ASTRONOMICAL REDSHIFTS REINTERPRETED

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A viscosity-related photon redshift with no frequency dependence eliminates the need for any expansion of space and lowers the velocity-related factor in the Hubble constant. The hypothesized structure of photons suggested here leads to a new explanation for why tired light may be the major contributor to the redshift observations of celestial objects. The result is a need for reinterpretations of the size of our big bang, its age, the size of our part of the universe and that beyond our big bang and the need for dark matter and dark energy. A new 'empty' space universal constant is uncovered and a relationship between the viscosity component of the current Hubble constant H_o and the fine structure constant α is suggested.

Keywords: Redshift; Viscosity redshift; Velocity redshift; Distance; Hubble Constant; Cosmology; Galaxies; Expansion; Universe; Fine Structure Constant; Dark matter; Dark energy; Arrow of time; Steady state;

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Introduction

Current orthodoxy is that there are three components to the redshift of celestial objects, due to gravitation, relative velocity and the expansion of space. The latter component is routinely accepted because the ***Z*** shift of many stars and galaxies implies that they have relative speeds greater than light speed.

The case for redshift due to distance, so called 'tired light', has been posited before in terms of a quadratic distance relationship locally [1] [2] or everywhere [3] or with some frequency dependence [4].

What is proposed here is a far simpler linear form of tired light, where every motion of every particle is opposed by a form of friction or viscosity reducing its energy. The specific case of how this physically affects photons will be explained later. For now, only the outcome, that each move of one Planck length R_s along its path by a photon suffers a fractional energy loss ***F*** regardless of the frequency of the photon.

The further proposition following on from this new treatment of tired light is that this effect completely replaces the ***Z*** shift of the expansion of space. Furthermore, relative speed above ***c*** of any physical object is excluded in this model, along with the universe being only three physical dimensions and flat, with the result is that the physical size of our big bang is changed, altering the need for dark matter and dark energy.

The starting point

The starting point is the energy loss by a photon emitted at frequency W_e moving between two points a distance ***D*** apart where $D = d\, R_s$ and the fractional energy loss is $F = f/R_s$ with the observed frequency W_o

$$W_e - W_o = F\, D\, W_o$$

The value of ***f*** is a constant in the same way that ***c*** is a constant, although in reverse impact. It is a minimum measureable value in 'empty' space, but takes a higher value where ***c*** is restricted by matter. So when a photon is near a black hole, its maximum speed will be close to zero, although this is still the local ***c***, but the value of ***f*** will be high. In the case of photons passing through space over long distances, the value of ***f*** can be treated as a constant just as is the case for ***c***.

The viscosity redshift Z_c of such a photon will be

$$Z_c = f\, d$$

This has no reliance on the frequency of the photon, only how far it has travelled. However, although each step of photon travel R_s has the same value for all photons, when converted into how much each is affected over a wavelength, the values of f have to be treated differently for different emission or observation frequencies.

For two photons of different emission frequencies W_{e1} and W_{e2} , observed at the same distance D, their energy losses will be

$$W_{e1} – W_{o1} = F_1 D W_o$$

$$W_{e2} – W_{o2} = F_2 D W_o$$

and the Fs are now differentiated between the two. If the two are emitted at the same distance away, then unless they have the same W_e, they will have different values of F_1 and F_2.

This may seem like frequency dependence, but it is only because in looking at the energies of the photons we need to know their frequency or wavelength differences. When considering only the distance that the photons travel between emission and observation, they experience the same fractional frictional or viscosity-like energy loss so that the ratio of W_e/W_o is the same in both cases – which is to say they have the same viscosity redshift.

Combining redshifts

When considering how to apportion how much energy loss in a photon is due to viscosity or due to relative velocity it first needs to be considered how the total is arrived at.

Since the F values vary when considering frequency differences, depending on emission and observation frequencies, it is not feasible to just add or subtract frequencies because the addition or subtraction changes each fractional relationship individually. Both viscosity and velocity effects are acting at the same time (plus gravitational effects as well) and they start from the same emission frequency and end at the same observation frequency.

