

A quick summary of the five possible interpretations, including one not previously discussed, is presented in Table I.

TABLE I. Five categorical ways of explaining the observed cosmic redshift.

COSMIC REDSHIFT					
Possible causes:	Basic Doppler effect	Expanding vacuum/ space	Gravitational (Einstein shift)	Tired light (& other exotic causes)	Overlooked mechanism
Modus operandi:	Galaxies are receding. Galaxies are moving away THROUGH the vacuum. (Hence, recession velocity is limited to *c*.) KEY POINT: The redshift occurs ONLY at the time of emission (at the original source galaxy).	Galaxies are receding due to ongoing cosmic expansion of the vacuum. Galaxies are moving away WITH the vacuum. KEY POINT: The redshift occurs DURING the time of the light's cosmic journey.	An effect predicted by General Relativity (and proved by the R. L. Mössbauer experiment)	Light during its extended journey through space encounters some perturbation, disturbance, or interaction that in one way or another robs the photons of energy.	A fundamental interaction between electromagnetic radiation and gravity
PROBLEMS:	• Violates Copernican principle. • Lacks a driving force.	• Violates observational evidence of systematic structure. • When extrapolated, violates philosophical principles as it leads to a "preposterous" cosmology.	• Predicts near equal degrees of redshift and blueshift; thus, resulting in almost complete cancellation.	• Predicts fuzziness, blurred images, but is not observed. • Fatal flaw: Can't explain the time-stretch between pulses.	No problems whatsoever

Profiled in the table are four familiar interpretations; and then there is the mechanism that was overlooked, the "unrecognized principle of nature" of Hubble's prescient opinion.

II. OVERLOOKED ASPECT OF LIGHT PROPAGATION

A. New law of physics

What the theorists overlooked was the law governing the prolonged interaction between electromagnetic radiation and gravity gradients—a rule for in-flight activity between light-waves and the ever-changing gravitational environment. One might also say, they forgot to take into account a basic fact of Quantum theory: Photons are not located at a point, rather, they are spread out.

New law of physics: It 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.

Its most easily understood manifestation: 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 other words, light undergoes redshifting and neutrinos lose energy—*throughout the entire 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. As for the calculations of the effect, those must be done in the frame of background Newtonian space—space in the sense of *an empty container*.

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, although not important for the present article, is presented here for the sake of completeness. It is, however, extremely important for black-hole physics.

As counterintuitive as the Principle may seem, the reasoning behind it is surprisingly self-evident.

Three proofs are presented. One uses basic algebraic addition and subtraction; and presented within the framework of the DSSU aether theory of gravity. The second uses basic integral calculus, and again within the framework of aether gravity theory. The third proof applies simple logic to the effect induced on light waves by gravity treated as a force—the Newtonian force of gravity.

The proof on which the main focus is directed has two requirements: The first is simply that light quanta possess wavelengths. Photons are spread out.

The second is the existence of a space medium through which light propagates. Some choose to call it the quantum foam; I choose to call it aether (specifically, DSSU aether). Like Einstein's aether, it is *nonmaterial* and *dynamic*, but unlike Einstein's aether it is not a continuum. Rather, it consists of discrete units; and it is kinetic.

Next, we need a gravity well.

B. Gravity well

Here is what will serve as a representative gravity well: Imagine an earthlike body isolated in some far off region of the dynamic aether medium—undisturbed except for the presence of the gravitating body.

What does the aether do? … It flows. While Einstein's aether "flows" in a geometrodynamic sense, DSSU aether flows in the fluid-dynamic sense (in conjunction with a self-dissipative process).[5] What this means is that the gravity well is essentially an *aether well*. Mass acts as a sink for aether. It means the aether flows symmetrically into the mass body. The rate of this flow, in accordance with the DSSU aether theory of gravity, is[6]

$$\text{Aether flow velocity}: \quad v = -\sqrt{\frac{2GM}{r}}, \tag{1}$$

where G is the gravitational constant and r is the radial distance (from the center of mass M) 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. Incidentally, it also expresses the limiting velocity of freefalling objects.

Note that the aether is actually accelerating toward the mass; and that the acceleration is in proportion to the inverse-square law, in agreement with Newtonian gravity. However, it is only the velocity that is important here and is plotted in the graph (Fig. 1).

Be reminded that (i) the gravitating body is at-rest within the *space medium*, (ii) consequently, the aether flow is simply described in Eq. (1), and (iii) the aether flow is with respect to background Euclidean space.

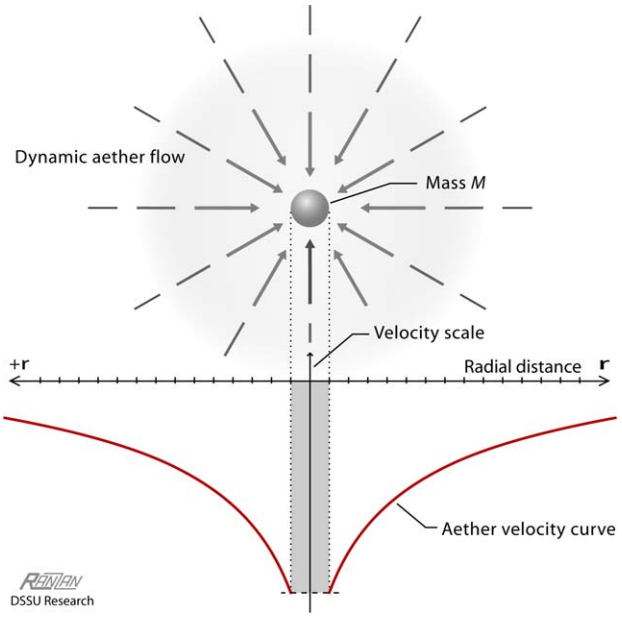

FIG. 1. (Color online) Schematic of the gravity well (top) shows the flow of aether into the central mass. The flow is an accelerating stream that nominally models Newtonian gravity. Just below is the graph representing the *velocity* of the flow of the space medium in accordance with the equation given in the text.

