Dilation Flooding:

A Solution For Cosmic Redshift Based On Gravity Wave Propagation

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Abstract

This theory demonstrates that observed redshift in the spectral lines of distant luminous sources directly correlates to an increase in background time dilation beginning when gravity waves began to propagate through the universe at the Electroweak Epoch. This is evidenced by recent measurements demonstrating a “c” velocity for the propagation of all relativistic phenomena including gravity waves.

Practical applications of this approach include an alternative and more accurate method for calculating the average particle density of the universe using redshift measurements. This may help estimate cosmic distances and identify unobserved masses, black holes, or other “dark matter”. A gradual change in maximum gravitational potential can better describe quasar evolution and the differences in galaxies observed today.

“Dilation Flooding” is based only on current cosmological observations, and requires no additional unobserved hypothetical force or matter. It is based strictly on the experimentally provable laws of Einstein relativity.

A Brief History of Modern Astronomy

To start, it is ideal to understand the history behind the theories regarding cosmic red shift. Much of what is commonly accepted today was hypothesized in the late 20th century based on the developments in astronomy over the last 400 years.

The invention of the telescope in the early 1600's significantly improved our ability to see objects at a distance. It did not take long before we started pointing them into the expanse of space. We soon observed moons around Jupiter and Saturn proving that they too were planets similar to earth. This brought to an end the popular belief that every object in space revolved around the Earth.

In the 1800's, spectrometry is developed which essentially involved focusing light from a luminous source through a prism. The pattern produced directly correlated to the chemical composition of the light source, and was used to determine the contents of the Sun and other stars.

By the end of that century, spectrometry and optics were refined to the point that astronomers could observe that some objects had spectral lines that were redshifted. Although the patterns produced matched the expected chemicals, they were offset towards the red end of the light spectrum. The popular conclusion of astronomers around the time of the American Civil War was that this was likely caused by an optical Doppler shift. In short, whichever object was displaying this red shift was moving away from us at a speed sufficient enough to alter our observation of that wavelength.

> Up to this point, most researchers believed the extent of the universe only reached as far as the ends of our own galaxy. It was not until the 1920's that Edwin Hubble was able to show conclusively that some of the objects we could now observe were not stars but other galaxies many parsecs away.

With this new intergalactic view of the universe, Alexander Friedman, Georges Lemaître, and Edwin Hubble (for which the Hubble telescope is named) further refined the redshift observations of the late 1800's and determined that there was a direct correlation between the distance of a galaxy from us and the measured degree of redshift. At that time, Hubble maintained the assumption made by astronomers decades earlier and assigned the cause to be entirely due to Doppler shift which requires constant acceleration to the rate of recession. The conclusion at that time was that the "metric" or physical space of the universe was expanding. This theory was quickly accepted by the scientific community of the time and soon thereafter became the basis for what we know as the Big Bang theory.

In the 1960's, the Cosmic Microwave Background [CMB] was discovered which is currently considered to be the oldest and farthest reaching observable signal in the universe. The

significance of the CMB is that we cannot directly observe anything beyond it. The CMB's range of measurable redshift is considered to be further support for the finite age of the universe and is the basis of many cosmic origin theories.

In summary:

- In only the last 400 years have we developed technology allowing us to see beyond the limit of the naked eye.
- In the 1600's we discovered we were not the only planet in the universe. Also, we concluded that the Earth is the Sun's satellite, not the other way around as was previously believed.
- 100 years ago we determined that the universe as we know it is not static, but is evolving in some way.
- In the 1920's we first determined that ours is not the only galaxy.
- The discovery of the CMB roughly 50 years ago showed us the electromagnetically observable extent of the universe. Before the CMB, the universe as we can measure it apparently did not exist.

The Big Bang theory and Hubble Flow continue to be researched and debated. Although they are considered by many to be the "de facto" theories on cosmic evolution, they seem to generate more questions than they solve.

Dilation Flooding Theory

“Dilation Flooding” most simply stated shows that cosmic redshift is entirely the result of a continuing change in the gravitational potential of the universe as a whole. This is due to the limited propagation speed of gravity which is similar to the rate of photons. As time persists, we continue to experience the gravitational influence of more distant masses similar to photons that arrive from just beyond the edge of the observable universe.

Time dilation’s effect on spacetime in this approach is observationally similar to Hubble Flow. Dilation Flooding supports a direct correlation between redshift and distance completely in agreement to prevalent theory.

However, Dilation Flooding forms several divergent conclusions and practical applications. These can all likely be calculated from existing observational data.

The following are the key components of this theory.

The Speed of Gravity

As we understand gravity today, all observable matter and particles (including photons) product some degree of gravity. To express the behavior of particles and passes in the universe mathematically, Einstein’s theories on relativity continue to provide the most accurate descriptions. Although relativity limits all reactions to a causal speed limit of “c” (speed of light), the effect of gravity has been largely been treated as static.

Gravity in most cases is not calculated to be itself moving, which is understandable. Its influence is ever present, and a large enough source of gravity moving fast enough to influence calculations is almost never a practical concern. As nothing we are aware of can control gravity the way we can with electromagnetic energy, and it is a very weak force requiring a prohibitively large experiment to measurably manipulate it, there has been little need to apply causality to it.

Only recently have apparati existed capable of detecting perturbations in gravity caused by extreme cosmic events. The LIGO interferometer experiment has proven that gravity “waves” exist and “more recent analyses of Ligo's findings have placed gravitational wave speeds closer to the speed of light, albeit with superluminal upper bounds.”[1]

> Although several theorists in the early 20th century predicted or mathematically demonstrated the effects of gravitational causality, it took nearly a century later to prove that gravity has a rate of propagation limited to “c”.

[1] Abbott, B. P.; et al. (2017). "Gravitational Waves and Gamma-Rays from a Binary Neutron Star Merger: GW170817 and GRB 170817A"

With the accelerating improvements to astronomy, cosmic observations of extreme velocity events where frame-dragging and gravitational waves apply are becoming more common. Relativistic computations of extreme cosmic events or objects at extreme velocities should consider the propagation rate of gravity going forward.

Chronology of interest

To visualize the origins of Dilation Flooding, we should first consider the theoretical state of the early universe. Note the following evolutionary epochs of Big Bang cosmology:

- Pre-Inflationary period - Including Planck and Grand Unification Epochs, this includes the first moments of the existence of the universe believed to be less than a quadrillionth of a second.
- Inflationary epoch - In this brief period (also less than a quadrillionth of a second) all the universe's contents expanded to a volume greater than that of the observable universe today.
- Electroweak epoch - Creation of exotic particles including Higgs bosons
- Quark/Hadron epochs - Formation of the conventional particles that make up the universe today happens within the last fractions of the first second since the Big Bang.
- Recombination epoch - About 380,000 years after the Big Bang, the first atoms form. The Cosmic Microwave Background results being the earliest directly detectable signal in the universe.