The solution is the same as is done for the effect of the expansion of space, that is to product the ratios of the frequencies, or more usually the (Z+1) factors, such that, ignoring gravitational Z_g and expansion of space Z_e redshifts, the relationship will be

$$(Z_t +1) = (Z_v+1)(Z_c+1)$$

where Z_t is the total Z shift of the object, Z_v its velocity redshift and Z_c its viscosity redshift.

The usual treatment of the Z_e of expansion of space is that $Z_e = Z_v$, so that the total expansion without any viscosity redshift is $Z_t = (Z_v+1)^2$.

Comparing these different versions of Z_t gives rise to different potential outcomes for the rates of expansion of our big bang constituents.

1 If $Z_e = 0$ and $Z_c = 0$

There is no explanation for the redshifts observed that imply relative velocities above light speed, although using the relativistic form of velocity redshift

$$Z = ((1+b)/(1-b))^{0.5}$$

where $b = v/c$, would enable large redshifts as v approaches c, but would do so over very small cosmological distances.

2 If $Z_e = 0$ and Z_v = near 0 and Z_c = any

The stars and galaxies would have no overall large relative velocities nearby and almost all the redshifts would be due to tired light, thus distance to each object. This might allow for the change in Hubble constant observed, although the slower expansion would suggest a longer lifetime. The change in expansion rate possibly would be from the components which are mostly part of our big bang to only those beyond it.

3 If $Z_e = 0$ and the Z_v and Z_c components of each redshift were split between the total in some fraction.

The result would be complex in that there would be reasonable velocities up to a maximum of c, beyond which all the redshift would be due to viscosity. The fraction for each observation would be different and the underlying overall viscosity factor f would have to be pinned down in order to separate out the velocity part.

Of greater complexity is that the hypothesis of our big bang is as one successful event amongst many failed big bangs and means that it will not be immediately clear whether an object under observation is part of those pre-existing relatively stationary objects through and past which our own big bang components are travelling, or one of those travelling components. Once beyond our CMB distance, it will only be viscosity redshift that will be observed.

It is clear that to ensure large velocity redshifts are included correctly, it is the relativistic Z_v that must be used in our formulae. This means that

$$Z_v + 1 = ((1+b)/(1-b))^{0.5}$$

which reduces to the usual

$$Z_v \sim v/c$$

at small v/c.

As a component of the total redshift, this use of the relativistic velocity formula provides an increasing slope above the linear viscosity component, so a graph of the expected total redshift will be linear to around $v/c < 0.1$ and then bend increasingly upwards until the velocity component ceases at the end of our big bang where there will be a step change back to the linear viscosity line.

This is not an issue because, as mentioned, the underlying hypothesis is that the universe is not only our big bang, but extends further outwards in volume to previous failed big bangs, many beyond our current view. Both within our current expansion volume and beyond there are embedded black holes and galaxies that were failed big bangs and acted as frameworks through which and around which our own expansion has passed and coalesced. This is a view of the universe as an eternal mixture of big bangs and steady state.

This hypothesis explains many unusual coincidences of different redshift objects 'within close proximity' as studied [5], the unusual number of early galaxies, the change in value of the Hubble constant at high Z and would reduce the need for dark matter or dark energy explanations if all galaxies were at smaller distances from us.

This latter possibility is not investigated further here and the accepted proper distances to stars and galaxies are considered correct. However, further work will be undertaken to confirm or deny these distances.

The value of Z_c is not bounded and will have a maximum only at the furthest observable distance from source to an observer, suggesting that the greatest Z_c shift observed will be a good estimate for the possible limit to the size of the observable universe.

The frequency around the 2.725k temperature of the CMB only relates to our successful big bang, not to the previous events. Assuming that the initial emission frequency of our big bang was the Planck energy E_s and the CMB energy at E_c the estimate of our own distance D_c from its centre of occurrence would be

$$E_s/E_c - 1 = f\,D_c$$

However, it is not clear if it is correct to assume the initial energy of emission was the Planck energy and the accepted CMB Z shift suggests a much lower value.

