



Distant High-Energy Sources and the Cosmic Microwave Background in a Creation Day 1 Framework

Randy Speir, 100 E. Ridgeway #615, Midlothian, TX 76065

Abstract

High-energy events at cosmological distances in our universe regularly emit gamma-ray bursts (GRB) that scan the periphery of the heavens with pinpoints of light in surprisingly isotropic fashion. GRBs exhibit isotropy and other behavioral correlations to the oldest relic in the universe, the Cosmic Microwave Background (CMB). From a creationist perspective, today's CMB is investigated for clues to a young universe cosmology. A 6,000-year-old universe is proposed in a Creation Day 1 construct of vastly spread matter particles, severe time dilation, dual cosmic expansions, dual cosmic clocks, imaginary time, dark energy, and relative ages.

Keywords

Cosmic Microwave Background, Eternity, Imaginary time, CMB time zone, CMB clock, Hubble particle, Hubble clock, Local time, Planck seed

Introduction

In the decades since the 1960s when Gamma Ray Bursts (GRB) were initially discovered, there has been no shortage of theories concerning the nature of their origins, and from what distances their signals are being emitted. While the mystery surrounding them will no doubt remain for some time, they are presently believed to be products of a merger of neutron stars, a merger of a white dwarf and neutron star, or the collapse of a massive star (Chattopadhyay, Misra, Chattopadhyay, & Naskar, 2007). Theories about their distance scale puts them at least as far back as the earliest stars, thought to be formed in minihalos of total mass $\sim 10^6 M$ at predicted redshifts of $z \approx 20-30$ (Bromm & Loeb, 2006).

At the outset, it is interesting to note that the creation model at hand predicts the first stars were formed on Creation Day 4 at redshift $z \approx 26$ (Table 1).

Light curves of dim burst GRBs exhibit time dilation at cosmological distances. Some GRBs were concluded to exist as events at extreme distances following a 1997 sampling of their afterglows which determined a decay from x-rays to optical to radio range in a manner predicted by pre-existing models (Meszaros, 2006).

This behavior prompts queries into the intrinsic nature of the early universe, namely, (1) the possibility of extreme time dilation in the deep past, and (2) the possibility that today's Cosmic Microwave Background (CMB) had its beginnings in the gamma-ray range.

Further behavioral correlations arise between the CMB and Gamma Ray Bursts when the isotropic nature of GRBs is studied. Satellites confirm about one to two bursts per day that, over time, reveal a uniform sprinkling across the cosmic sky. Over the nine year mission of the Burst and Transient Source Experiment on board NASA's Compton Gamma-Ray Observatory, data collected on a map showing the locations of 2704 Gamma Ray Bursts bears out this remarkable feature of GRB phenomenology (Figure 1). Here, one is reminded of the isotropic nature of today's Cosmic Microwave

Table 1. Datasheet z.stars.

| Local Time (years) | Description | CMB Temperature (K) | CMB Wavelength (m) | Redshift (z) |
|--------------------|---------------|---------------------|--------------------|--------------|
| 1.71E-51 | Planck | 1.180E+14 | 2.457E-17 | 4.326E+13 |
| 3.17E-08 | 1 sec | 1.797E+03 | 1.612E-06 | 658.2 |
| 0.00274 | Day 1 | 1.048E+02 | 2.766E-05 | 37.4 |
| 0.00548 | Day 2 | 8.815E+01 | 3.288E-05 | 31.3 |
| 0.00822 | Day 3 | 7.965E+01 | 3.638E-05 | 28.2 |
| 0.01096 | Day 4 (stars) | 7.412E+01 | 3.910E-05 | 26.2 |
| 0.01370 | Day 5 | 7.010E+01 | 4.134E-05 | 24.7 |
| 0.01640 | Day 6 | 6.702E+01 | 4.324E-05 | 23.6 |
| 1 | | 2.398E+01 | 1.208E-04 | 7.8 |
| 500 | | 5.072E+00 | 5.714E-04 | 0.9 |
| 1000 | | 4.265E+00 | 6.795E-04 | 0.6 |
| 3000 | | 3.241E+00 | 8.943E-04 | 0.2 |
| 5500 | | 2.785E+00 | 1.041E-03 | 2.145E-02 |
| 6000 | | 2.725E+00 | 1.063E-03 | 0.000E+00 |

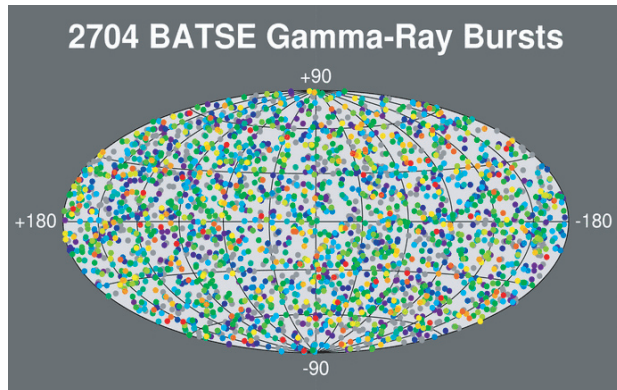


Figure 1. The burst locations are color-coded based on the fluence, which is the energy flux of the burst integrated over the total duration of the event. Long duration, bright bursts appear in red, and short duration, weak bursts appear in purple. Grey is used for bursts for which the fluence cannot be calculated due to incomplete data. <http://www.batse.msfc.nasa.gov/batse/grb/skymap/>.

Background and the noticeable absence of any noteworthy temperature gradient across the spread of what may be nature's supreme blackbody radiator (Figure 2). Another query arises concerning the early universe—the possibility that random dim burst GRBs point backward to a single high-energy event from a much smaller capsule of space and time.