Although there are other epochs not included, we will largely be concerned with this period of time. By the Recombination epoch, the trend of cosmic redshift is already underway and will persist for the foreseeable future.

Origin of Gravity Waves in the early universe

Following with the Big Bang theory, at the time of the Electroweak epoch the volume of the universe (or at least the distribution of its contents) expanded at an extreme rate to a volume beyond that of the observable universe today. This rate of expansion was such that the universe was only a few quadrillionths of a second old after the Inflationary Epoch had ended.

The Inflationary Epoch greatly outpaced the speed of light which also includes the speed of gravity. Since all observable bosons (including quarks) contribute to gravitational force, we can expect that relativistically compliant matter existed by roughly 1 second after the Big Bang. Even if the pre-inflationary contents of the universe since the Big Bang contributed to gravity, it would have been extremely diluted by the vastly expanding metric of space. In either case, we can presume a gravity wave background level of effectively zero.

At the end of the Inflationary epoch, the actual volume of the universe is expected to have been considerably larger than the size of the observable universe today. Since our ability to measure

the volume of the universe is currently limited to our observable sphere, we may never know for certain the true extent of the universe.

> We can therefore conclude that the initial gravity waves from matter beyond the observable universe may not have reached our point in the cosmos yet.

For example, CMB radiation at the furthest measureable redshift value is just now reaching us for the first time from the edge of the observable universe. As time passes, EM radiation from even further beyond the currently observable universe will continue to reach us.

Dilation Flooding and Gravitational Potential Energy Compression

Dilation Flooding is the gradual increase of background time dilation as our causality sphere continues to grow.

> A Causality Sphere is the maximum distance a relativistic event can occur within during a period of time.

In this case, our causality sphere is the maximum distance gravity waves can travel since the introduction of gravity in the universe. As time continues to pass, the causality sphere of our universe increases by roughly the rate of “c”. As distant matter continues to become within our sphere, we are likewise within the causality sphere of that mass and subject to each others’ gravitational influence.

So what does it mean to be in the gravitational pull of a galaxy 14 billion light years away? Frankly, not much. The influence at that distance is immeasurably small. However, it does exist!

Additionally, we are not considering the gravitational influence of a single object but of all the matter at that same distance from us as a function of expanding spherical volume. Just 1 light year of radius added to a 14 billion light year radius sphere adds 2.4x10^21 cubic light years of volume. For example, every year our causality sphere includes the additional mass found in a spherical area of the universe with a diameter of over 8 million light years or about 2.5 Mpc (megaparsec).It is like adding the mass of the local galactic group to our observable universe every year.

Since the causality sphere of all points in the universe are growing at the same rate, this means at all points in the known universe there is a gradual increase in time dilation. Although the effect is gradual (over 13 billion years in the making), this continuing “flood” of time dilation from beyond our observable universe causes relativistic compression effects on all information in transit since the beginning of the universe.

Gravitational Potential Energy Compression is the change in maximum $PE_{gravitational}$ of all relativistic events over time due to the gradual increase in time dilation from DilationFlooding. In other words, the maximum Gravitational Potential Energy for a particle is realized when it is under the minimum influence of time dilation at emission. However, as Dilation Flooding is slowly increasing time dilation across the universe, the $PE_{gravitational}$ of all matter (including particles in transit) is reduced.

Exercising Einstein's Equivalence Principle, another way to explain this is that gravitational (time dilation) effects are interchangeable with doppler effects. Leveraging the spacetime manifold model of the universe, as gravitational force increases it is expanding the fabric of spacetime.

Whether cosmic redshift is caused by expansion of physical space, a change in the energy level of information over a distance, or a universal compression of potential energy, it can be explained using only time dilation.

Illustrated Example

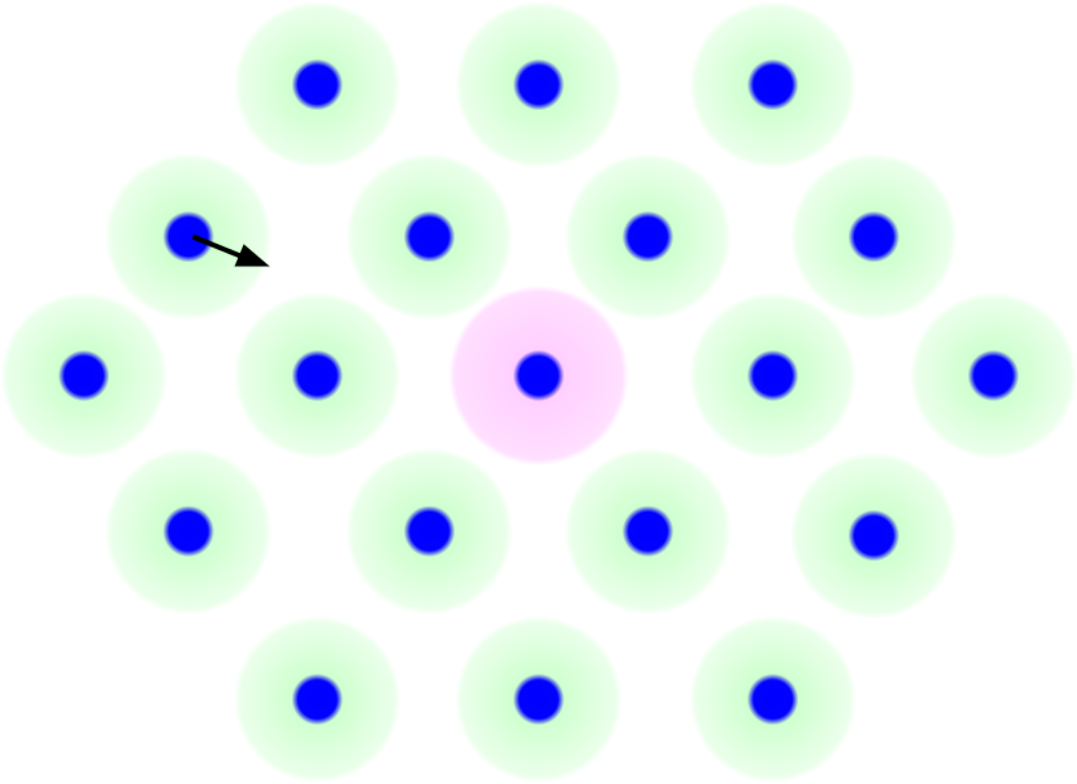
To restate, recent evidence from gravity wave experiments conclusively show that all relativistic effects including changes in gravity are limited to a rate of "c". When gravity producing particles came into existence, their relativistic influence propagated outward at the speed of "c".