Finding f

One method to uncover the value of f would be to assume that since overall there is a redshift observed in astronomical observations following approximately the Hubble constant relationship at low Z, it is likely that there is some form of simple factor at work, but that it is due to velocity and viscosity in total (ignoring lateral motion and, as before, expansion of space and gravitational redshifts) and those two parts need to be split out.

The Hubble relationship $H_o = v/D$ in the new redshift reinterpretation would be replaced by a New Hubble term $\boldsymbol{N}$. From before, the relationship at low velocity is that

$\boldsymbol{v/c} = \boldsymbol{Z} = \boldsymbol{H_o D/c} = \boldsymbol{fD}$

so that $\boldsymbol{H_o} = \boldsymbol{f/c}$

Now instead we say that, using $\boldsymbol{f_L}$ here in Ly^{-1} rather than the initial $\boldsymbol{f}$ in $\boldsymbol{R_s^{-1}}$ for simplicity

$\boldsymbol{N} = \boldsymbol{f_L/c}$

And retain $\boldsymbol{H_v}$ for the now much smaller velocity component of $\boldsymbol{Z_t}$.

Taking the current best central observation value for $\boldsymbol{H_o}$, 70 kms^{-1} Mpc^{-1}, as the value for $\boldsymbol{N}$ leads to an estimate for $\boldsymbol{f_L}$ using the observations of the type 1 Seyfert galaxy 2E 3934 [6] as an example.

$(\boldsymbol{Z_t} +1) = (\boldsymbol{Z_v}+1)(\boldsymbol{Z_c}+1)$

$= (\boldsymbol{Z_v}+1)(\boldsymbol{f_L D_x}+1) = (\boldsymbol{Z_v}+1)(\boldsymbol{Nc\ D_x}+1)$

$\boldsymbol{Z_t} = 0.06147$

$\boldsymbol{f_L} = \boldsymbol{Nc} = 7.15896 \times 10^{-11}\ Ly^{-1}$

This can be compared with the distance calculated assuming $\boldsymbol{Z_v}$ to be zero as

$\boldsymbol{D_{calc}} = \boldsymbol{Z_t/f_L} = 8.59 \times 10^{8}$ Ly

Which is only 17% larger than the actual observed proper distance $\boldsymbol{D_x}$

$\boldsymbol{D_x} = 7.79 \times 10^{8}$ Ly comoving = 7.34×10^{8} Ly proper

So the conclusion could be drawn that there is a velocity component and its value using $\boldsymbol{N}$ and $\boldsymbol{f_L}$ will be

$(1+\boldsymbol{Z_v}) = 1.008485$

And $\boldsymbol{v_x} = 0.008485\ \boldsymbol{c}$

So the new value for $\boldsymbol{H_v}$ would be

$\boldsymbol{H_v} = \boldsymbol{v_x/D_x} = 1.156 \times 10^{-11}\ Ly^{-1}$

Or, in usual units $\boldsymbol{H_v} = 11.3$ Kms^{-1} Mpc^{-1} or $\boldsymbol{H_v/H_o} = 0.16$

This implies, admittedly from only one example, that the main component of total redshifts is the viscosity component and that the velocity expansion is much slower than currently estimated.

However, since $\boldsymbol{H_v}$ is linear in $\boldsymbol{v}$ and $\boldsymbol{D}$, it will fail at high velocities and so the relationship needs to be adjusted with

$\boldsymbol{Z_v} +1 = [(1+\boldsymbol{v/c})/(1-\boldsymbol{v/c})]^{0.5}$

Or the reverse

$\boldsymbol{v/c} = ((\boldsymbol{Z_v} + 1)^2-1)/((\boldsymbol{Z_v} + 1)^2 +1)$

so

$\boldsymbol{H_{rel}} = ((\boldsymbol{Z_v} + 1)^2-1)/((\boldsymbol{Z_v} + 1)^2 +1)\boldsymbol{c/D}$

Using the latter results in a small lowering of the relative velocity of the Seyfert galaxy in the example to $\boldsymbol{v_x} = 0.008449\ \boldsymbol{c}$ and a consequent small lowering in the new $\boldsymbol{H_v}$ to $1.151 \times 10^{-11}\ Ly^{-1}$.