Creation cosmology has identified five categories into which current creation models fall: (1) phenomenological language, (2) fast cosmic clocks, (3) slow earth clocks, (4) variant light velocity, and (5) miraculous generation, with slow earth clocks presently being the preferred construct (Hartnett, 2003). However, drawing from the above thoughts surrounding a small, high-energy beginning, early time dilation, ubiquitous radiation, and isotropic distribution, a sixth creation option necessarily emerges—one which identifies an added time dimension in nature. For the Creator to build dual cosmic clocks into his universe allows for an elegant solution to the problem of retaining a young age

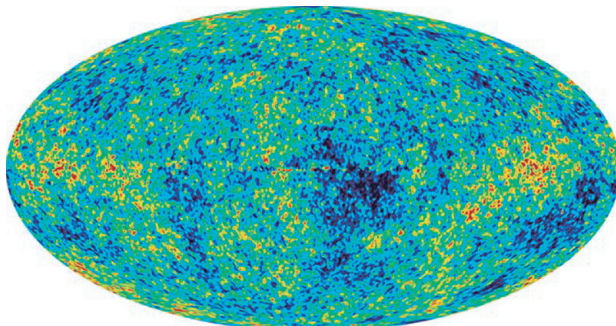


Figure 2. The Microwave Sky from WMAP Mission. Credit: NASA/WMAP Mission. Posted on: 04 Apr, 2003. http://www.redorbit.com/images/gallery/wmap/the_microwave_sky_from_wmap_mission/23/1/index.html.

throughout an exceedingly vast system as well as the problem of explaining our reception of billion-year-old starlight in mere thousands of years. The clock of the preferred universal frame will be offered as the ubiquitous Cosmic Microwave Background and will be hypothesized to have accurately recorded local, earth time from the initial creation moment. Every hypothetical observer, at any point in the universe present or past, will set his clock by the advancing CMB wavelength. All motion relative to this preferred frame will point to an extreme range of relative ages and will be tracked by the second cosmic clock—the very old, long-running Hubble, a timepiece that will be hypothesized to have its origin in timeless eternity.

Space, Time, and Matter

This cosmological model will prefer a Euclidean coordinate system in asymptotically flat space-time which has reduced to a geometry of Minkowski space at large distances where curvature becomes negligible. If possible, it will further attempt to adopt that geometry at the outset of time itself, the beginning instant of everything.

In standard cosmology, space expands as time and space move in increments simultaneously. It is said that between points with constant coordinates, distance increases over time. However, the symmetry and elegance of this phenomenon should not be violated if one says conversely that, between constant points, *time* grows over *distance*.

Let P and P₁ represent two points in empty space separated by any non-zero arbitrary distance, yet existing outside the bounds of a time dimension (if that were possible). Only later, insert a time coordinate, *t*, indicating simultaneity, into both. The point coordinates would be

$$\begin{aligned} P &(x, y, z, t) \\ P_1 &(x_1, y_1, z_1, t). \end{aligned}$$

Both points share *t*. If it were possible for this situation to exist momentarily, *t* must immediately begin to expand until a value of *t*₁ is achieved: *t* → *t*₁. Because in Special Relativity time and space are intrinsically linked, time must move to “catch up” to the distance separating events P and P₁. With respect to P, point P₁ would move to assume the *t*₁ coordinate:

$$P_1(x_1, y_1, z_1, t_1).$$

From the view of P₁, P would assume *t*₁ :

$$P(x, y, z, t_1).$$

At the moment *t* is introduced, an observer would

likely see what appeared to be a single point in space, when the reality would be two separate points in space inhabiting the same time. As time moved and increased, the apparent view would be that space was expanding and incrementally distancing the particles over time. In actuality, the observer would himself share t with all other points and would observe a spreading of all points away from himself and each other.

If such a scenario of the beginning of everything could be true, then the singularity of the big bang cosmology with its accompanying protests from cosmologists (Greene, 2003, pp. 365–366) is removed. Only time—not matter, energy, forces, space, and time—would be singular in the beginning.

This cosmological model will propose that from time zero, the boundary of the universe was already vast and matter was already “there”—only time need travel to “catch-up” to the reality of the distance. In this case, the real “bang” was an explosion of time (though the universe was intensely hot). Here, any horizon problem¹ has evaporated since time is growing over distance, not distance over time. Distance between particles at extreme intervals would not have surpassed communication between those particles since the view that expanding space is conveying matter quickly apart—even at superluminal velocities—is only apparent.

The reality of time dilation during the first critical moments after creation ensured a uniformity of radiation wavelength and temperature isotropy across a symmetrically inflated, matter-fixed universe in miniature (Figure 3).

Cosmogony

According to General Relativity, time does not exist without matter. That can only mean that the two must exist simultaneously, at the same beginning instant. If that beginning instant is taken to mean zero forward, $0 \rightarrow$, then matter may have existed in sub-Planck time, before 10^{-43} second had elapsed. That sub-Planck gap—between zero time and one Planck second—was ample allowance for a supreme Creator to spread out an untold number of matter particles across an expanse to a boundary the size of His choosing.

String cosmologists suggest a whole pre-Planckian history to the universe, calling on time dilation to drive space curvature and dramatic increases in temperature and energy density before time even reaches a zero value. The result is described as “an accelerated contraction phase”—a lead-in to the big bang (Greene, 2003, pp. 362, 410).

Some of these thoughts are appealing in light of the

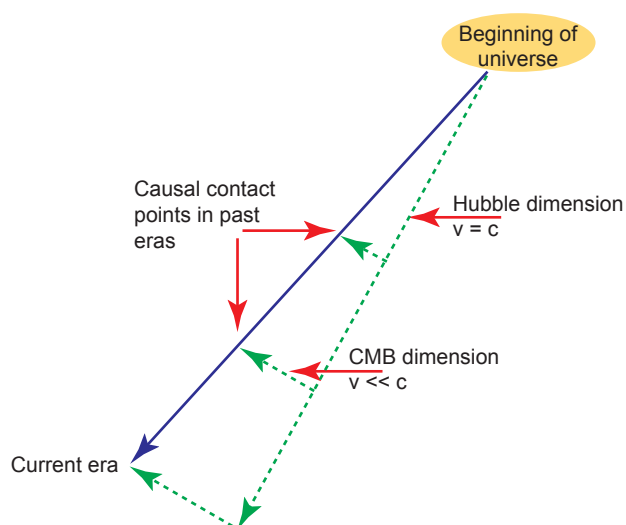


Figure 3. Causal contact. In a universe with two time dimensions, causal contact between particles is never lost. As time advances (solid arrow), the intersecting CMB time zone ensures that we will always receive information from the earliest era no matter how distant it grows. That includes early starlight.

theory at hand. If time did exist in a pre-Planck era and was fully dilated, it might have gone undetected—that is, it might be difficult or impossible to ascertain empirically since it would give the appearance of non-existence, as it did not move along incrementally as we know it. Matter, then, may have co-existed with time in a state of suspended animation. Matter, too, would go undetected in that early era, being invisible until time was allowed to make its first advance.