If the contents of the universe had always been gravity producing since the moment of the Big Bang, this force would have been diluted over tens of millions of parsecs within a second. If gravity began after the Electroweak epoch after exotic particles like the Higgs boson decayed, this would provide a similar result. In either case, we can expect that the gravity wavefront produced by the first conventional particles in the universe need to propagate across space just as photons from the Recombination epoch are just reaching us.

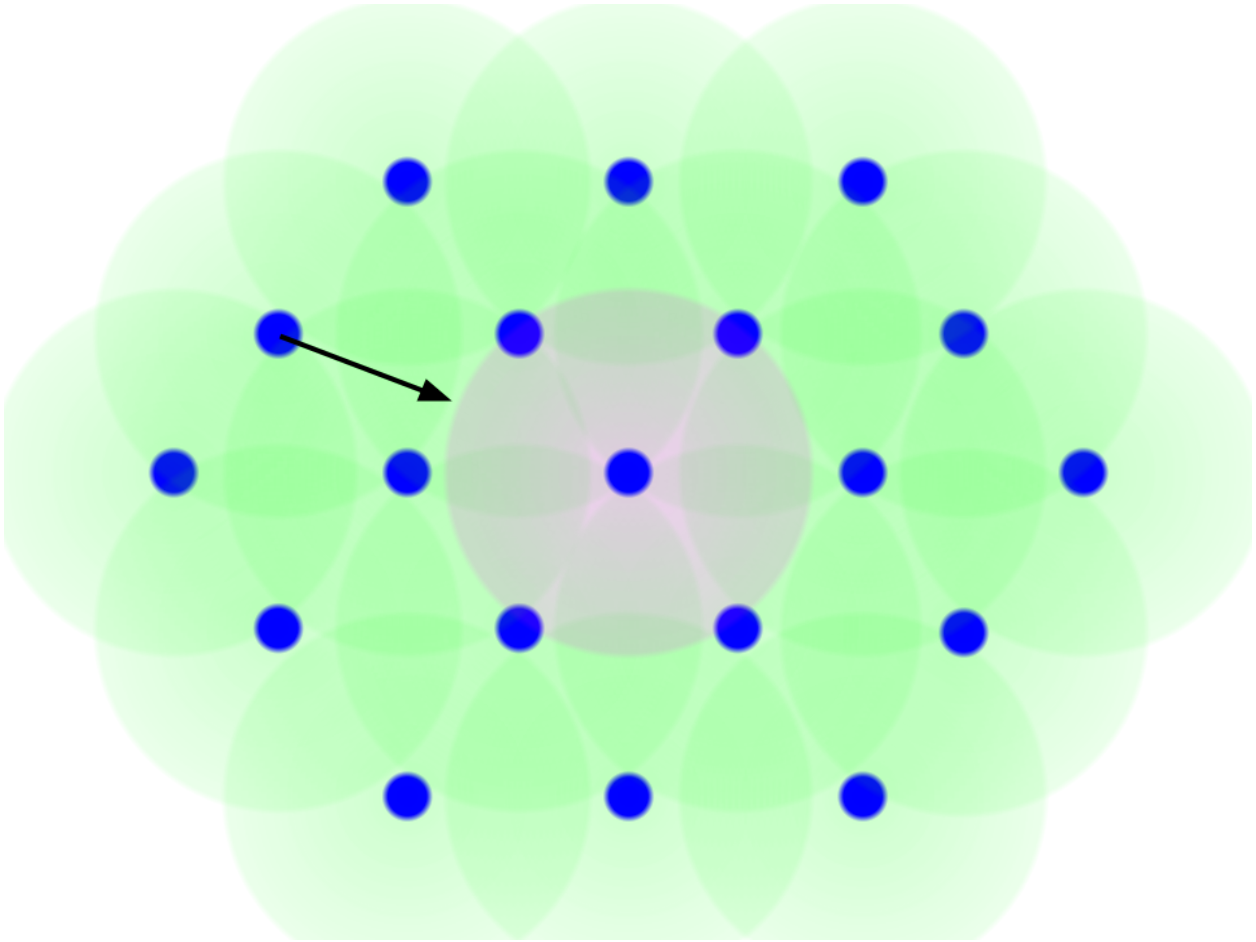
Identical to the CMB concept of the "surface of last scattering", our "causality sphere" is a kind of "surface of first gravity".

To illustrate, the following diagram represents the universe after the Inflationary epoch.. The gravity wave fronts (shaded circles) are radiating from the distributed mass centers (dark circles). The point of observation is represented by the point in the center (red gravity wave front) and information is traveling to us from one of the other masses (arrow).