III. ELEMENTARY PROOF

It should be pointed out that all the gravity-well graphs presented herein use a radial coordinate system. That is, the radius axes on the left side and on the right side are both POSITIVE. And the sign convention is: Any motion away from the origin (the center of gravity) is considered positive, and motion toward the origin is deemed negative. The reason for using this method is to keep things as intuitive as possible. Needless to say, using a regular Cartesian coordinate system will give the same results.

A. Lightpulse during inbound journey

Consider a photon propagating into the representative gravity well surrounding its central mass body. By simple inspection (see Fig. 2), it should be apparent that the front end of the photon is moving inbound faster than the back end. It is a straightforward matter to show that the two ends are moving apart.

At the instant that the lightpulse is located at the radial position indicated as r_1 and r_2, the two ends of the lightpulse 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 *higher* up the gravity well, subtract the one *lower* in the well. An expression for the end-to-end relative velocity, then, follows:

$$\begin{aligned}&(\text{Relative velocity between ends of lightpulse})\\&\quad=(\text{vel. of higher end})-(\text{vel. of lower end}),\\&\quad=(-c+\upsilon_2)-(-c+\upsilon_1),\\&\quad=(\upsilon_2-\upsilon_1)>0,\end{aligned}\tag{2}$$

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, υ_2 is higher on the velocity scale than υ_1. Therefore, the expression must be positive. Hence, there is a velocity of separation between the two ends of the pulse.

B. Lightpulse during outbound journey

Next, consider a lightpulse propagating through the ascending half of the gravity well. Once again, it is found that the front end of the photon is moving faster (in the direction of propagation) than is the back end, see Fig. 3. The proof is a simple matter of showing that the two ends are moving apart; which means showing that the two ends have a positive 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.

As before, subtract the two velocities: From the one *higher* up the gravity well, subtract the one *lower* in the well.

$$\begin{aligned}&(\text{Relative velocity between ends of lightpulse})\\&\quad=(\text{vel. of higher end})-(\text{vel. of lower end}),\\&\quad=(+c+\upsilon_3)-(+c+\upsilon_4),\\&\quad=(\upsilon_3-\upsilon_4)>0,\end{aligned}\tag{3}$$

where υ_3 and υ_4 are the radial velocities of the aether flow. Since υ_3 is higher on the velocity scale (Fig. 3) than υ_4, the expression must be positive. Hence, there is a velocity of separation between the two ends of the pulse.

This confirms there does exist a positive end-to-end relative velocity.

Summarizing the journey: A lightpulse enters the gravity well, bypasses the central mass, proceeds to exit the well, and continues on its way to eventually enter into another gravity well, and so on. All the while, and this is the essential point, the pulse elongates—it accumulates a redshift. And over cosmic distance, as the pulse passes through galactic wells and galaxy-cluster wells, the effect of differential propagation becomes perceptible as a *cosmic redshift*.

The velocity difference of the ends of the lightpulse is the consequence of two concurrent factors: The velocity gradient of the conducting medium (aether); and the constancy of the pulse's speed (lightspeed c) with respect to that medium—specifically and emphatically with respect to the medium. So, when the medium's own velocity is not exactly the same at the front and back ends, the difference is imparted to the pulse.

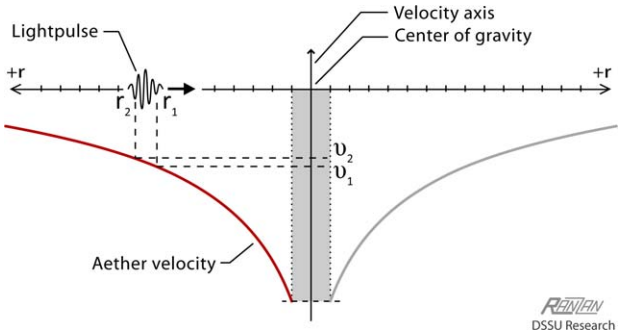

FIG. 2. (Color online) Lightpulse entering a gravity well "experiences" a flow differential between its front and back ends. As a consequence, the pulse tends to elongate; the pulse undergoes an elementary redshift process. (Note, the use of a cylindrical coordinate system, making the radius axis positive in both directions.)

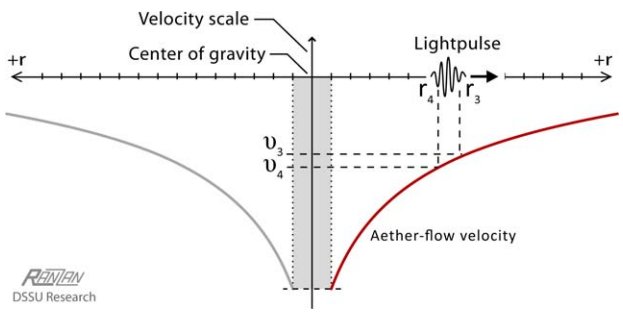

FIG. 3. (Color online) Lightpulse ascending a gravity well experiences a flow differential between its front and back ends (whose instantaneous positions from the center of gravity are r_3 and r_4, respectively). As a consequence, the pulse undergoes elongation and acquires a spectral redshift—a *velocity differential redshift*. (Pulse is greatly exaggerated in size.)

IV. DETAILED PROOF

The purpose here is to show that both paths through a gravity well—the one in and the one out—cause wavelength elongation.