Imaginary time was first introduced by Stephen Hawking and Jim Hartle several decades ago as a device to avoid singularities—points of infinite curvature unexplained by current laws of physics. Since imaginary time intersects ordinary time at right angles, it meets with our three spatial dimensions to create a geometry analogous to the smooth surface of the earth. Just as no designated point on this surface, for example, the North Pole, could be said to “begin” this geometry, neither does imaginary time have a beginning or an end (Corbett, Stafford, & Wright, 2007). Hawking calls it “infinite” in scope (Hawking, 1996, p. 141). This model proposes that it is “eternal.”

All of God’s dealings with us and our realm involve an intersection of the divine. Jesus, on a divine mission, took on a human body in order to intersect with our physical realm. Even today, we understand Him to inhabit the heavens still in possession of that form, albeit a regenerated one. The vast system we call our universe may be no less than a great intersection of timeless eternity which occurred around 6,000 years ago in temporal history. If the heavens look eternal to

¹ This is a reference to the well-known “horizon problem” of the big bang model

us, it may be because, in a very real sense, they are.

Figure 4 shows how God may have caused orthogonally oriented imaginary time (or eternity), matter, and our time to interact in order to bring about the universe Adam observed by creation day 6 and the elegant one we observe today. The cosmogony presented, which is still being developed, introduces several novel features to the science of creation modeling: a proto-universe, dual intersecting time zones, two concurrent cosmic expansions, a “Planck seed,” and a “deep time” achieved in ordinary earth days.

Velocities greater than c

Davis and Lineweaver (2003) correctly call our attention to certain aspects of the phenomenon of superluminal expansion in the universe. In response to a popular definition, “Superluminal expansion might be most naturally defined as that where any two comoving points eventually lose causal contact,” they add this comment in Appendix B: “... we should use this definition with caution because even if the recession velocity between two points is $D > c$ this does not mean those points will eventually lose causal contact.” They emphasize that we regularly view galaxies in our universe with redshifts greater than $z \sim 1.46$ receding at above light speeds, adding, “... we know there is no contradiction with Special Relativity when faster than light motion occurs outside the observer’s inertial frame.” Contrary to popular computation methods which involve special relativistic corrections at high redshift, the authors urge principles of General Relativity to help mitigate the number of miscalculations surrounding superluminal velocities.

Discussions of superluminal velocities in the universe appeal to the characteristics of space, time and matter in the present creation model. Overall, the model says that, in reality, above c recession velocities simply do not exist—rather, they only exist apparently.

A quick calculation of Hubble radius/Hubble time using figures from Table 2 shows that, in its own frame of reference, the Hubble dimension is expanding at a rate of c , but not above. Only to an observer looking from the CMB dimension into the Hubble dimension, would velocities appear to be exceeding c . Thus, there is no violation of physical laws occurring. To use the disclaimer of modern-day cosmologists attempting to explain this phenomenon, “Special Relativity is not contradicted because the motion is occurring outside the observer’s inertial frame.”

Too, it must be iterated that in the expansion peculiar to this model, time is growing over distance, not distance over time. At $t_L = 1$ Planck second, t_p , matter particles do not actually move at $v = 1.28 \text{ e}42 \text{ m/sec.}$ to arrive at a radius of 6.91cm; those particles were already there. Only time moved to catch-up to the reality of the distance. At that opening moment, you might say time was backfilling distance at a rate of

$$\frac{1}{1.28 \text{ e} 42 \text{ m/s}} = 7.80\text{e} - 43 \text{ sec/m}$$

At $t_L = t_p$, matter particles have apparently raced at $1.28 \text{ e}42 \text{ m/s}$ to an older time location at .0691m. At that horizon, they will possess a Hubble age of

$$\frac{.0691 \text{ m}}{c} = 2.305\text{e} - 10 \text{ sec or}$$

$$7.308\text{e} - 18 \text{ Hubble years}$$

to observers in a local, CMB time zone who will register only the passage of one Planck second. This scenario of matter particles apparently moving in increments to older horizons will continue for several thousand years locally as Hubble years pile into the billions. This peculiar layout of spacetime and matter will characterize the dual nature of time in the universe—at any local time, t_L , an accompanying apparent Hubble time, t_H , will simultaneously exist.

Table 2. Datasheet 1.

| Local Time (years) | Description | CMB Temperature (K) | CMB λ (m) | Hubble Radius r_H (m) | Hubble Time t_H (years) | Hubble Constant (km/s/Mpc) |
|--------------------|-------------|---------------------|-------------------|-------------------------|---------------------------|----------------------------|
| 1.71E-51 | Planck | 1.180E+14 | 2.457E-17 | 6.910E-02 | 7.309E-18 | 1.339E+29 |
| 0.00274 | Day 1 | 1.048E+02 | 2.765E-05 | 8.749E+22 | 9.254E+06 | 105,729.53 |
| 0.00548 | Day 2 | 8.815E+01 | 3.288E-05 | 1.237E+23 | 1.309E+07 | 74,762.07 |
| 0.00822 | Day 3 | 7.965E+01 | 3.638E-05 | 1.515E+23 | 1.603E+07 | 61,046.69 |
| 0.01096 | Day 4 | 7.412E+01 | 3.910E-05 | 1.750E+23 | 1.851E+07 | 52,864.77 |
| 0.01370 | Day 5 | 7.010E+01 | 4.134E-05 | 1.956E+23 | 2.069E+07 | 47,283.68 |
| 0.01640 | Day 6 | 6.702E+01 | 4.324E-05 | 2.141E+23 | 2.264E+07 | 43,216.51 |
| 1 | | 2.398E+01 | 1.208E-04 | 1.671E+24 | 1.768E+08 | 5,534.41 |
| 500 | | 5.072E+00 | 5.714E-04 | 3.738E+25 | 3.953E+09 | 247.51 |
| 1000 | | 4.265E+00 | 6.795E-04 | 5.286E+25 | 5.591E+09 | 175.01 |
| 3000 | | 3.241E+00 | 8.943E-04 | 9.155E+25 | 9.683E+09 | 101.04 |
| 5500 | | 2.785E+00 | 1.041E-03 | 1.240E+26 | 1.311E+10 | 74.63 |
| 6000 | | 2.725E+00 | 1.063E-03 | 1.295E+26 | 1.369E+10 | 71.45 |