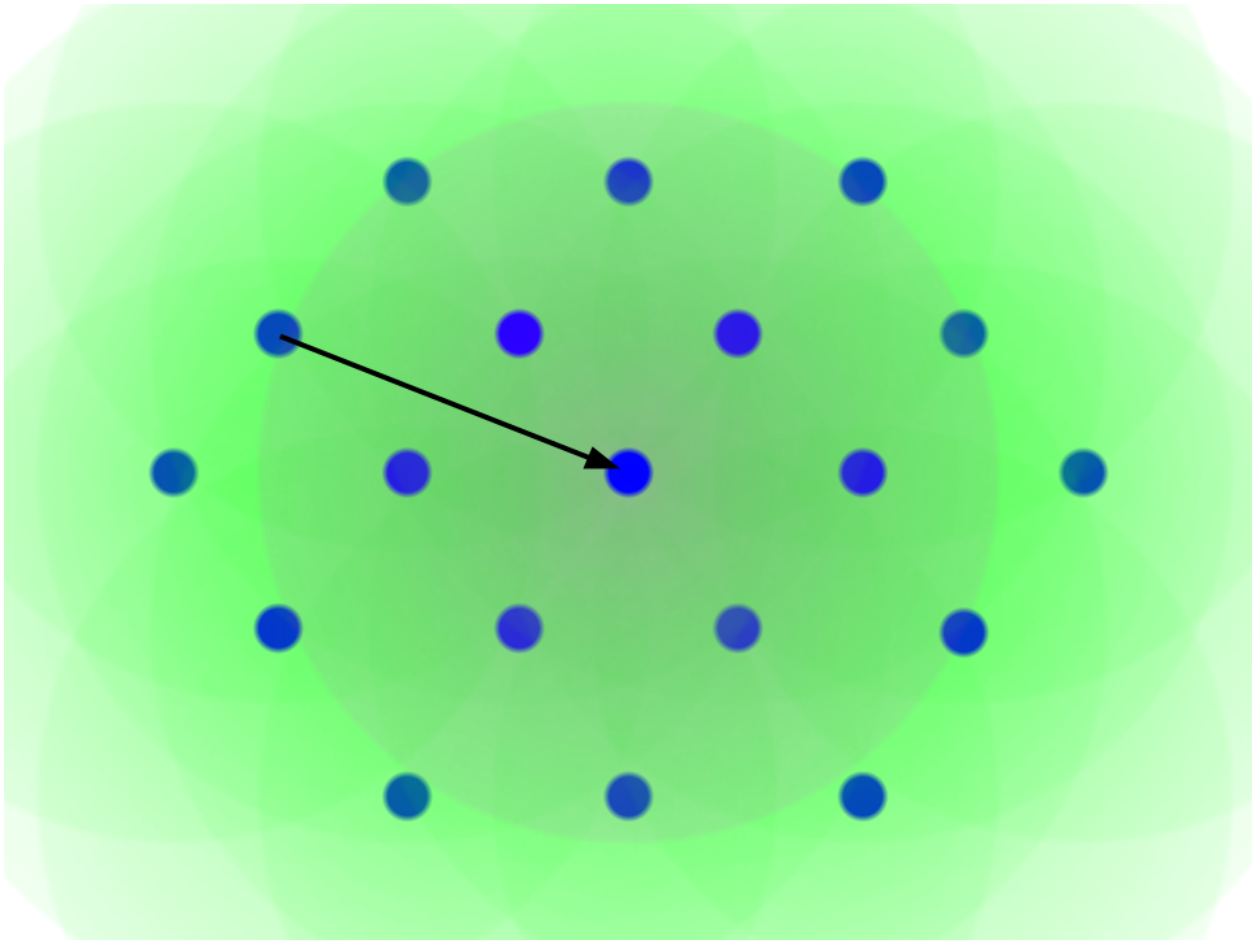
As these gravity wave fronts represent the influence of the force of gravity at T_1, one can see that time dilation is only influencing an area local to the emanating masses.



As the waves continue to propagate, at T_2 we can observe an overlap in the gravitational wave fronts. As the information (arrow) continues to travel, it falls within the gravitational field from more masses. This causes an increase in time dilation to the entire system, including the observer and, most notably, the information in transit.



When the information reaches the observer's point in space, time dilation across the entire system of interest has continued to increase. This Gravitational Potential Energy Compression has altered the energy level of the signal, and the continuing change in time dilation has increased the relativistic distance between the source and observer.



As this diagram illustrates, as long as the universe is larger than our causality sphere, then we will continue to experience an increase in time dilation due to an ever expanding “surface of first gravity”.

Considerations For Computation of Dilation Flooding

Although the process of Dilation Flooding is straightforward, most mathematics takes the computational point of view that we are already at the theoretical minimum time dilation. Of course, this is not intellectually true since at any location within our galaxy we are experiencing some degree of time dilation and are in the gravitational pull of some mass. However, being that Gravitational Potential Energy (GPE) is computed as a negative value from a situationally arbitrary “0” value implies we are primarily interested in our distance away from our current relativistic state.

Since we can computationally show black hole “event horizon” gravitational potential values and can assume that this is a constant threshold value anywhere in the universe, I propose basing Gravitational Potential values from this known and fixed minimum value. Although direct observation of black holes is prohibitive, computational confidence in indirect evidence is such that an “event horizon” GP level can likely be determined for a galaxy or galaxy cluster.

Since this theory demonstrates that redshift is evidence that our gravitational potential is gradually lowering, this means we need to create computations based on signal sources having been at a higher GP when the currently observed signal was at first emitted.

Linear apparent expansion of space

Time dilation can be described in several ways. One of the most common is using the spacetime manifold model, where gravity directly impacts the rate of time and therefore the distance of travel over an affected area. In any case, where more gravity is present, the distance between two points is likewise affected.

If one prefers a fixed volume approach to space, an increase in time dilation reduces the relative velocity of photons and other fundamental particles over the same distance. This observationally produces the same measured result as if the distance has increased over time.

Supporting Data

At the time Hubble attributed an expanding metric of space to explain the cause of cosmic red shift, there was no largely accepted concept in science for a cosmic origin. Most scientists to that point presumed the observable universe was constant and had been forever present. Even if propagation of gravity was being considered, gravitational influence would have already reached its maximum extent. In other words, scientists of the early 20th century would have presumed that our causality sphere had reached the edge of the entire universe. Nothing beyond our observational distance was expected to exist.

The Hubble Flow theory of attributing redshift entirely to an expanding space metric has been the basis of several theories including Big Bang cosmology and the various Dark forces. However, this niche of theoretical science includes many hypotheses that require the laws of relativity to be *conditional* at certain scales. There is so far no evidence supporting deviation from relativity at any scale.

Dilation Flooding provides a provable solution to Hubble Flow without violating any rules of relativity. Consider the following:

Einstein's Principle of Equivalence

"A little reflection will show that the law of the equality of the inertial and gravitational mass is equivalent to the assertion that the acceleration imparted to a body by a gravitational field is independent of the nature of the body. For Newton's equation of motion in a gravitational field, written out in full, it is:

> (Inertial mass) • (Acceleration) = (Intensity of the gravitational field) • (Gravitational mass)

"It is only when there is numerical equality between the inertial and gravitational mass that the acceleration is independent of the nature of the body."[2]

> In short: Frequency shift can either be caused by the Doppler effect ***or*** by gravitational field.

Since both solutions are equally valid, if evidence supporting one approach is lacking then the other is more likely true. Albert Einstein describes this as a necessary effect in his theory of relativity. His equations currently *are* the lab tested "de facto" mathematics that best describe the mechanics of the observable universe.

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[2] Einstein, Albert (2003). The Meaning of Relativity. Routledge. p. 59. ISBN 9781134449798.

To my knowledge, the Principle of Equivalence has not been considered as the primary cause of cosmic redshift in any theory.

The Expanding Universe: Relativistic Distance ‘vs’ Physical Distance

“Expansion of space” refers to the theoretical change in metric of the universe over time. In brief, this would mean that the distance between any two points in the universe are becoming measurably further from one another over time.