The analysis makes use of the photon as an extended particle embedded in a kinetic and dynamic aether—all in accordance with the aether theory of gravity that underlies DSSU cosmology.[5]

A. Detailed analysis of lightwave during descent

Earlier, in Eq. (2), the relative velocity between ends of the lightwave was found to be $(v_2 - v_1)$. This elongation velocity of the wavelength can be expressed as $d\lambda/dt$. Furthermore, it is proportional to the wavelength λ itself. That is, $(d\lambda/dt) \propto \lambda$. Expressed as an equation,

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

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

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

As can be read from Fig. 4, the numerator $d\lambda/dt$ is simply $(v_2 - v_1)$, the velocity difference between the photon's two ends. Also, from the figure, the photon's wavelength λ is $(r_2 - r_1)$. Then,

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

which, by definition and by simple inspection, is just the slope of the curve (the aether-inflow velocity function). And

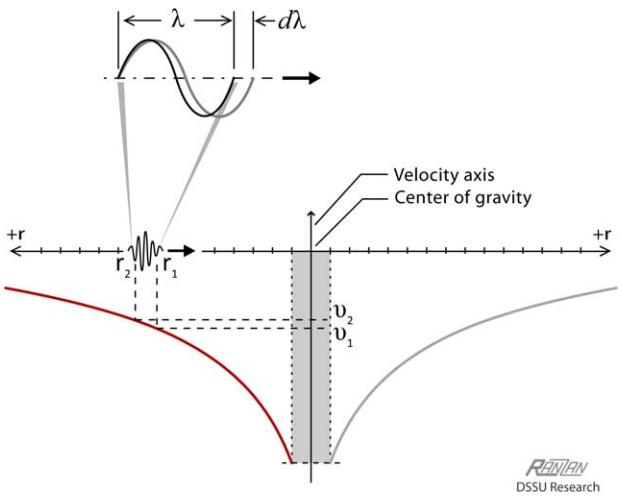

FIG. 4. (Color online) Lightwave elongation during inbound propagation through the gravity well. The wave/photon is being conducted by a space medium, whose speed of inflow increases with proximity to the gravitating structure. As a result, the photon's front and back ends experience a flow differential. The wavelength increases during the descent into the gravity well, which is shown here by its aether-flow velocity curve. (The radius axis is positive in both directions by virtue of using a cylindrical coordinate system.)

the expression for this curve [the aether-flow curve from Eq. (1)] is

$$v_{\text{aetherflow}} = -\sqrt{\frac{2GM}{r}}, \tag{7}$$

where $r \geq$ (radius of mass M), G is the gravitational constant, and M is the spherical gravitating mass. And the slope of this curve is just the derivative

$$\frac{dv}{dr} = \frac{d}{dr}\left(-\sqrt{2GM/r}\right) = \frac{1}{2}\sqrt{2GM}(r^{-3/2}). \tag{8}$$

Thus, the slope k can be expressed for any radial location, r, as

$$k(r) = \frac{1}{2}\sqrt{2GM}(r^{-3/2}). \tag{9}$$

With the substitution of Eq. (9) into Eq. (4), the rate of change of the wavelength is expressed as

$$\frac{d\lambda}{dt} = \frac{1}{2}\sqrt{2GM}(r^{-3/2})\lambda, \tag{10}$$

or equivalently (by using the chain rule),

$$d\lambda\frac{dr}{dt} = \frac{1}{2}\sqrt{2GM}(r^{-3/2})\lambda dr. \tag{11}$$

But dr/dt is just the velocity of the photon itself, which is $-c$. It has a negative sign, because it is in the negative direction of the radial coordinate system. And so

$$\frac{d\lambda}{\lambda} = -\frac{1}{2c}\sqrt{2GM}(r^{-3/2})dr. \tag{12}$$

The wavelength, as a function of radial distance, is found by simply integrating Eq. (12) from *initial* to *final* "values"

$$\int_{\lambda i}^{\lambda f}\frac{d\lambda}{\lambda} = -\frac{1}{2c}\sqrt{2GM}\int_{ri}^{rf}(r^{-3/2})dr \tag{13}$$

$$\ln\lambda\Big|_{\lambda i}^{\lambda f} = -\frac{1}{2}\sqrt{\frac{2GM}{c^2}}(-2r^{-1/2})\Big|_{ri}^{rf};$$

$$\ln\lambda\Big|_{\lambda i}^{\lambda f} = \sqrt{2GM/c^2}(r^{-1/2})\Big|_{ri}^{rf};$$

$$\left(\begin{array}{c}\leftarrow \text{ This step just cancels out}\\ \text{the previous two negatives.}\end{array}\right)$$

$$\ln\lambda f - \ln\lambda i = \sqrt{2GM/c^2}\left(r_f^{-1/2} - r_i^{-1/2}\right);$$

$$\ln\left(\frac{\lambda f}{\lambda i}\right) = \sqrt{2GM/c^2}\left(r_f^{-1/2} - r_i^{-1/2}\right);$$

$$\frac{\lambda f}{\lambda i} = \exp\left(\sqrt{2GM/c^2}\left(r_f^{-1/2} - r_i^{-1/2}\right)\right). \tag{14}$$

This expression gives the ratio of the "final" and "initial" wavelengths, for light propagating into a gravity well. And it

should be emphasized, these are *intrinsic* wavelengths; they have a fundamental connectedness to the aether medium. The above equation may be applied to the wavelength of the light or to the gap between periodic light pulses.

The corresponding *intrinsic* redshift follows directly from the basic redshift definition:

$$z = \frac{\lambda f - \lambda i}{\lambda i} = \frac{\lambda f}{\lambda i} - 1, \tag{15}$$

$$z_{\text{intrinsic}} = \exp\left(\sqrt{2GM/c^2}\left(r_f^{-1/2} - r_i^{-1/2}\right)\right) - 1. \tag{16}$$

Consider a simple example; and remember, we are regarding the gravity source in isolation and assuming the absence of any other gravity wells. Light traveling from a significant distance to reach the earthlike mass would acquire an intrinsic spectral shift as follows:

By using these values with Eq. (16): $c = 3.0 \times 10^8$ m s^{-1}; $G = 6.673 \times 10^{-11}$ N m^2 kg^{-2}; $M_E = 5.98 \times 10^{24}$ kg; $r_{\text{initial}} \approx \infty$, and $r_{\text{final}} = R_E = 6.37 \times 10^6$ m; one obtains

$$\begin{aligned} z_{\text{intrinsic.E}} &= \exp\left(\sqrt{2GM_E/c^2}\left(R_E^{-1/2} - 0\right)\right) - 1; \\ \mathbf{z_{intrisic.E}} &= 0.000\,03733. \text{ (Inbound)} \end{aligned} \tag{17}$$

Significantly, this value is *positive*—therefore identifying it as a redshift.