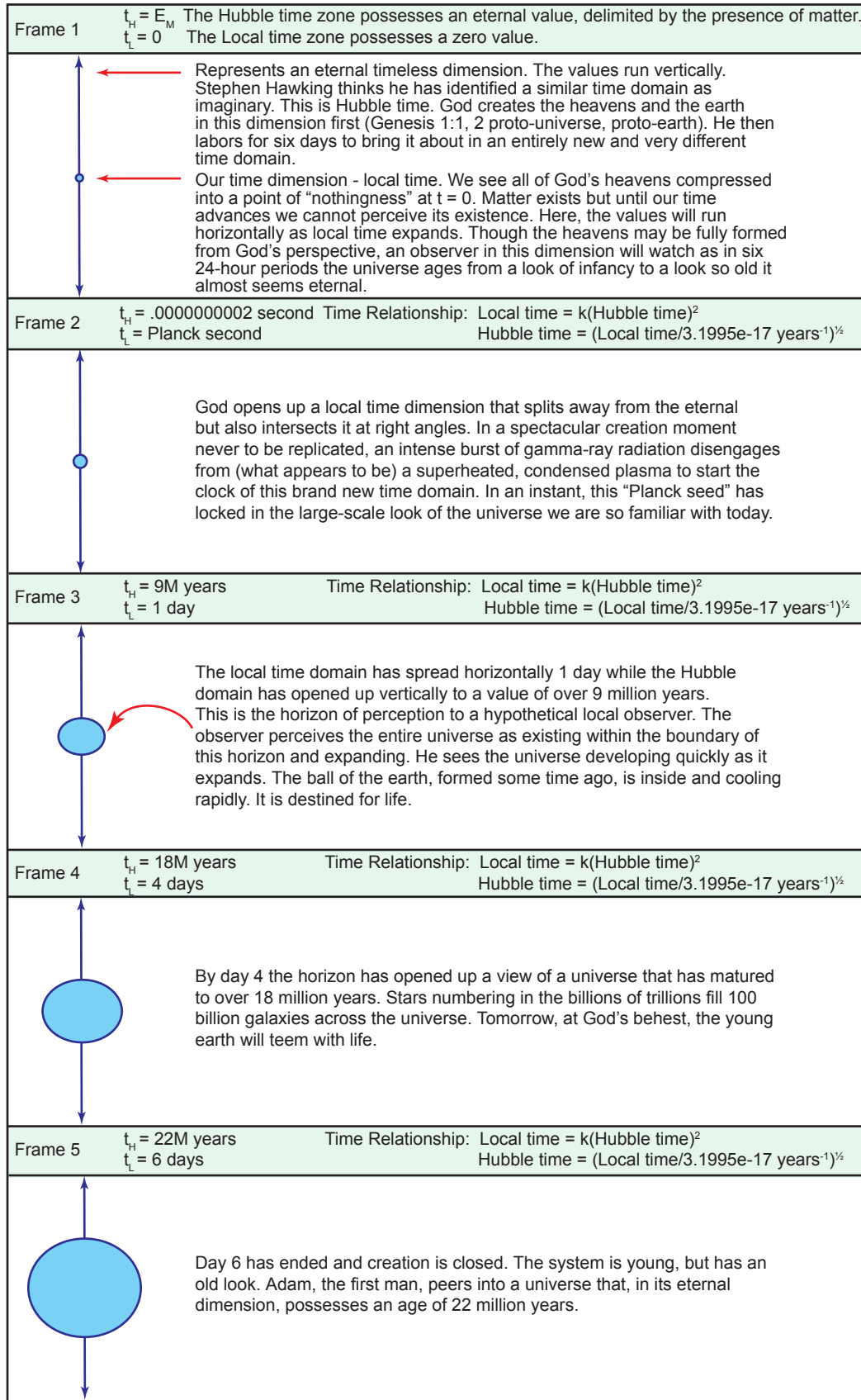


Figure 4. Creation time frames. The vertical line and expanding circle are pictorial representations only of interrelated time dimensions. In no wise are their respective sizes and shapes intended to portray mathematical models.

Cosmological Constant

Almost all cosmologies need a mechanism to “jump-start” the system and begin an expansion of matter, energy, space, time, and forces from a small capsule—some from infinite density, like singularities—to the vast expanse we call our universe today. To get the big bang singularity moving in the right direction, cosmologists call on a mechanism termed “vacuum energy density” or a negative pressure which, in the early universe, caused exponential expansion to occur when symmetry between the fundamental forces was broken and a “freeze out” of the strong nuclear force produced a super-rapid inflation (Chaisson & McMillan, 2002, p.727; Wright, 2006). This model prefers a cosmological constant, sometimes termed “dark energy,” to drive the expansion of space, time, and matter.

In four-dimensional space-time, the three orthogonal spatial coordinates of a point are here written as a function of time :

$$[t(x)+t(y)+t(z)]=3t$$

where the integer represents spatial density in a 3-manifold. Orthogonal coordinates x, y, z are fixed while the time coordinate is dynamic; it has earlier been stated that t moves to assume t_1 . It is precisely this movement which acts as negative density pressure on the point under consideration:

$$-[t_1(x)+t_1(y)+t_1(z)]=-3t_1.$$

Then, for expanding space, the point exists as

$$[t(x)+t(y)+t(z)]-[t_1(x)+t_1(y)+t_1(z)]=3t-3t_1$$

or

$$-3(-t+t_1).$$

For all points, $t=0$ for initial conditions, it is seen that while time may be observed to move positively toward t_1 , in reality, it is being pulled negatively by an energy density in three spatial dimensions. Cosmologists say:

... General Relativity says that if the vacuum has energy density, it must also have pressure. In fact, it must have a pressure equal to exactly -3 times its energy density, in units where the speed of light and Newton's gravitational constant equal 1. ... ultimately this is because there are 3 dimensions of space (Baez, 2006).