The entirety of the theory for the increasing metric of space is based on observations and computations made by Hubble himself of galaxies and cosmic events beyond distances of 10 parsecs. This does not mean that metric growth is not happening here on Earth, but that the effects are gradual enough that they are currently immeasurable on anything closer than several galaxies away.

To provide a cause for this metric growth, Hubble’s theory requires a yet unobserved extra-relativistic force or energy to physically stretch space and at an accelerating rate. This has led to the frequently used Dark Matter and Dark Energy terms to which few can agree on the exact nature of. Being absolutely frank, much effort is spent trying to prove such an exotic and extra-relativistic presumption to the apparent physical expansion of space.

> So is the universe expanding?
> Yes, but relativistically.

By strictly adhering to relativity we can describe the exact same phenomenon observed by Hubble. The only difference is that the cause of the *apparent* expansion of space is due to time dilation.

Using Dilation Flooding, space is stretched *relativistically*. Time dilation impacts the rate at which particles move, therefore objects at a distance will appear to be receding. No unobserved or hypothetical property of space is required.

Using only experimentally provable Einstein time dilation produces the same mathematical result for red shift. A gradual increase in relativistic background level over time will also give the appearance of greater distance between distant points in space due simply to time dilation. This is done without the physical distance having changed due to extra-relativistic matter or energy and is fully explained using only Einstein relativity better matching observed data.

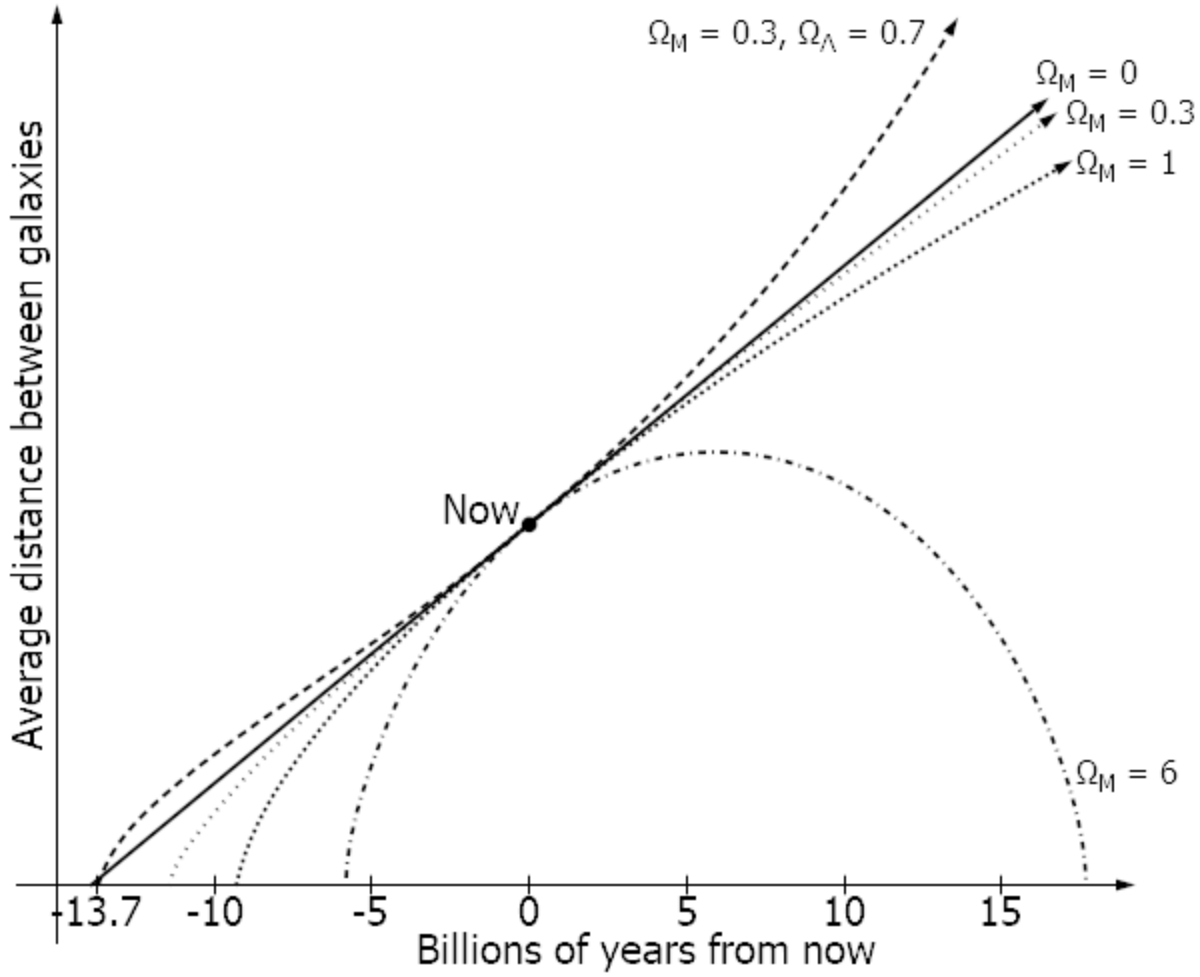
Linear ‘vs’ Curved Results

Hubble Flow and all comparable space expansion theories require some variable or accelerating rate of expansion. A linear function does not allow for a causal force and has always been assumed to be incorrect.

However, all measurable evidence currently implies a linear result for red shift. The rationale is that, at our current point in time, we are at an inconvenient point on the cosmic acceleration curve where all redshift distances *appear* to be linear. If that is the case we will never be able to verify that the curve exists as it will take millions of years to observe a change in the slope.

> The Hubble Parameter is often misnamed the Hubble Constant because for the foreseeable future the practical value will be linear.

To illustrate, the following diagram plots a variety of solutions to the Friedmann equations which are used to estimate the age and predict the fate of the universe. The topmost dashed line represents the accelerating universe as hypothesized by Hubble. All candidate values as demonstrated are picked to conform with the observed linear trend (Ω_M=0).



[3]

[3] By BenRG [Public domain], from Wikimedia Commons

In contrast, Dilation Flooding theorizes a constant value. Plotting the trend of Gravitational Potential Energy Compression over time is a linear slope. This agrees with all redshift observations to date. Since this rate of change is caused by conventional particles known to be present in the universe, no unknown or unconventional force is required.

The only prerequisite for Dilation Flooding is that the contents of the universe were distributed somewhat uniformly when the universe began. Measurements of the Cosmic Microwave Background support that, as of the Recombination epoch, this is the case.