The estimate of $\boldsymbol{f_L}$ also provides a size for our big bang, if there was one, since from before

$\boldsymbol{E_s/E_c} - 1 = \boldsymbol{f_L\ D_c}$

With this energy ratio and the value $\boldsymbol{f_L}$, the distance $\boldsymbol{D_c}$ from the origin of our big bang can be calculated as

$4.904 \times 10^{9}/3.762 \times 10^{-23} - 1 = 7.15896 \times 10^{-11}\ \boldsymbol{D_c}$

So $\boldsymbol{D_c} = 1.82 \times 10^{42}$ Ly

From the size of our big bang, its age can be calculated as

$\boldsymbol{T_c} = \boldsymbol{D_c/c} = 6.07 \times 10^{33}$ Years

which is a bit longer than current accepted calculations.

Using the currently accepted value for the CMB $\boldsymbol{Z}$ shift of 1090 and current interpretations results in a distance to that event of $\boldsymbol{D_{CMB}} = 1.4 \times 10^{12}$ Ly in the new interpretation, just a small fraction of the potential overall size of the universe, if the Planck energy is the starting energy and the CMB started from a lower energy.

Using the accepted CMB ***Z*** shift and its inferred size for our part of the universe compared with the new possible size of the whole universe suggests that our part represents only around 5 $\times 10^{-91}$ of the whole volume.

Graphic inferences

What can be inferred from Graph 1 in the References section is that this hypothesis leads to slower expansion of our big bang constituents such that none have reached even 0.5***c*** by the currently accepted comoving distance to the CMB of 4.6 $\times 10^{9}$ Ly.

The scale of the graph is such that the Seyfert galaxy used in the example calculations is just inside the first point, so that the acceleration in total ***Z*** is only just appearing. The usual use of linear ***H*** up to ***Z*** around 0.1 extends only as far as the third point.

Also it is possible to see clearly that the two lines of Z_c and Z_t represent two different classes of objects. One set is expanding and the other is not. This means that two objects at the same ***Z*** value may be at different distance from us, or alternatively that two objects at the same distance may have different ***Z*** values.

Graph 2 shows the same graph but using a greater distance scale so that the larger values of ***Z*** can be seen. The cut off to Z_t will be infinite, but in the graph it has been kept only to a maximum of just under ***Z*** = 20 for ease of use. The line for Z_c is shown to just keep increasing over distance. The Z_t line represents the total ***Z*** of objects expanding within our big bang, a combination of Z_v and Z_c, whilst the Z_c-alone objects are those that pre-existed before our big bang and exist beyond its boundaries.

Objects observed above the Z_c line in Graph 2 will have outward velocities and those below the line inward velocities. For the Z_t line, those above or below will be excess or deficient velocities relative to the general motion. A mix of the above and below Z_c along a section of the line would indicate random motion and no big bang.

Expansion of space

Within the explanation of the physical effect of the viscosity on photons is that the hypothesis also proposes [7] [8] that the universe is composed only of one size of particle and its anti-particle and that they exist in either merged or unmerged forms. When merged, they spin, rotate, vibrate and translate and are the foundation of the universe. When they are unmerged, they form chains which then form loops and some of those loops are our fermions. This foundation means that there is only one size of particle on which everything is based and is made from. So there cannot be any expansion of space, because its foundations are all values equal to unit 1 in (adjusted) Planck units. Changing the size of the particles changes nothing, because they are the base of our units – everything would be changed proportionately and we would observe no change. Therefore space does not expand and so the only way in which redshifts could show relative speeds apparently in excess of ***c*** is because the photons are losing energy as they travel.

A second way to find ***f***

Aside from assuming that H_o represents a good place to start from, the value of empty space ***f*** can also be calculated by comparing the redshift of a close star or galaxy that also has had its distance measured by parallax. Being near will mean that its relative velocity may be low, but also means that its redshift may be very small. So a number of those close objects will have to be observed at random points to obtain a decent sample. Even then it will be difficult to separate out the fraction due to velocity or viscosity.