B. Detailed analysis of lightwave during ascent

As with the previous analysis, the relative velocity between the ends of the lightwave can be expressed as $d\lambda/dt$ proportional to the wavelength λ itself and equated to $k \cdot \lambda$

$$\frac{d\lambda}{dt} = k\lambda, \tag{18}$$

and

$$k = \frac{\dfrac{d\lambda}{dt}}{\lambda}. \tag{19}$$

From Fig. 5, the photon's intrinsic wavelength λ is $(r_3 - r_4)$. And $d\lambda/dt$ is again the velocity difference between the photon's two ends; this difference, from Eq. (3) above, is $(\upsilon_3 - \upsilon_4)$. Then,

$$k = \frac{(\upsilon_3 - \upsilon_4)}{(r_3 - r_4)}, \tag{20}$$

which, by definition, is just the slope of the curve (the aether-inflow velocity function in Fig. 5). The slope is the same as was previously determined in Eq. (9)

$$k(r) = \frac{1}{2}\sqrt{2GM}(r^{-3/2}). \tag{21}$$

Combining Eqs. (18) and (21), one obtains

$$d\lambda\frac{dr}{dt} = \frac{1}{2}\sqrt{2GM}(r^{-3/2})\lambda dr. \tag{22}$$

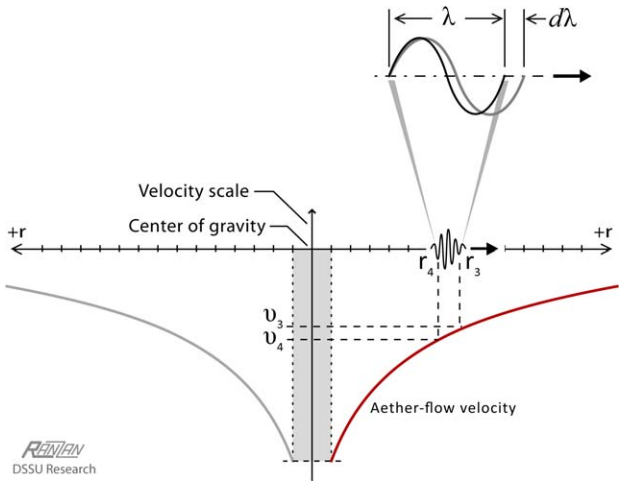

FIG. 5. (Color online) Lightwave elongation during outbound propagation through the gravity well. The wave/photon is being conducted by aether whose speed of inflow accelerates with proximity to the gravitating structure. As a result, the photon's front and back ends experience a flow differential. The wavelength increases during the ascent within the gravity well, shown here by its aether-flow velocity curve.

Noting again dr/dt is just the velocity of the photon itself, but this time it is in the positive radial direction and given a positive sign, $+c$. And so, the fractional change in the wavelength can be expressed as

$$\frac{d\lambda}{\lambda} = \frac{1}{2c}\sqrt{2GM}(r^{-3/2})dr. \tag{23}$$

The wavelength, as a function of radial distance, is found by integrating between initial and final limits

$$\int_{\lambda i}^{\lambda f}\frac{d\lambda}{\lambda} = \frac{1}{2c}\sqrt{2GM}\int_{ri}^{rf}(r^{-3/2})dr. \tag{24}$$

After completing similar steps detailed in Section IV A, one obtains a slightly different equation (note carefully the radius subscripts)

$$\frac{\lambda f}{\lambda i} = \exp\left(\sqrt{2GM/c^2}\left(r_i^{-1/2} - r_f^{-1/2}\right)\right), \tag{25}$$

where G is the gravitational constant, M is the gravitating mass, and $r \geq$ (radius of mass M). This expression gives the ratio of the *intrinsic* final and initial wavelengths, for light propagating outward.

Using the basic definition of redshift, $z = (\lambda_f - \lambda_i)/\lambda_i$, the corresponding *intrinsic* spectral shift is

$$\begin{aligned} z_{\text{intrinsic}} &= \frac{\lambda f}{\lambda i} - 1 \\ &= \exp\left(\sqrt{2GM/c^2}\left(r_i^{-1/2} - r_f^{-1/2}\right)\right) - 1. \end{aligned} \tag{26}$$

If evaluated for the isolated-Earth example (using the values $c = 2.997 \times 10^8$ m s^{-1}; $G = 6.673 \times 10^{-11}$ N m^2 kg^{-2}; $M_E = 5.98 \times 10^{24}$ kg; $r_{\text{initial}} = R_E = 6.37 \times 10^6$ m, and $r_{\text{final}} \approx \infty$), the resulting outbound journey's spectral shift will be

$$z_{\text{intrinsic.E}} = \exp\left(\sqrt{2GM_{\text{E}}/c^2}\left(R_{\text{E}}^{-1/2} - 0\right)\right) - 1;$$
$$\mathbf{z_{intrisic.E}} = 0.000\,03733.\ (\text{Outbound})$$

Again, a positive value, again a redshift. It is identical to the redshift acquired during the inbound portion of the journey.

V. THIRD PROOF BASED ON GRAVITY AS A FORCE/EFFECT

Although easiest understood in the context of the DSSU aether theory of gravity, a proof can also be constructed by using gravity just by itself—by using gravity as a force without any reference to its fundamental cause. The "force" argument depends only on self-evident factors: Namely, light quanta are extended entities, that is, 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). Gravity's ability to influence and accelerate light has long been known from the proven phenomenon of gravitational lensing.