The only foreseeable limit to the linear trend would be due to a finite volume universe. If gravity waves from the closest extremity of the universe ever reach us, there would be a declining and possibly uneven redshift value in all cosmic observations from that moment forward as the change rate of Dilation Flooding slows.

Length of a photon

The length of a photon is undefinable.

To be more clear, when observed or interacted with, a photon is pointal and immeasurable in any dimension. For all practical purposes, the length of an individual photon in motion is immeasurably small.

Hubble flow is often described as an optical Doppler effect as distant objects are accelerating away from us. However, this requires extreme regressive velocities be present in those distant objects at emission. For example, galaxies believed to be 13 billion light years away would need to have already been moving at 0.9 c at the time the photons we are now observing were emitted using simple Doppler calculation.

The effect of redshift must then be attributed to a change of wavelength as a result of physical expansion of space after emission. However, this is dependent upon how space “expands”. Simply adding to the metric of space would not necessarily alter an optical wavelength any more than two different lengths fiber optic cables used for the same signal.

As there is currently no consensus regarding the nature of Cosmic expansion, there is no way to experimentally verify that such non-relativistic metric expansion of space in fact changes a photon’s wavelength or would add Doppler shift to a signal in transit.

> Referencing the Principle of Equivalence, Doppler effect and time dilation are the *two* experimentally provable conditions in which a photon’s energy level would change.

Gravitational Potential Energy Compression due to Dilation Flooding provides a lab proven mechanism for the change of energy of a photon in transit. However, if one would argue that

time dilation *is* the physical stretching of space, that further supports a directly relativistic cause to redshift as described in this document.

Interpretation of Hubble constant measurements

Recent observations using the Hubble Telescope have shown that we can currently observe galaxies in excess of 13 billion light years away.[4] Loosely stated, that implies these galaxies not only existed over 13 billion years ago, but were at a distance no closer than 13 billion light years away when the light being observed was emitted.

As mentioned previously, estimates of the size of the complete universe are exponentially larger than the observed universe. Only a finite unbounded universe or other unconventional manifold would provide an exception to this. Excepting that possibility, one must assume that observable particles began existence in the universe at a distance much greater than the 13 billion light years to form the distant quasars we are currently observing.

Additionally, consider that LIGO and other interferometer experiments have essentially proven that gravity "waves" exist and "more recent analyses of Ligo's findings have placed gravitational wave speeds closer to the speed of light, albeit with superluminal upper bounds."[5]

Along with the photons we observe from distant objects, their gravity waves arrive at roughly the same time. This means that the relativistic influence from all matter within roughly 13.7 billion light years distance has reached the earth and is influencing the space between us and observable objects right now.

However, 1 billion years ago only the gravity waves within a 12.7 billion light year distance would have reached our point in the universe. In another billion years, the relativistic influence of a 14.7 billion light year circumference will have reached us.

> In agreement with general relativity and observations supporting gravity wave theory, one must conclude that as the light from ever more distant and ancient objects eventually reaches earth for the first time, so does its relativistic influence.

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[4] Most Distant Object in the Universe Spotted By Hubble Space Telescope, Shattering Record For the Farthest Known Galaxy
Andrew Griffin -
https://www.independent.co.uk/news/science/most-distant-object-in-the-universe-spotted-by-hubble-space-telescope-shattering-record-for-the-a6911096.html

[5] Abbott, B. P.; et al. (2017). "Gravitational Waves and Gamma-Rays from a Binary Neutron Star Merger: GW170817 and GRB 170817A"

This theory postulates that only particles present since the Electroweak Epoch have conformed to relativity and "contribute to the stress–energy tensor".[6] In other words, they produce relativistic phenomena including the speed of light limit and time dilation.

As the contribution to time dilation propagates from these particles at "c", the relativistic background level of any given point in the universe changes.

> This gradual "flooding" of time dilation lowers the Gravitational Potential across the universe. The result is a linear "relativity compression" altering the relative rate of "c" over time.

This provides a causality for observable redshift measurements of distant objects using only relativity without violating or modifying any known physical law.

Additionally, "Dilation Flooding" can explain observed phenomena that are difficult to resolve with a space expansion cosmological model. No exceptions or special considerations are required.

[6] E. g. sections 9.1 (gravitational contribution of photons) and 10.5 (influence of gravity on light) in Stephani, H.; Stewart, J. (1990). General Relativity: An Introduction to the Theory of Gravitational Field

The Incomplete Hubble Flow Redshift Theory

As mentioned earlier, cosmic redshift is an observable discrepancy between the expected frequency of light from a distant source and the measured value.
What Hubble and his contemporaries were able to determine is that the degree of frequency redshift appears to be directly proportional to the distance to the object. The more red shifted the object, the further away it is.

> To explain this phenomenon, Hubble adopted the common assumption of the nineteenth century: Optical redshift is a result of optical Doppler effect.

Although Einstein's Equivalence Principle was described decades earlier, there was no reason to believe it would apply. Without observational evidence of the finite age of the universe and wider acceptance of the propagation rate of gravity, there was little to suggest divergent theories.

However, the necessary condition of Hubble Flow is that everything in the universe is accelerating away from our point in space. Also, as redshift is greater at further distances, objects at an extreme distance would need to be moving extraordinarily fast. Organic movement of galaxies was not adequate to justify the calculated velocities, so an unobserved property of the universe was assumed to be involved.

> The metric expansion of space itself was concluded to be the cause of red shift.

Unfortunately, Hubble did not appear to speculate on the cause of this expansion. Also, per his own theory, the rate of this expansion should plot on a curve, and all measurements to this point suggest a linear trend.

Over the last 100 years, the cause of Hubble Flow has remained an unanswerable question with a plurality of conflicting or wholly unverifiable hypotheses. For example, Dark energy and other related theories exist only to corroborate Hubble Flow and have no other application. All attempts to verify the existence of dark energy fail or even result in contradicting it.

Gravity Wave Propagation

Prior to Einstein's theory of general relativity, the propagation of gravitational phenomenon at a distance was thought to be instantaneous.

Only in 1918, Austrian physicists Josef Lense and Hans Thirring had described rotational frame-dragging of gravitational effects. Einstein contributed a linear frame-dragging theory a few years later. Before then, there was no concept for "propagation" of gravity.

Although there is some observable evidence of gravitational frame-dragging, “propagation” of gravity from its source has not often been a consideration as there is no practical way to *switch it on and off* for experimental purposes. In all practicality, the gravitational influence of any observed object is already present and was there before the object was observed, so it has been prohibitive and largely unnecessary to try and prove how long gravity takes to get to a distance from its source.