The structure of a photon

As previously mentioned, the hypothesis is that fundamental particles and anti-particles form loops, which are the only real structures that exist [7] [8].

The loops comprise only one type of particle and anti-particle (a 'pair') which initially chase each other and eventually catch onto the tail of other pairs to form chains which, when a chain of three such pairs catches its own tail, form a fermion loop. Loops of other pair numbers are dark matter.

A photon is a loop and its anti-loop rotating in the same sense merged together along the perpendicular axis of the loops and the chase action then acts along that axis to force the double loop up to its maximum possible speed in the local environment. We call that maximum speed $\boldsymbol{c}$ and its numerical value depends on the density of the local environment. So the balancing effect to maintain a limitation to a maximum velocity will be a friction or viscosity on the fundamental particles/anti-particles in the loops, called meons.

The basis for the energy reduction of a photon is that the universe has, or is at its base, a background of those fundamental merged particle/anti-particle pairs before they unmerge to form loops, plus subsequently other formed loops, through which a photon travels and that together act as a form of viscosity. It is the physical form of the photon as six partially merged pairs rotating in a loop as they translate at $\boldsymbol{c}$ that allows the same amount of energy to be lost over a given distance regardless of the frequency of the photon. The six pairs are subject to the same amount of viscosity as they move one distance $\boldsymbol{R_s}$ along regardless of the path length, meaning the wavelength, of the photon in which they can be considered to be moving in the cylindrical simile used here – although they are actually the photon itself.

The base pair of particle and anti-particle were originally merged together, vibrating, rotating and translating along with myriad others the same. This is fundamentally 'the universe' before any pairs unmerged and every subsequently formed loop has to move through it and loses energy in doing so – like a very dilute aether.

Since all the fundamental particle/anti-particle components of a loop are the same (adjusted) Planck size, they experience the same 'viscosity' of the background and so if a fermion loop has six (three pairs) or a photon twelve, merged into six, (as two loops) it does not matter what the size of the loops (their frequencies/masses) are – only how many components there are that feel the background viscosity.

So it is the effect of viscosity on the meons that reduces energy for the photon double-loop – its rotational rate (frequency) reduces whilst its external velocity remains at $\boldsymbol{c}$. It is the path length of the meons that matters, rather than that of the photon, although this can be ignored to some extent as explained below.

The spiral path of a meon in a photon is given by the combination of its wavelength, representing its translational distance travelled over one complete rotation, with its rotational distance. The best physical description is of a cylinder of length $\boldsymbol{2 \pi R_x} = \boldsymbol{D_\gamma}$ whose circumference is also $\boldsymbol{2 \pi R_x} = \boldsymbol{\Lambda_x}$. Over one rotation of the six meons, they travel around the circumference whilst moving along the cylinder in a spiral path. The total path length over which they travel within each photon is thus

$$(\boldsymbol{2 \pi R_x})^2 + (\boldsymbol{2 \pi R_x})^2 = \boldsymbol{\Lambda_x}^2 + \boldsymbol{D_\gamma}^2 = \boldsymbol{\Lambda_t}^2$$

So that the total path length of the meons $\boldsymbol{\Lambda_t}$ relative to the single photon path length $\boldsymbol{D_\gamma}$ is

$$\boldsymbol{\Lambda_t} = (2)^{0.5}\, \boldsymbol{D_\gamma}$$

The total path length of a photon from emission to observation is

$$\boldsymbol{D} = \sum \boldsymbol{D_\gamma}$$

As mentioned, this relationship does not actually matter greatly because the ratio of the meon path length to photon path length takes a constant value for all photons. Although the cylinder envisaged always has a slight expansion towards its direction of motion, due to the energy lost reducing the photon frequency and thus expanding the rotational circumference (based on loop dynamic $\boldsymbol{h} = \boldsymbol{M v_x R_x}$, where $\boldsymbol{M}$ is the (adjusted) Planck mass of a meon), the fractional change is that factor $\boldsymbol{f}$ – which is very small.