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.

When a light pulse descends into a gravity well, the leading end is nearer to the source of the gravity, thus, making the gravitational effect acting on the pulse's leading end greater than the effect on the trailing end, see Fig. 6. This difference, or differential, in the acceleration exists throughout the inbound journey. It follows that, in the frame of the pulse itself (and with respect to the background Euclidean space), there will occur a separation between the two ends. An elongation of the wavelength will accrue.

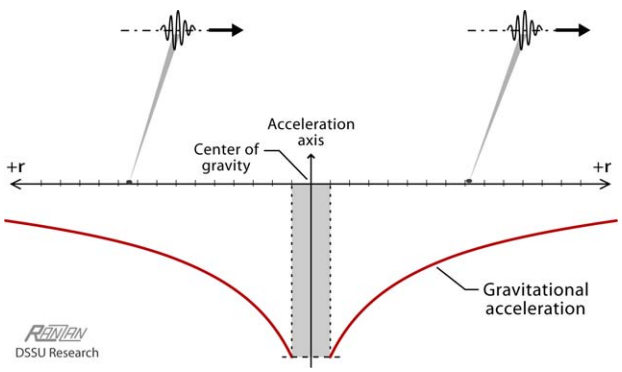

FIG. 6. (Color online) Light pulse transiting a gravity well. During the descent, the gravitational acceleration acting on the leading end of the pulse is slightly more intense than the acceleration on the trailing end. This differential in the acceleration manifests as an intrinsic elongation. During the ascent, the situation is reversed; the gravitational acceleration acting on the fore end is slightly *less intense* than what is experienced by the back end. In other words, the trailing end is being "dragged back" more than is the front end. Consequently, there is again an intrinsic stretch (gravitational acceleration: $a = -GM/r^2$) (note again, the use of a cylindrical coordinate system).

Then, when the pulse ascends the gravity well, it is the tail end that is closer to the center of gravity. The gravitational pull on the back end is ever so slightly more intense than is the pull acting on the leading end. There exists a gravitational acceleration differential as evident in Fig. 6. The trailing pulse-end "feels" a stronger backward pull throughout the outbound propagation. Once more, it follows that there will be an intrinsic separation manifesting as wavelength elongation.

The argument applies, just as well, to a train of light pulses; but it also applies to the spacing between mass objects (aligned along a radial axis and undergoing inertial freefall). Objects falling in tandem from a very great height will, as a matter of fact, experience an increase 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 *redshift*. Yet, the conventional view predicts a gravity differential *blueshift*.

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

VI. SOME RELEVANT ASPECTS

A. Total redshift across gravity well

The total velocity differential effect across a gravity well is not simply the sum of the redshifts of the in and out paths. Realize that the redshifting process occurring during the outbound path applies to the original wavelength PLUS its additional delta-λ acquired during the inbound path. Redshifting is a compounding process.

Assuming an uninterrupted total light path, the overall effect is calculated as follows:

$$\begin{aligned}(\text{Total redshift factor}) &= (\text{Inbound redshift factor}) \\ &\quad \times (\text{Outbound redshift factor}), \\ (1 + z_{\text{total}}) &= (1 + z_{\text{inbound}})\,(1 + z_{\text{outbound}}).\end{aligned}$$

Across the isolated earthlike gravity well, the total intrinsic redshift would be

$$\begin{aligned}(1 + z_{\text{total}}) &= (1 + 0.000\,03733)\,(1 + 0.000\,03733), \\ \mathbf{z_{Earth}} &= (1.000\,03733)^2 - 1, \\ &= 0.000\,074661.\end{aligned}$$

Now compare. The corresponding in-out *gravitational shift* (per relativity theory) would be practically zero.

What if the light is mirror-reflected from the surface of a gravitating body? Nothing would change; redshift acquisition would still take place during both legs of the path.

B. Observability aspect

The principle of velocity differential propagation makes the following prediction: Light that enters a gravity well and reaches the bottom will have acquired an intrinsic redshift.

However, an observer at the bottom, that is, on the surface of the gravitating body, will observe the light as having

undergone a blueshift. The observer does not detect the redshift of the Principle!

The question is *Why not*?

It's simply that surface observers are *not* inertial spectators. Their seemingly stationary light-measuring apparatus is actually "experiencing" acceleration—an acceleration that is built into the force holding up the observatory and everything in it.

What the observer is actually detecting is the wavelength of relativity theory, the gravitational shift (which, for incoming light, is a blueshift).

The intrinsic shifts are not directly observable from inside the gravity well. The truth of this applies to just a single gravity well (but does not apply over multiple wells). The underlying reason is that any observer inside the well is always, and everywhere, under the influence of accelerated motion with respect to the inflowing space medium (aether). For instance, the "stationary" observer positioned on the Earth's surface is subject to an upward acceleration of 9.8 m/s^2. And as part of the same mechanism, the observer is subject to a constant relative-to-aether motion of 11.2 km/s (if one ignores the background aether flow that surrounds the well, or just thinks in terms of the isolated earthlike object). What this means is that Earth-surface detectors, by virtue of location, are undergoing radially upward "motion"; consequently, incoming light waves and pulses are subject to an underlying Doppler effect. Also, measuring instruments are subject to a clock-slowing factor.

How large is the resulting *Doppler* blueshift effect? (It hardly needs stating but this Doppler shift is quite unrecognized within conventional gravity theory.) In the case of the earthlike example, the associated surface speed of the inflow [per Eq. (1)] is 11.2 km/s. Effectively, measuring instruments are in motion vertically into the aether at the this same speed. This "measured" Doppler shift turns out to be −0.000,03733 (a blueshift). Meanwhile, the velocity-differential redshift is +0.000,03733 for the same incoming light. This means the two effects cancel each other to within four significant digits.