Since gravitational and relativistic effect is largely attributed to mass, and the existence of mass and relativity are static as we know them (cannot be induced or suppressed like electromagnetic energy), this property of gravity is often ignored.

Only recently have there been apparatus capable of measuring the extreme astrological events that have provides experimental evidence of “gravity waves”. These “waves” prove that gravitational effects propagate through space conforming to Einstein’s relativity. In particular “more recent analyses of Ligo's findings have placed gravitational wave speeds closer to the speed of light, albeit with superluminal upper bounds.”[7] Through coordinated use of Laser Interferometers and several satellites observing the extreme gravitational and spectral perturbations caused by the merger of two neutron stars, we have strong evidence to show that relativistic effect (a.k.a. “gravity waves”) propagate from its source in a similar fashion to EM waves at a rate close to “c”.

In any case, I expect gravitational propagation was not a consideration when Hubble Flow was theorized.

“Law” vs “Constant” ‘vs’ “Parameter”

Hubble’s law is “A law of cosmology stating that the rate at which astronomical objects in the universe move apart from each other is proportional to their distance from each other.

“Current estimates of the value of this proportion are known as Hubble's constant”[8]

Although measurements of this value plot linearly, the theory behind Hubble’s Law is dependent upon the value being a parameter that plots on a curve.

To illustrate, the following diagram plots a variety of solutions to the Friedmann equations which are used to estimate the age and predict the fate of the universe. The topmost dashed line represents the accelerating universe as hypothesized by Hubble. However, all current measurements plot linearly, which obfuscates what the actual curve may be.

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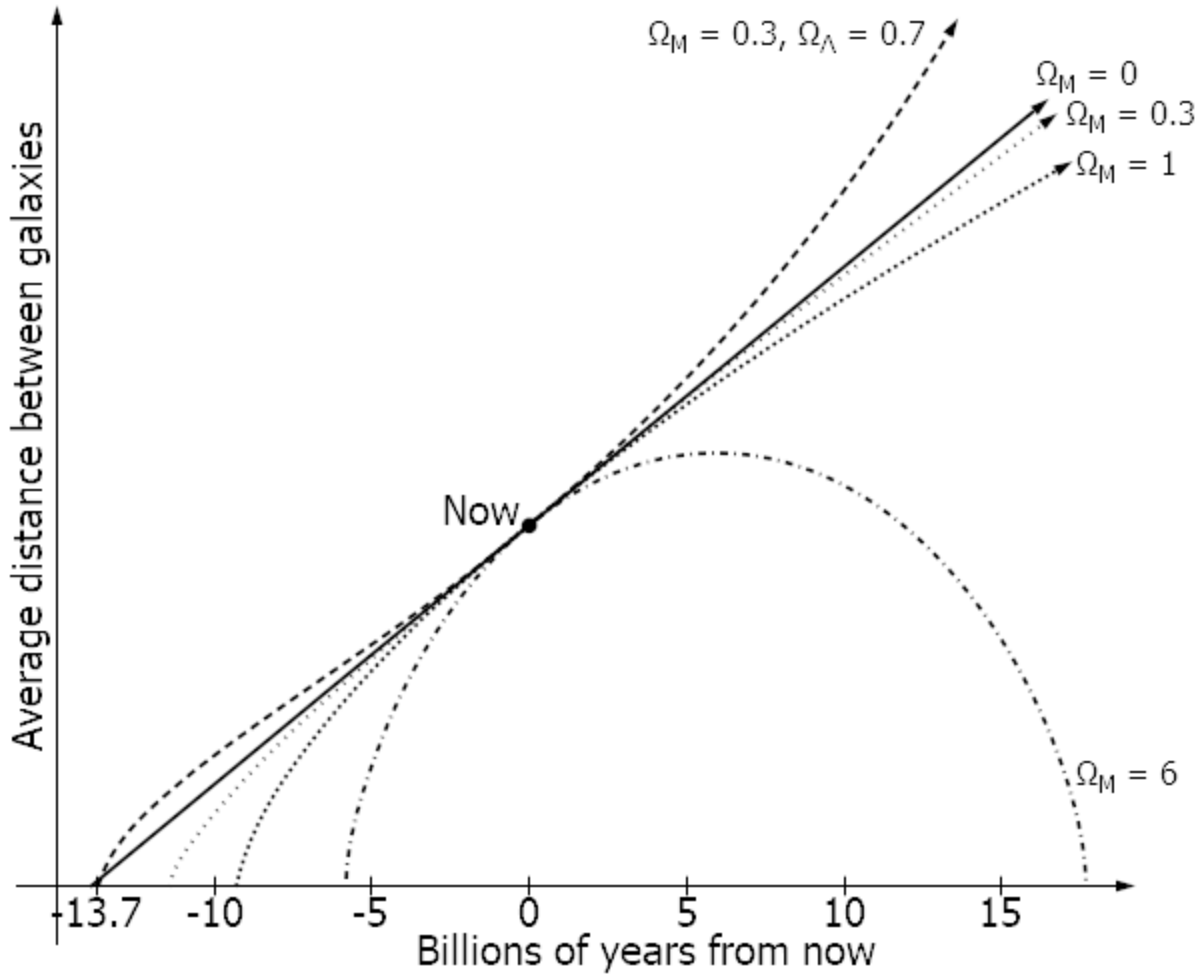
[7] Abbott, B. P.; et al. (2017). "Gravitational Waves and Gamma-Rays from a Binary Neutron Star Merger: GW170817 and GRB 170817A"

[8] https://www.dictionary.com/browse/hubble-s-law



[9]

Further complicating detection of a curve, measured and computed values of the Hubble constant over the last 2 decades have produced a variety of values. Some of this may be attributable to using different methodology or source samples. However, there is typically about ±2% uncertainty using nearly all measurement methods. Only the two recent Planck Mission publications have claimed accuracy to within ±0.6% (67.66±0.42 (km/s)/Mpc in 2018) using primarily CMB measurements.

Additionally, independent measurement of several objects in close proximity (like the Virgo Cluster) can have highly variable results. This causes additional speculation as to the cause of the redshift and brings into question the validity of different measurement techniques.

Since there is a wide range of values and a wide uncertainty in even the most narrow Hubble constant estimates, a linear result is just as likely as an accelerating/curved result. To observe a measurable difference in the curvature of the Hubble constant would take no less than 10 million

[9] By BenRG [Public domain], from Wikimedia Commons

years to identify, and that is assuming we can reduce the indeterminacy of our measurements adequately to detect the difference.