It is thus possible to just consider the total photon path length $\boldsymbol{D}$, the distance between emission and observation, to calculate the fraction of total energy lost for every photon regardless of the numerical difference between the frequencies of emission $\boldsymbol{W_e}$ and of observation $\boldsymbol{W_o}$.

What has confused in the past is that the observed frequency $\boldsymbol{W_o}$ of a photon appears in the energy loss formula. Attempts to square this logical circle with the distance-related-only $\boldsymbol{Z}$ redshifts have proved fruitless previously because this is not possible without a structure for the photon that enables such a property. The point that has been missed before is that it does not matter how many wavelengths are contained within a photon path between emission and observation.

It does not matter that a high frequency photon has a different frequency difference between emission and observation to the frequency difference of a low frequency photon. The point is ONLY that they travel the same distance between emission and observation. So the energy loss due to the friction or viscosity suffered by the meons comprising the photons in both cases will be the same fraction over the same distance that they cover.

The calculated value of $\boldsymbol{f_L}$ here is 7.15896 $\times10^{-11}$ Ly^{-1} and of $\boldsymbol{f}$ is 3.066 $\times10^{-61}$ Rs^{-1} or 7.568 $\times10^{-27}$ m^{-1}, each in 'empty' space over a long distance. These are obviously very small and difficult to observe at close range so would have been missed in any terrestrial experiments.

The redshift of objects at low velocity such as the Voyager spacecraft exiting our own solar system at 18 $\times10^{12}$ m from Earth would only show a $\boldsymbol{Z_c}$ shift around 1.36 $\times10^{-13}$, so not very much.

There is a viscosity effect against the motion of all loops, although they will not all be travelling at $\boldsymbol{c}$, and so will experience a lower rate of energy loss. However, this small energy loss is enough to provide an arrow of time since no motion can be reversed without losing energy in both directions.

For a non-photon loop, or other composites made from loops, the energy lost is recovered by interaction with photons to transfer enough rotational rate to maintain their locked-in frequency (mass). This is why photons interact with other loops – to refresh frequencies, not to transmit electromagnetic forces.

A new universal constant?

Since $\boldsymbol{f}$ drives the limit on the value of local velocity that is $\boldsymbol{c}$, it is possible to say that in 'empty' space, and possibly elsewhere,

$$\boldsymbol{f}\,\boldsymbol{c} = \boldsymbol{k_s}$$

where $\boldsymbol{k_s}$ = 2.269 $\times10^{-18}$ s^{-1}. Equating this through dimensionality to an energy using $\boldsymbol{E}\,\boldsymbol{t} = \boldsymbol{h}$ provides an equivalent value for $\boldsymbol{k_E}$ = 1.503 $\times10^{-51}$ J, equivalent to a mass $\boldsymbol{m_k}$ = 1.673 $\times10^{-68}$ kg.

It may well be that $\boldsymbol{k_E}$ is a more fundamental or universal constant than either $\boldsymbol{c}$ or $\boldsymbol{f}$, in that the two always vary depending on the local density of energy or matter, whereas their product may not vary under any circumstances, possibly excluding when the photon becomes stationary exiting a black hole or when stacking in a nucleon or other loop stack.

As for the earlier discussion on total meon path length versus photon path length, it is possible to consider that the numerical value of maximum velocity $\boldsymbol{c}$ may be $(2)^{0.5}$ higher since that is the distance travelled by the meons. However, this also does not matter since all that is observable is the photon path length where $\boldsymbol{c}$ is what is measured.

Hubble constant relationship with $\boldsymbol{\alpha}$

It is interesting to note that the new 'empty' space mass $\boldsymbol{m_k}$ can be related to the fine structure constant $\boldsymbol{\alpha}$ by

$$|\boldsymbol{m_k}| = \boldsymbol{h}^2 \sqrt{\alpha/2\pi}\ 1.118$$

and ignoring that the dimensionalities are inconsistent so that only the sizes are relevant to the comparison.