Nothing which comes from God is “naturalistic,” yet the brilliant simplicity by which he builds nature sometimes gives the illusion that events are happening in a self-contained sort of manner absent any outside,

or grand initial cause. This is not deception on the part of God, but rather, an evocation of faith from man by his Creator, who, by the way, also “built” the heart to believe. His cosmological constant, or universal expansion mechanism, is just such a brilliant construct. Simply put, he mixes eternity and matter, two foreign elements which by design have violently conflicting natures. Their flashpoint is immediate exposure to one another.

Timeless eternity is “old,” but matter is a brand new substance. Since it possesses dimension, with edges and boundaries, its very existence is pinned on something else entirely new—time. The process is easy to grasp. God delimits a swatch of eternity with the presence of matter—herein, is the proto-universe. The earth is “without form” (yet it has a proto-form) and darkness shrouds everything. But God has intentionally built a variance, a supreme tension, into this new system. Matter, by nature, cannot exist in simultaneity across this timeless proto-universe spread without the element of time to achieve such a look. But the time which has simultaneously come into being with matter is stretched taut across the delimited field. It is severely dilated and possesses a literal, zero value. Like all that God does, the system is perfect, but is also perfectly imbalanced. A flashpoint is imminent.

God says, “Let there be light.” A super-intense burst of radiation in the gamma-ray range, with an energy output of over 50 millionkeV (per the beginning wavelength on Table 2), erupts as a brand new intersecting time dimension opens at right angles to the eternal. This is our frame of reference. Since time is small, a hypothetical observer would see all of God's proto-universe condensed to a small, hot plasma, expanding as our time expands. By the moment the first increment of time—Planck—elapses, time dilation has fallen to just below maximum and is undergoing rapid decay. Temperature and energy density, though high, are declining rapidly. The overall effect is a “time-bounce,” as time moves quickly—though decelerating—to fill the vastness of space. The ensuing expansion will continue along a smooth curve until time has (apparently) “backfilled” the extent of matter's initial spread. Thus, the driving force behind the cosmological constant—dark energy—with much of its mystery stripped away.

Hubble Law

This model assumes uniform movement in metrically expanding space in a universe entirely homogeneous and isotropic from the beginning. Any privileged observer O should see and describe the exact universe that privileged observer O_1 sees and describes, no matter their interval of separation. In this geometry, an idealized Hubble's Law is given by

$v=H_0r$, where v is velocity, H_0 is the Hubble parameter, and r is the proper distance (in megaparsecs) a photon of light travels from a distant source as measured in a local observer’s rest frame. Intuitively, it is seen that the Hubble Law arises as a natural consequence in this model. For inertial observer O with points $P, Q,$ and R along his radial line of sight at distances of $x, 2x,$ and $3x,$ respectively, all appear to inhabit the same point in space at $t=0$. However, at $\Delta t,$ $P, Q,$ and R are apparently receding from O at velocities

$$\begin{aligned} v_P &= x/\Delta t \\ v_Q &= 2x/\Delta t \\ v_R &= 3x/\Delta t. \end{aligned}$$

Edwin Hubble concluded that points in space, or cosmic objects, move away from each other with a velocity proportional to their distance apart (Hubble, 1929). This model confirms his observations.

An Inside View

Prior to time as we know it—and in order to accept the cosmogony presented here—one may have to entertain the notion that God exploited his own created natural laws in order to tightly wind the entire cosmic system in a pre-expansion phase of super time dilation. Upon its release, the system began to quickly unwind, decelerating the whole while. The picture is much like a ball, mashed on the floor at the bottom of a bounce, full of potential energy, temporarily motionless, suddenly springing upward, transferring its kinetic energy back to potential as it slows under the negative pull of gravity. Immediately, at Planck time, the universe “woke up” to find that spatial coordinates from end to end of a boundary billions of light-years across, all shared the same time coordinate. At that instant, because of severe length contraction, an inside observer would likely see the universe as a small orb just above his head.

Andrew Hamilton describes what may have been an inside view of this infant expanding universe. As he plunges his reader toward the singularity of a black hole, he describes a view of the universe just outside the event horizon, or Schwarzschild surface:

One way to watch all the history of the Universe would be to stay just above the horizon... . The Universe would then appear ... speeded up, ... highly blueshifted (probably roasting you in gamma rays), and concentrated in a tiny piece of the sky just above you.

[You could] take a trip around the Universe. Thanks to special relativistic time dilation, [you] could travel vast distances in a modest time, at superluminal speeds—apparently faster than the speed of light. (Hamilton, 2006)

While the cosmological model at hand does not claim a primordial universe full of black holes or singularities, it does propose that the view from

any arbitrary point in the very early system would be exactly that of standing on the event horizon of a black hole. Looking into the system, events would be passing with extreme rapidity; gamma rays (later stretched to microwaves) would be everywhere; if human eyes could detect those small wavelengths, the universe would appear condensed to the size of a small orb.

From that point forward, the scene would have passed quickly but beautifully. Table 3 shows that even before one second of local time had elapsed, the expanding orb of the universe would have already stretched gamma-ray wavelengths through the entire optical spectrum. All of God’s radiation wavelengths constitute “light,” and his verbal pronouncement calling forth light into his infant system could have come at any picosecond in this short time interval, $t=0 \rightarrow 1$ sec. Wavelengths shown on the datasheet correspond to a declining cosmic temperature and are given by Wien’s Displacement Law for a blackbody spectrum:

$$\lambda_{max} = b/T \tag{1}$$

where λ_{max} is the peak wavelength in meters, T is the blackbody temperature in Kelvins, and b is Wien’s displacement constant.

Early Tension

Surprisingly, a manifold of high curvature may not have been characteristic of this early spacetime if time were the only single element. If the manifold might be explained in a wholly time-dependent metric, then spacetime was possibly conformally flat from the beginning with little or no consideration being given to super matter density or significant gravity.