The main reason, then, that the intrinsic redshift is not observed is attributed to the canceling effect of the Doppler blueshift. (For the earthlike example, the surface velocity-differential redshift of +0.000,03733 cancels the Doppler blueshift of −0.000,03733.)

The proper way, or most effective way, to measure the velocity-differential redshift is to take reading across the width of the gravity well or some reasonable portion thereof. A light source needs to be on one side and the detector on the other.

Nevertheless, when the light passes through multiple gravity wells, including those of cosmic scale, the redshift imprint of each is accumulated and compounded; the opportunity for detecting the shift is then most favorable. In that case, the two shifts introduced by the receiving gravity well, the Doppler blueshift and the gravitational blueshift, become relatively negligible; and so, the ground-based spectrometers are able to measure the much larger velocity differential shift and identify it as the cosmic redshift.

Putting this in perspective for the earthlike gravity well: The gravitational blueshift is a miniscule $z_{\text{grav}} = -6.965 \times 10^{-10}$; and the Doppler shift is $z_{\text{Dop}} = -0.000,03733$. When compared to the spectral shifts of galaxies that astronomers commonly deal with, both of these "contaminants" are inconsequential.

Earth astronomers, however, do have to consider another Doppler effect. They are careful to make compensating corrections for Earth's Doppler motion caused by its orbit about the Sun. They then refer to the "corrected" redshift as being heliocentric. The idea is to remove the known significant contaminants.

C. Why the neutrino is subject to the principle

Neutrinos are subject to the velocity differential effect by virtue of being a composite of linearly propagating photons.

A neutrino is simply a pair of photons locked together in such a way that they internalize their electromagnetic fields/effects causing the neutrino to lose, almost entirely, its ability to interact with the rest of the electromagnetic world; all the while, the locked pair propagates as a unit at the speed of light.[7] In the words of neutrino experts Kearns *et al*. "Described quantum-mechanically, the neutrino is apparently a superposition of two wave packets of different mass."[8]

The take-away point is that a neutrino travels at the speed of light and possesses a wavelength and, consequently, is subject to the velocity differential effect just like ordinary quanta of light. And so it is, neutrinos will lose energy when traversing a gravity well or gravity domain.

VII. EVIDENCE

There is good experimental evidence of the velocity-differential redshift from signals propagating across the Solar gravity well—evidence that wavelengths and the intervals (the gaps) between pulses are affected by the Principle.

Evidence from 1967 of additional redshift when star passes behind the Sun: Every year in the month of June the star Taurus A (a radio source also known as Aldebaran) aligns very close to the Sun. During such annual approach, it is possible to measure the change in the star's light spectrum, notably its 21-cm absorption line, as the radiation passes through the Sun's gravity well. Any shift in this absorption line to a lower frequency (or longer wavelength) would indicate that a redshift had been imparted.

In 1968, the journal *Science* published the results of such an experiment. It was reported that the 21-cm signal coming from Taurus A suffered a redshift of 150 Hz while grazing the Sun at a distance of 5 solar radii on June 15, 1967. The authors noted the shift was much larger than what is predicted by the general theory of relativity. This redshift cannot be explained by the Einstein shift which predicts a change of only ±0.16 Hz.[9]

Evidence from 1974 relating to the Pioneer-6 anomaly: It was reported in Astronomy and Astrophysics that the 2292 MHz signal from *Pioneer-6* was found to be subjected to a redshift when it passed behind the sun, that is, when the Sun lies near the signal path. The authors pointed out that

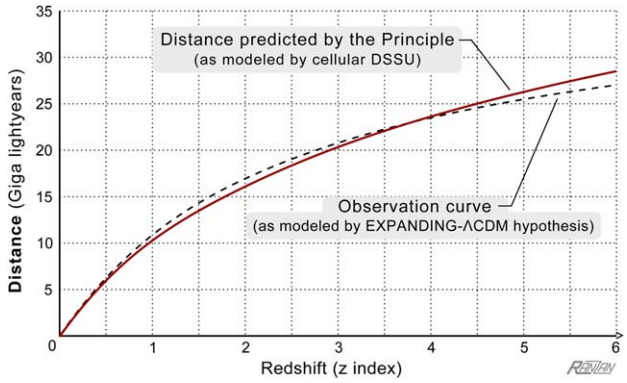

FIG. 7. (Color online) Cosmic redshift is interpreted in accordance with the Principle of velocity differential propagation (solid curve). The dashed curve represents the cosmic-redshift-versus-cosmic-distance relationship based on astronomical observations over many decades using sophisticated techniques. The "prediction" curve agrees remarkably well with the "observation" curve. Note that the observation curve is modeled by the expanding-ΛCDM hypothesis; reasonable agreement is obtained by adjusting its various parameters none of which has a connection to physical reality. **Specs: The DSSU** model (solid curve) uses gravity wells 350×10^6 light-years in diameter across which the calculated redshift is 0.0242. **Specs: The expanding-ΛCDM** model (dashed curve representing the "now" distance) uses $H_0 = 70.0$ km/s/Mps, $\Omega_M = 0.30$, $\Omega_\Lambda = 0.70$; and the plotting was done with Edward Wright's *Cosmology Calculator*, www.astro.ucla.edu/~wright/CosmoCalc.html.

there is no satisfactory quantitative explanation of these phenomena.[10]

Evidence from 1976 relating to the Viking mission to Mars: Several experiments have been performed with planetary probes; one of the most precise was with the Viking landers on Mars. It was found that when Mars is on the far side of the Sun, signals from the Vikings must pass through the deepest portion of the Sun's gravity well resulting in observed delays of about 100 μs. It is as if Mars had jumped some 30 km out of its orbit.[11] According to the Principle, this represents a redshift, or fractional elongation, of 0.0810×10^{-6}; and if the source signal had the same radio frequency as Taurus A, the delay would correspond to a frequency decrease in about 116 Hz. This supports the earlier results of the 1967 *Taurus A Experiment*, in which the frequency shift was 150 Hz acquired over a larger portion of the Sun's well.