This suggests that the viscosity factor $\boldsymbol{f} = \boldsymbol{k_s}/\boldsymbol{c}$ may be directly related to, if not the underlying reason why, the size of the electronic charge $\boldsymbol{q_e}$ takes the value that it does.

In order for that relationship to be exact requires only that the value of $\boldsymbol{f}$, set here at just the current best central observation value for $\boldsymbol{H_o}$, 70 kms^{-1} Mpc^{-1}, be reduced by the factor 1.118.

So this suggests that the final best value for the viscosity component of $\boldsymbol{H_o}$ would be $\boldsymbol{N_*}$ = 62.6 kms^{-1} Mpc^{-1} leading to the relationship

$$\boldsymbol{N_*} = (\boldsymbol{h}^2/\boldsymbol{c})\sqrt{\alpha/2\boldsymbol{\pi}}$$

since N is used here to represent the Hubble effect due only to viscosity. Although this value may seem very low, it possibly represents the minimum viscosity factor that underlies resistance to motion in ‘empty’ space and also the limit on the rotational rate of meons due to that same viscosity.

It would thus be likely that no celestial object should lie beneath the new $\boldsymbol{N_*}$ line, translated into an equivalent $\boldsymbol{f}$ value, and that all the $\boldsymbol{Z}$ component of an object above this line represents its relative velocity. This would require the value of $\boldsymbol{k}$ to be adjusted appropriately.

However, the Planck SI and (adjusted) Planck (DAPU) values of $\boldsymbol{k}$ in terms of time, distance, energy or mass equivalents is 3.066 x10^{-68} (SI) and 3.753 x10^{-51} (DAPU) on the basis of $\boldsymbol{H_o}$ at 70 kms^{-1} Mpc^{-1} and cannot be split into any component constituents except those with dimensionalities of $\boldsymbol{Y^o}$, so the constants $\boldsymbol{h}$ and α only.

The closest the current SI Planck value of $\boldsymbol{k}$ can be compounded from $\boldsymbol{h}$ and α is that

$$\boldsymbol{k} = 1.061\ \ h^2/(\frac{\alpha}{2\pi})^2$$

Double-adjusted Planck units (DAPU) are based on the elimination of $\boldsymbol{G}$ and adjustment of charge related property by $\sqrt{10^{-7}}$ for each charge $\boldsymbol{q_e}$, so that $\boldsymbol{M_*} = \sqrt{\boldsymbol{hc}}$ (DAPU) instead of $\boldsymbol{M_s} = \sqrt{\boldsymbol{hc}/\boldsymbol{G}}$ (SI) and $\boldsymbol{M_*Q_*} = \boldsymbol{h}$ with $\boldsymbol{q_e}/\boldsymbol{Q_*} = \sqrt{\boldsymbol{\alpha}/2\boldsymbol{\pi}}$.

Conclusion

The hypothesized structure of photons leads to a new explanation for why tired light may be the major contributor to the redshift observations of celestial objects. The result is a need for reinterpretations of the size of our big bang, its age, the size of our part of the universe and that beyond our big bang and the need for dark matter and dark energy.

A new ‘empty’ space constant may exist whose value depends on the underlying viscosity of space and there may be a direct relationship between an adjusted minimum value, due to viscosity, of the Hubble constant and the fine structure constant.

One observable test of the relationship between the viscosity-only part of the Hubble constant $\boldsymbol{N_*}$ and $\boldsymbol{\alpha}$ would be whether any distant celestial objects were observed beneath that line.