Table 3. Datasheet 2.

| Local Time (years) | Description | CMB Temperature (K) | Wavelength (m) |
|--------------------|---------------|---------------------|----------------|
| 1.71E-51 | Planck | 1.180E+14 | 2.457E-17 |
| 1.00E-20 | | 2.398E+06 | 1.208E-09 |
| 1.00E-15 | | 1.349E+05 | 2.149E-08 |
| 1.00E-10 | visible light | 7.584E+03 | 3.821E-07 |
| 4.17E-10 | visible light | 5.308E+03 | 5.459E-07 |
| 7.33E-10 | visible light | 4.609E+03 | 6.288E-07 |
| 1.05E-09 | visible light | 4.213E+03 | 6.878E-07 |
| 1.37E-09 | visible light | 3.945E+03 | 7.347E-07 |
| 1.68E-09 | visible light | 3.744E+03 | 7.740E-07 |
| 2.00E-09 | visible light | 3.586E+03 | 8.081E-07 |
| 3.17E-08 | 1 sec | 1.797E+03 | 1.612E-06 |
| 0.00274 | Day 1 | 1.048E+02 | 2.765E-05 |
| 0.00548 | Day 2 | 8.815E+01 | 3.288E-05 |
| 0.00822 | Day 3 | 7.965E+01 | 3.638E-05 |
| 0.01096 | Day 4 | 7.412E+01 | 3.910E-05 |
| 0.01370 | Day 5 | 7.010E+01 | 4.134E-05 |
| 0.01640 | Day 6 | 6.702E+01 | 4.324E-05 |

Under this rule, General Relativity would be limited to high-gravity structures that would only later arise in the universe—stars, galaxies, black holes. In the absence of curvature, initial temperatures would not be so high as the Standard Model proposes². Some of the mystery surrounding large-scale clusters and structures like the cobweblike pattern of matter filaments and voids observed on the cosmic scale today (Conselice, 2007) would be diminished in light of the view that vast clumps of matter were possibly distributed anisotropically from the beginning—initially by God, then due to the emergence of dual time dimensions.

If the tensors of General Relativity did not govern the metric of early spacetime, then the laws which God exploited in the beginning were likely those of Special Relativity, and only a Minkowski metric need be considered. In so doing, prevailing parameters would dictate that the construction of four-dimensional spacetime under consideration—where points at vast distances in space all shared the same time coordinate—would be a fundamental impossibility. Spacelike geodesics do not correspond to the path of any physical particle and spacelike separations are disallowed by Special Relativity. That is because not enough time would have elapsed between spread out physical particles for a cause-effect relationship to exist. A flash of light does not occur at points in space near and far simultaneously.

Using the metric signature $(-, +, +, +)$, the spacetime interval

$$ds^2 = -c^2 dt^2 + dx^2 + dy^2 + dz^2$$

yields a spacelike separation for any value $ds^2 > 0$. Clearly this would have been the situation in the proposal above and for time dilation at max when t is shared by all points in space:

$$ds^2 = (0 + [dx^2 > 0] + 0 + 0)$$

where instantaneous coordinates for a particle in a local rest frame and any other “ x +number” particle along its radial line-of-sight are considered. In Special Relativity the solution $ds^2 > 0$ for physical particles is a scenario not known to exist. If however, at the beginning, God caused it to exist in variance to his own created laws, then it might be presumed that the universe has been in a prolonged correction phase ever since.

Here it should be considered that spacelike worldlines correspond to paths that move backwards in time. While the notion that we could possibly be

counting “down” time rather than “up” and entropy still increasing in the universe might be worthy of serious consideration, I will conclude here that the overall notion is irrelevant. Whether down or up, I will agree with cosmologists that increasing entropy and an expanding universe should cause us to conclude that time is moving *forward* in every sense of the word (Hawking, 1996, pp. 147–157). As it does so, is it crossing thresholds? Today’s Hubble age of 13.7 billion years is admittedly a kind of pre-established time threshold in this cosmological model and could prove to be a hard-sell theoretically if it cannot be found to possess an intrinsic “special-ness.” Though that quality may indeed exist, it will not be investigated in this paper (Hartnett, 2007)³.

Albeit, it is precisely the forward direction of time and the inextricably blended nature of distance and time which will impose a supreme tension on the infant universe given the cosmogony just proposed. From that tension will spring an entirely distinct timepiece in the universe—a long-running, distance-based clock, or “Hubble clock.” Compared to the clock of a local observer at rest, the Hubble clock will move billions of years in a relatively short span of time.

The Creator-imposed $ds^2 = (0 + [dx^2 > 0] + 0 + 0)$ would so tightly wind the spacetime interval, that 13.7 billion years of Hubble time would need to move rapidly through the system in order to even bring the spacetime interval coordinates into an SR-condoned lightlike separation where $ds^2 = 0$. The system would enter a sort of self-adjustment phase and begin a rapid “backfilling” of time across the entire expanse—a catch-up phase of time to distance. In this vast cosmic neighborhood, every observer would testify that his clock was running normally while (Hubble) clocks of neighbors near and far were running abnormally fast in direct proportion to their distance from him in accord with Hubble Law.

Relative Ages

A credo of big bang cosmology is that of comoving points, wherein all points of the bang record the same advance of cosmological time as the universe ages and expands. Co-movement is vitally important to the preservation of the theory in that it disallows the claim that any particular point be “central,” and thus, distinctly “privileged.” All points must have aged at the exact same rate throughout the history of the universe ensuring isotropy and homogeneity remain fundamental characters of the system. Caught up in the Hubble flow, big bang cosmology says all points should agree that the universe is around 14 billion years old today.

² This model predicts a temperature at Planck time 18 orders of magnitude lower than the big bang Planck temperature of 1.416×10^{32} Kelvin.

³ However, some have already seen an intrinsic value in today’s Hubble age of 13.7 billion years

However, disagreement of cosmic ages might arise if more than one clock is at play in the system. For instance, far from being the primary time-keeper in the universe, the Hubble flow is really only a background flow of time. It is the eternal domain in which God started our system and is what gives the universe its vast, eternal look. Because its original spread was cosmically staggering, we perceive it to “drink” copious amounts of time and expand rapidly, even superluminally. In reality, our primary flow of time, distinct from the Hubble expansion rate, is exclusively attributed to the expansion of the Cosmic Microwave Background wavelength, whose value at any historical instant is but a fraction of the time marked off by the age-old Hubble flow. Rather than comoving in the Hubble flow, as standard cosmology insists, all points in this model are instead said to be caught up in a synchronous *CMB flow* and all agree that the age of the universe is quite young in contrast to the apparent Hubble age. In this way, time advances synchronously for all points as the universe expands and ages, but in a manner peculiar to a very young universe. Therefore, talk of 14-billion-year-old horizons or structures more describes distance scales and relative ages in the universe than the actual age of the system itself.