Remember, the *Einstein shift* of general relativity—because it practically cancels out—cannot explain this.

Then there is the evidence relating to the cosmic-scale gravity wells. When the Principle is applied to the gravity domains of rich galaxy clusters, when the line of sight passes through cluster after cluster and still more clusters, one finds the most amazing agreement with astronomical distance measurements. Figure 7 shows, on the one hand, what is predicted by the DSSU with its *nonexpanding* cosmic gravity wells, and on the other, the observation-based distance as a function of redshift. The comparison is truly remarkable; all the more so because the DSSU is strictly a nonexpanding universe.

A more in-depth analysis of the DSSU redshift-distance relationship (and additional graphical comparisons) is presented in Ref. 12.

VIII. CONCLUDING COMMENTS

A. What do the experts believe?

Experts Martin White (of the Enrico Fermi Institute, Chicago) and Professor Wayne Hu (of the Institute for Advanced Study, Princeton) have published considerable research on what is called the Sachs–Wolfe effect—an effect specifically dealing with photons traversing cosmic gravity wells. They believe, if the gravitational potential does not change (that is, the depth or shape of the gravity well stays the same) while the photon is crossing it, then there will be a cancellation "between the infall blueshift and the outclimb redshift."[13] Their assessment is unambiguous and expresses no doubts.

The no-net-redshift view is the prevailing wisdom and treated as an established fact. A check of any encyclopedic work on astronomy or astrophysics yields the assertion that photons gain energy entering a gravity potential and lose it while climbing out. If the gravity potential remains stable, then the gain and loss expectantly cancel.

B. Discussion of validity

How compelling is the proof of the Principle and its applicability to the cosmic redshift? How valid is all this?

In addressing the question of validity, consider the Law itself and the underlying elements. Say one wishes to refute the stated Principle. There are several ways to attempt this.

- One could claim that quanta of light do not have wavelengths. Surely, no one would ever make such an assertion.
- One could claim there is no space medium. To my knowledge, no serious researcher has ever done this except in presentations for popular audiences or in an elementary level discourse. (For instance, see the quote, below, by Sheldon Glashow.)
- One could claim there is no intimate connection between light and the space medium, no interaction, no embeddedness, no relationship. Aether, or whatever, is not luminiferous. This amounts to an assertion that light is not some kind of disturbance or excitation in, or of, the space medium. But if light is not a disturbance/excitation of the vacuum, then what, one must ask, is? And if nothing disturbs/excites the medium, then why bother with it at all? In other words, if one refutes the connectedness between light and aether, one is effectively denying the very existence of the space medium. And as stated above, no researcher is willing to do this.
- One could claim there is no velocity differential of the space medium—no gradient in the flow of aether. This will not alter the validity, because the proof does not depend exclusively on the velocity differential concept. Proof number three is based solely on the indisputable property of gravity as an inverse-squared effect.
- One might maintain there is no stretching of lightwaves nor of the gaps, but then one is essentially saying that gravity does not accelerate the motion/propagation of light. And if one denies gravity's ability to accelerate light (or lightpulses) then one is automatically rejecting the phenomenon of gravitational lensing!

- Lastly, one could, maybe as an act of desperate frustration, simply reject objective reality (as seems to be the modern trend). Needless to say, one would then be outside the realm of science. To which nothing more need be said.
- But I should add a post script: There are, however, dishonest people who will, without hesitation, reject the argument (hence, the reasoning supporting it) solely on the basis of the conclusion. They hinder the advancement of science while exposing themselves as frauds. This, I suspect (for good reason) is probably the most common factor.

As for challenging the validity of the Law's applicability to the cosmic redshift, the Law's involvement in its cause: The only possible objection here is to declare there are no gravity wells. The universe does not consist of gravity fields. *That*, assuredly, is absurd.

C. The unavoidable question

How could scientists have missed the Principle?

The main factors were the influence of relativity and the total lack of restraint in the adoption and application of a totally unverified hypothesis.

First and foremost, scientists of the 20th century missed this Law because of the single-minded effort to interpret, whenever possible, Nature and its phenomena in terms of relativity theory. It was applied wherever a phenomenon was in some way dependent on the perspective or the motion of the observer or the measuring instruments. Gravity, too, was interpreted in terms of relativity theory. The theory's application extended to ever greater time scales and ever more extremes of size scales. From cosmic beginning of time to the unimaginable future; from the scale of the whole universe down to the scale approaching singularities, explanations were sought within Einstein's conceptual framework. However, the Principle having pivotal relevance here involves something that happens to electromagnetic radiation (and neutrinos) at a level entirely independent of any observer. Here was a phenomenon no one thought of investigating.

One might be tempted to assert that Einstein's rejection of aether played a major role. He had, in his early and rebellious years, rejected the very existence of aether. Although he was wrong about aether, the extraordinary success of the relativity theories and the other great theories (such as the quantization of light and the photoelectric effect) led to the wholesale acceptance of what became the "new physics," including, unfortunately, the nonexistence of aether.

However, the mature Einstein made it quite clear, as expressed in his 1920 Leyden University lecture and in his 1922 book *Sidelights on Relativity, Ether and the Theory of Relativity*, that aether does exist. In fact, he stated that light would not be able to propagate without it. "According to the general theory of relativity space without aether is unthinkable; for in such space there … would be no propagation of light," He further stated "As to the part which the new aether is to play in the physics of the future we are not yet clear."[14]

And that is pretty much where he left the issue of aether. Einstein never exploited "the new aether" beyond the confines of relativity theory, and, for the most part, neither did anyone else. But why!? Einstein and his followers insisted: The idea of motion may not be applied to the aether of the new physics. Without aether motion, of course, there can be no aether-flow differential.