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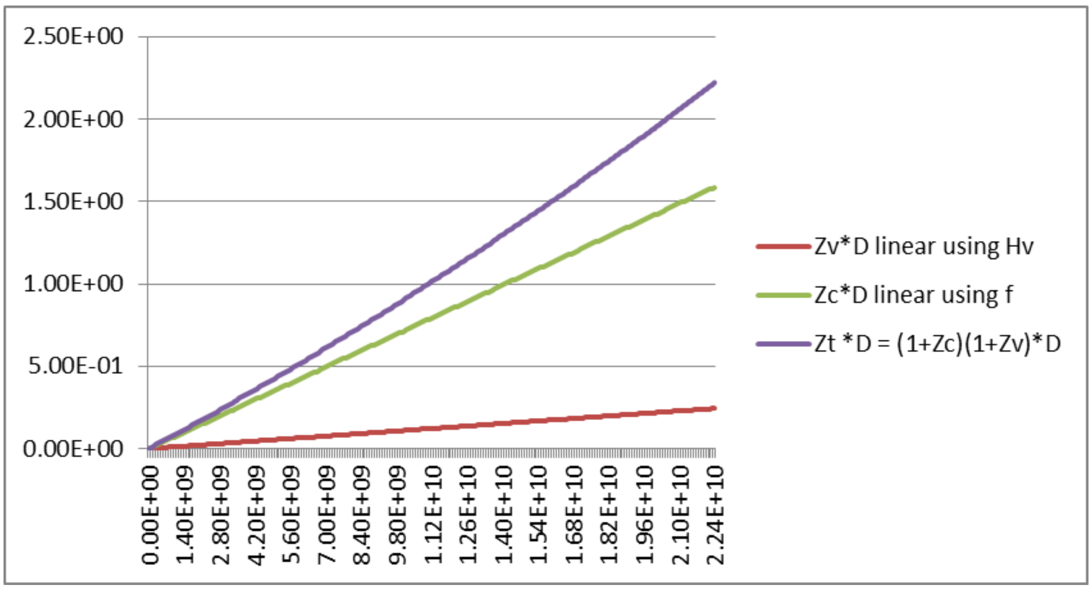
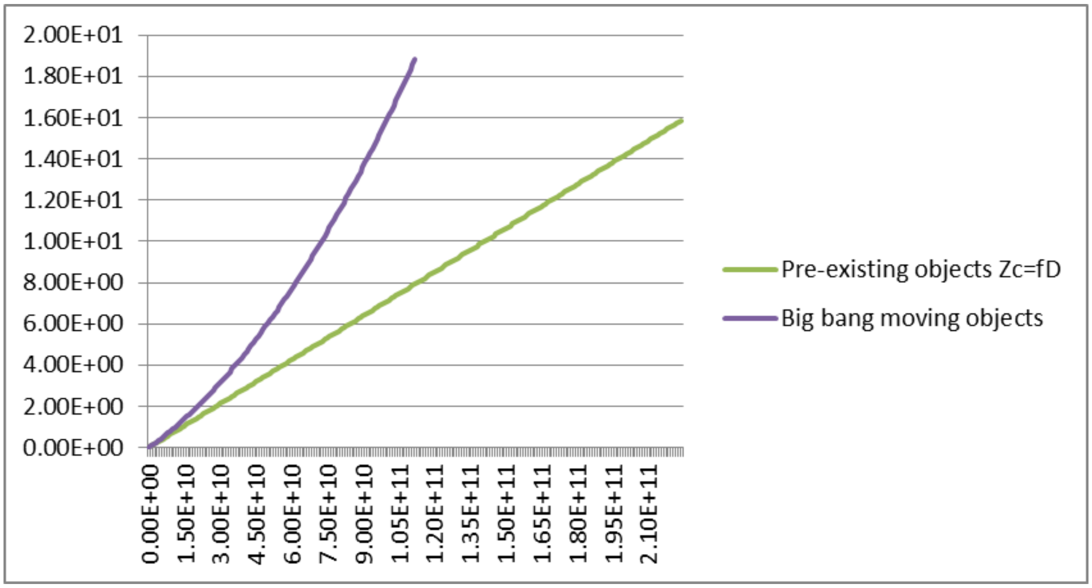


Graph 1 ***Z*** red shift versus ***D*** distance in Ly



Graph 2 ***Z*** red shift versus ***D*** distance in Ly – $\boldsymbol{Z_t}$ for moving big bang components and $\boldsymbol{Z_c}$ pre-existing ones