Despite Hubble's theory to the contrary, redshift currently plots on a line. If it in fact is a curve, then we are either unable to measure to that degree of certainty or is it a cosmic coincidence that we happen to exist at the point in the curve where the nonlinearity is undetectable for the foreseeable future.

The improbably static universe

In most applications, accuracy within the degree of measurement error can often be realized while making several assumptions and locally measured values.

However, Einstein's was the first to accurately characterize Mercury's orbit around the Sun using his equations for relativity. By definition, this means that all mathematics considering moving bodies is incomplete unless the entirety of relativistic effect is also being considered.

Hubble Flow theorizes that the mass distribution of the universe is changing, yet the theory assumes that the state of the observer is static throughout the observational period.

> Over the past 13 billion years, if the universe is metrically expanding due to a non-relativistic force, then Time Dilation should be decreasing due to the growing distance between matter in the universe.

In any case, I argue that additional variables like changes in the time dilation of the observer over time are not adequately conserved.

The Gravitational Potential Issue

If the universe is in fact expanding as stated in Hubble Flow, then the effects of time dilation due to nearby mass should be reducing. Additionally, if the gravitational potential of the universe is decompressing (time dilation is less prevalent), then the evidence for the energy potential of particles should be increasing.

This is contrary to observations of quasars and similar "high energy" cosmic objects. The improbably high energy of quasars and few examples of ancient black holes is only possible if the range of gravitational potential is sufficiently large to make it less likely for mass to be compacted to the point of collapse.

> The fact quasars existed but all appear to be extinct, and that black holes seem to be a more recent cosmic phenomena is evidence that the gravitational potential range of the universe is compressing.

Because of this observational evidence, time dilation appears to be increasing which implies average matter density in space (or its gravitational effect) is also increasing. This is counterintuitive to a physical expansion of space which would dilute time dilation and increase the maximum GP range across the universe.

The Undefinable Dark Forces

The arbitrary expansion of space theory of Hubble Flow has been largely unchallenged in roughly 100 years. However, there are many conflicting hypotheses under serious consideration that exist only to rationalize the cause for such an outward physical expansion. Terms like dark matter and dark energy are tossed about frequently in support of nearly every mathematical model that needs an unconventional force or exotic behavior to solve the problem of Hubble Flow.

Also, continuing from the previous section, this would not explain why gravitational potential appears to be compressing over time. The only possible correlation is if these Dark Forces add to time dilation while simultaneously forcing galaxies away from each other.

There seem to be more theories on Dark matter and dark energy then there are scientists proposing them. To date, every time one of these theories is tested it fails.

The End

If “Dilation Flooding” is indeed the mechanism that is driving cosmic redshift, how does this affect the distant future of the universe? The answer is dependent upon the complete form of the universe beyond our observation. I speculate there are at least 3 potential outcomes:

Dilation Recession

Conditions of the universe:

- Finite mass
- Infinite volume into which mass can disperse
- Outward velocity of mass exceeds the universal center of gravity

If the universe is a finite mass centered in an infinite expanse, at some point the relativistic influence of every particle will have reached its extents. At that point, there would be a “Dilation plateau” with the redshifts of distant objects gradually reducing/shifting towards nominal values.

After the relativity plateau, if the limited contents of the universe have sufficient outward momentum within an unbound infinite expanse, the gradual lowering of particle density will result in a reduction in relativity compression. During this “relativity recession”, deep space observations will have a blueshift.

> Following the doppler-based reasoning behind Hubble Flow, this would be considered evidence of a shrinking universe. However, a reversal in Dilation Flooding would be caused by the continuing spread of limited matter away from us.

In this model, the contents of the universe will continue to scatter. Although gravity will work to draw clusters of matter together, the reduction in relativity compression will allow for higher energy features (like quasars) to scatter matter even further. Eventually, most matter will be converted into energy or high velocity particles moving infinitely into space. Only black holes and small objects incapable of ignition remain.

Cosmic Black hole

Conditions of the universe:

- Finite mass
- Finite volume *or* Outward velocity of mass does not exceed the universal center of gravity

This hypothesis follows the same path as Dilation Recession until the “Dilation plateau”. If the contents of the universe do not have sufficient momentum away from the cosmic center, a dilation differential will grow from the mass center of the universe.

This gravitational imbalance will gradually form a universe size gravity well. Eventually the whole mass of the universe will be drawn in. Without modeling this to some detail, it is difficult to predict if we would observe blueshift as the distance between objects decreases, or redshift as relativity compression increases as an observer migrates towards the cosmic center.

In the end, the contents of the entire universe are reduced to a single black hole.

Gluon Failure

Conditions of the universe:

- Infinite mass
- Infinite volume (or a finite unbounded manifold)

If our universe has infinite mass evenly distributed across an infinite volume (or a finite mass evenly distributed within an unconventional manifold like a finite unbounded universe), Dilation Flooding will continue to increase indefinitely. Redshift will maintain the same linear trend, and Relativity Compression will continue to increase the relative distance/lower the GP between all points in space. This means that even if the “real” distance between objects is constant, the time it takes for light and force to move between those points will increase.

> For example, it only takes about one billionth of a second for the light from this page to reach your eyes. As the level of relativity compression increases, it will take much longer for the light to reach your eyes.
>
> As your sense of perception will also be slowed, even if it takes minutes for the light to reach your eye, you would still perceive it to be billionths of a second. Only in observation of the evolution of deep space objects would we be able to recognize the difference in relativity compression over time.

Eventually, relativity compression across the entire universe will reach Event Horizon levels. Since boson functionality is directly dependent upon “c” being an adequately large relative value, a very low GP or high time dilation will leave gluons unable to provide enough force or velocity to maintain hadron structure. All protons and neutrons will disintegrate into individual quarks no longer bound by their functionless gluon. Fundamental particles as a whole will have too little energy or too much relative space between them to provide meaningful interactions.

Since all fundamental particles will still contribute to time dilation, the universe will eventually be reduced to non-functional bosons in a persistent state of extreme time dilation indefinitely.

Conclusion

Hubble Flow as a causal mechanism for cosmic redshift measurements was hypothesized 100 years ago. Although the idea of an accelerating expansion of space itself may have seemed fantastic, our understanding of relativity at the time was not able to provide enhancement to Hubble's theory.

Since then we have accrued lab proven evidence of Quantum entanglement, the Higgs Boson, gravitational wave propagation, and other discoveries which all enhance the scientific understanding of yesteryear.

As a theory that is in agreement with available scientific evidence and strictly follows the most basic application of Einstein relativity, it is my conclusion that a "Dilation Flooding" model accurately fits as a cause for observed cosmic redshift.