The aether, whether old or new, was neglected for the rest of the century, with the definitive experiments of Dayton Miller being a notable exception. Even as late as 1988, Nobelist (1979 Physics) Sheldon L. Glashow would dismiss aether in these terms: "What we call light consists of electromagnetic oscillations, periodically changing electric and magnetic fields, but they do not need aether or any other medium to propagate themselves. They are perfectly capable of propagating through empty space."[15]

Second, there was the adoption of an unverified hypothesis and its outrageous extrapolation.

The hypothesis was that the apparent recession of distant galaxies was caused either by the galaxies actually flying away through the vacuum or by the expansion/growth of vacuum between here and the distant galaxies.

The theoretical backing came from Einstein's general relativity, which allowed the "space medium" to expand. Additional backing came in 1932 with the introduction of the Einstein–deSitter model of the universe. It was a mathematical construction of a universe that expands and over time gradually slows down its rate of expansion.

It seemed there was no alternative to the hypothesis of the recession of galaxies. Hubble was truly perplexed. In 1937, he wrote, "There must be a gravitational field through which the light quanta travel for many millions of years before they reach the observer, and there may be some interaction between the quanta and the surrounding medium." But what medium was Hubble referring to? He did not specify. No matter. He immediately summed up the situation in these words, "The problem invites speculation, and, indeed, has been carefully examined. But no satisfactory, detailed solution has been found. The known reactions have been examined, one after the other—and they have failed to account for the observations."[1]

And so it happened that the experts settled on the expansion idea (medium or no medium), which was immediately extrapolated into a hypothetical expansion of the entire visible universe. It was even back-extrapolated to a hot-and-dense primordial state—a tiny cosmic egg.

Hubble had laid out the available options: "this dubious world, the expanding universe of relativistic cosmology," on the one hand, or "some unrecognized principle of nature," on the other. A practical man, Edwin Hubble, refused to commit himself and simply gave up on any further investigation of the causality issue; and was quite content to let the experts figure it all out and decipher the true meaning.

The accredited experts contrived and promoted the expanding-universe paradigm—a supreme masterpiece of misconception. (Whether the particular version hypothesized a steady-state expansion or an explosive growth, made no difference, each was exquisitely crafted and equally unrealistic.)

The only evidence to be had consisted of those *apparently receding* galaxies—misinterpreted as actual receding

motion. There was simply no real evidence. None whatsoever. Model variations and alternative theories were explored. The situation was desperate. Then it happened. In 1965, a pair of Bell Lab researchers Arno Penzias and Robert Wilson measured the background radiation believed to be coming from deep space; essentially it was treated as the background temperature of the universe. Some actually considered it to be a major discovery, worthy of no less than a Nobel Prize. The only thing "major" about this temperature measurement was its potential for supporting the big bang hypothesis; theorists realized they could exploit this temperature as the critical evidence, otherwise lacking. Here, they declared was the "proof" of expansion, evidence that the cosmic climate had changed from a sunny-hot 5000 K down to a sub-freezing 3 K. At last the cosmic climate change adherents had something to serve as evidence. When, in 1978, the Nobel was awarded to Penzias and Wilson, everyone knew the big-bang believers were definitely in control.[d)]

It became orthodoxy that the universe expanded from a hot and dense matter-dominated state and, during the expansion, transitioned to the diluted state with a cool 3 K background evident at this time. This radical change, supposedly took place during the last 13.8×10^9 years. Although completely wrong, there is no doubt that the scenario is a masterpiece and was conceived by brilliant minds. For instance, the time scale of 13.8×10^9 years just mentioned was established over many years of research and is claimed to be accurate to within about 1%. "[T]he age of the Universe is now known with better than 1% accuracy"![e)] The good authority for this is the world's foremost cosmologist James Peebles (yes, another Nobel laureate).

There is, however, nothing special about this temperature value. It is just the temperature that the Universe happens to be—at least in the regions away from hot spots like stars, quasars, and astrophysical jets. The background temperature is what it is and quite worthless as evidence of some hot-and-dense big-bang beginning. If the temperature had been different; if it had measured 15 K or 50 K, the claim that it was evidence to serve as the pillar for the big-bang paradigm would still have been advanced.

The resolution of Olbers' Paradox is often elevated to the status of a supporting pillar. Again, one finds a finely crafted argument. Unfortunately for the big-bang defenders, *that* pillar was toppled in 2016.[16]

In summary, the Principle was overlooked primarily because the leading thinkers of the time were preoccupied with the new physics of relativity and, moreover, became obsessed with the paradigm of universe-wide expansion. Others merely followed; naturally, that included following the money. Much more could be said on this matter, but the point has been made, the question answered.

D. Momentous misinterpretation

Theorists of the last century, along with all their many hangers on—journal editors, book publishers, videographers, financial funders, educators, etc.— had committed themselves to a false narrative, and they did so to the depth and extent where there was no way out. The current Century has inherited this dilemma. When the "collective wisdom" has it wrong to such a degree, there really is no easy way out. Don't expect anyone to turn traitor to the collective. Instead, expect the misinterpretation to sink ever deeper. Expect more awards such as the 2011 Nobel Prize, this one given for the "discovery" of ever-faster cosmic expansion! Expect ever more abandonment of objectivity and disconnect from reality. How, then, can this ever be resolved? What fate for the masterpiece of misconception? … It will either suffer a prolonged dissolution by decay or undergo a replacement by revolution!

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[15]S. L. Glashow, *Interactions* (Warner Books Inc., New York, 1988), p. 43.
[16]C. Ranzan, Am. J. Astron. Astrophys. **4**, 1 (2016).

[d)]It turns out that what Penzias and Wilson had actually detected, based on some rather conclusive evidence, was an Earth-sourced signal—the signature from the Earth's oceans, via the hydrogen bond in water.

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[e)]As quoted in the report issued by The Nobel Committee for Physics of the Royal Swedish Academy of Sciences: *Scientific Background on the Nobel Prize in Physics 2019* (8 October 2019).