In the beginning, time split. At $t=0$, all clocks were synchronized. By 10^{-43} second, however, relative motion sprang into being, because for each fundamental particle present, a different frame of reference opened up. All particles perceived themselves as “local,” and thus, members of the CMB time zone, though each possessed two clocks—a CMB and a Hubble. (The Hubble clock is a relative timepiece, while the “CMB clock” is a standard, cosmological timepiece.) As a result, all local particles riding along with the expanding blackbody were watching on-board Hubble clocks of neighboring particles run faster than their own, while all CMB clocks registered the same periodic flow of time no matter their location in the universe. Hubble clocks of particles with the highest radial velocity relative to a local observer were spinning the fastest, though their CMB clocks registered the same time as the local observer’s no matter their recession velocity. Hubble clocks of particles attached to the expanding universe which were the most distant from a local observer would, in the end, register billions of years over a comparatively short span of ordinary, local time. In this manner, homogeneity was preserved. Only in a universe with dual, intersecting time zones could there exist such a vast range of relative ages while, simultaneously, all points claimed to possess the exact same cosmological age.

In the model at hand, where all points are central and none is “preferred,” there is no intent

to call homogeneity into question. Isotropy, on the other hand, born of the cosmological principle which says the universe should look the same from every point in space, might turn out to be a more difficult doctrine to preserve given the duple nature of time and the vast anisotropic configurations it might produce (though this model does hold to the thermal isotropy of the pervasive CMB). However, the Copernican principle, which makes a narrow statement that the earth occupies no unique location in the universe, should be broadened and qualified before acceptance here. Counter to that principle, and in keeping with biblical creationist views, this model will claim that God chose a unique cosmic location as his “center” for recording and time-keeping of creation events. Given our prolonged attachment to this celestial ball, that chosen center will be understood to be earth. Therefore, local time or ordinary time or CMB time will always be taken to mean earth time.

Nature’s Local Timepiece

And God has placed a clock in nature which has historically tracked local time with great precision. This model proposes that local time as measured on earth-based clocks should be exactly equal to the age of the Cosmic Microwave Background. The residual temperature, energy density, and wavelength we measure in space from this beautifully symmetric and uniformly expanding primordial blackbody should be a focus of every creationist cosmology since, (1) it has consistently recorded the true age of the universe from the beginning, (2) it is considerably younger than cosmic distance scales lead us to believe, (3) it is nature’s preferred frame of reference, and (4) it is the domain to which every point in space is inescapably bound.

Therefore, the CMB is a unique cosmic expansion, distinct from the Hubble, yet interrelated. This model proposes two concurrent expansions in operation in our universe: one associated with the changing photon wavelength of the Cosmic Microwave Background, and the other, acting to increase the actual radial size of the universe and defined by the Hubble parameter. The two are inextricably linked and are mutually bound to preset parameters that govern their expansion rates. Figure 5 shows how their times are relational:

$$\text{CMB time} \propto (\text{Hubble time})^2.$$

Their sizes are related in this manner shown in Figure 6:

$$(\text{CMB } \lambda)^2 \propto \text{Hubble radius}.$$

Scale factor, $a(t)$, and redshift, z , are related such that (see Table 4):

$$a(t)_{\text{cmb}} = a(t_0)/(1+z) \quad (2)$$

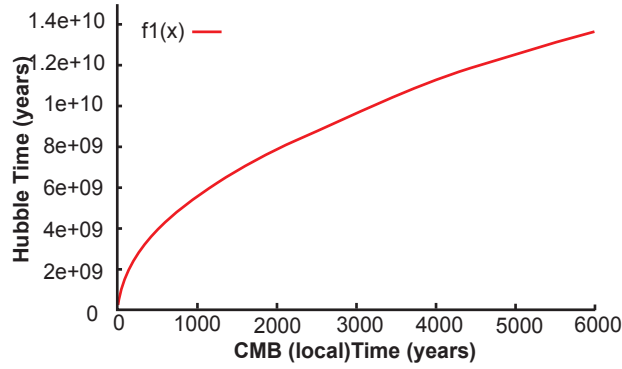


Figure 5. $y=f(x)=(x/3.1995e-17)^{1/2}$
Regarding CMB time and Hubble time, there exists a constant of proportionality, k , such that °

$$k = \frac{\text{CMB time}}{(\text{Hubble time})^2} = 3.1995e-17 \text{ yrs}^{-1}$$

Since the CMB is considered the preferred frame of reference in this model, it clocks time in regular, periodic fashion from the beginning. As CMB photon wavelengths expand uniformly, Hubble time splits from $t=0$ with extreme rapidity, moving through 9 million years by the close of Creation Day 1. As CMB time progresses, the rise of Hubble time on the graph slows.

and

$$a(t)_H = a(t_0)/(1+z)^2. \tag{3}$$

where $a(t_0)$ equals 1 in today’s cosmological era.

While it is the Hubble parameter we perceive as the true expansion rate of our universe dimensionally, it is the CMB expansion that authentically dates it. Since CMB photons are not matter-specific (as are photons tied to a cosmic structure like a star, for instance) and literally came from everywhere in the early universe, we say that redshift, z , and temperature variance in the CMB at that redshift, T_z , serve to mutually cancel so that little or no temperature gradient is detected in the CMB:

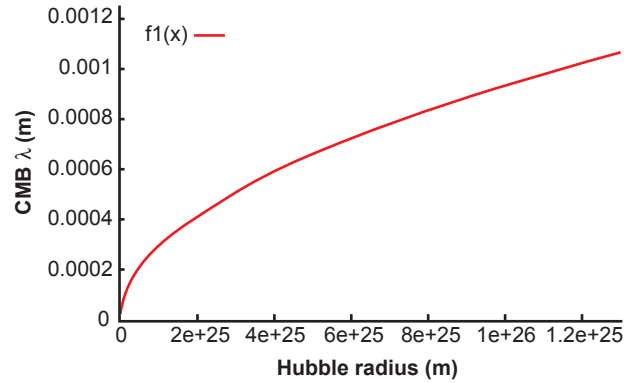


Figure 6. $y=f(x)=(x*8.7351e-33)^{1/2}$
Regarding the CMB wavelength and the Hubble radius, there exists a constant of proportionality, k , such that

$$k = \frac{(\text{CMB } \lambda)^2}{\text{Hubble radius}} = 8.7351e-33 \text{ m}.$$

$$T_z = T_{z=0}(1+z). \tag{4}$$

The apparent temperature at any redshift z is equal to today’s CMB temperature:

$$T_z/(1+z) = T_{z=0}.$$

Temperature isotropy is essential to all cosmologies, because, as shown in equation (4), it is temperature which determines redshift values, and redshift which provides a unique cosmic measuring tool. A look back into space at $z=1$, says we should behold a universe one-half its present size; at $z=2$, one-third its present size, and so forth, in accord with equation (2). However, cosmic expansions that do not expand in step with the CMB wavelength, as does the big bang model, may see the accuracy of redshift values break down if temperature isotropy is not maintained in the system. Fast-moving creation cosmologies may suffer in this area. This model has just such a variant

Table 4. Datasheet scale factor.

| Local Time (years) | Description | CMB Temperature (K) | CMB λ (m) | Redshift (z) | CMB Scale Factor a(t) _{cmb} | Hubble Radius (m) | Hubble Scale Factor a(t) _H | a(t) _H /a(t) _{cmb} |
|--------------------|-------------|---------------------|-----------|--------------|--------------------------------------|-------------------|---------------------------------------|--|
| 1.71E-51 | Planck | 1.180E+14 | 2.457E-17 | 4.326E+13 | 2.310E-14 | 6.910E-02 | 5.337E-28 | 2.310E-14 |
| 0.00274 | Day 1 | 1.048E+02 | 2.765E-05 | 37.4 | 2.599E-02 | 8.749E+22 | 6.75E-04 | 2.600E-02 |
| 0.00548 | Day 2 | 8.815E+01 | 3.288E-05 | 31.3 | 3.091E-02 | 1.237E+23 | 9.557E-04 | 3.092E-02 |
| 0.00822 | Day 3 | 7.965E+01 | 3.638E-05 | 28.2 | 3.421E-02 | 1.515E+23 | 1.170E-03 | 3.421E-02 |
| 0.01096 | Day 4 | 7.412E+01 | 3.910E-05 | 26.2 | 3.676E-02 | 1.750E+23 | 1.352E-03 | 3.677E-02 |
| 0.01370 | Day 5 | 7.010E+01 | 4.134E-05 | 24.7 | 3.887E-02 | 1.956E+23 | 1.511E-03 | 3.8873E-02 |
| 0.01640 | Day 6 | 6.702E+01 | 4.324E-05 | 23.6 | 4.066E-02 | 2.141E+23 | 1.65E-03 | 4.066E-02 |
| 1 | | 2.398E+01 | 1.208E-04 | 7.8 | 1.136E-01 | 1.671E+24 | 1.291E-02 | 1.136E-01 |
| 500 | | 5.072E+00 | 5.714E-04 | 0.9 | 5.373E-01 | 3.738E+25 | 2.887E-01 | 5.373E-01 |
| 1000 | | 4.265E+00 | 6.795E-04 | 0.6 | 6.389E-01 | 5.286E+25 | 4.083E-01 | 6.390E-01 |
| 3000 | | 3.241E+00 | 8.943E-04 | 0.2 | 8.409E-01 | 9.155E+25 | 7.071E-01 | 8.409E-01 |
| 5500 | | 2.785E+00 | 1.041E-03 | 2.145E-02 | 9.784E-01 | 1.240E+26 | 9.574E-01 | 9.785E-01 |
| 6000 | | 2.725E+00 | 1.063E-03 | 0.000E+00 | 1.000E+00 | 1.295E+26 | 1.000E+00 | 1.000E+00 |

expansion (see equation (3) where the value of $1/a(t)_H$ is the square of the standard $1/a(t)_{\text{cmb}}$], yet maintains temperature isotropy because the slow moving CMB expansion was dispersed ubiquitously at right angles on a super-rapid Hubble expansion. Even with the presence of two very different expansions in our universe, we may have no choice but to conclude a homogeneous universe and isotropic CMB because *we are actually living in the young CMB time zone* and not the age-old Hubble. For that reason, we may perceive the $(1+z)$ scale factor, but not the $(1+z)^2$.

Albeit, the fact that to us the temperature gradient of the CMB is cancelled might hold a more profound consequence for the strict creationist. If the Hubble scale factor of $(1+z)^2$ is beyond our perception, then so is the veritable (young) age of the entire system. This may lead the creationist to speculate that God hid the true age of his universe at its inception. For this reason, the Cosmic Microwave Background must be viewed as a preferred frame of reference, one to which every local observer in the universe will claim attachment. It must be labeled a truly unique expansion in every respect; otherwise, if confused with very old Hubble, it loses its young identity and is erroneously dated, as is the ongoing practice of modern cosmology. It is easy then to see why today's cosmologist readily falls in step with popular ideas regarding profoundly long cosmic ages, unaware that he may have, in fact, glossed over a very young date stamp contained in the oldest cosmic relic around—today's CMB. Notwithstanding, the difficulty for the creationist to explain such widely disparate ages in the universe in a convincing manner is compounded.

Age of the Universe

After time split in the beginning and relative motion sprang into being, a local observer would note that all particles were rushing away from him at varying velocities. He might term those which were the farthest from him, moving with the highest radial velocity, "Hubble particles." From a local frame of reference, a Hubble particle would exist at the very edge of the new, expanding universe. The local observer is aware that both he and the Hubble particle each possess two clocks and that their CMB clocks are synchronized. However, the local makes an assumption that if he were able read the time on the *Hubble clock* of a Hubble particle, he could ascertain the Hubble age of the expanding universe at any local time, t_L .

In the Minkowski signature, (-, +, +, +), a spacelike interval can be defined as

$$x^*x - (ct)^2 = s^2. \tag{5}$$

Here, x will equal the velocity of a Hubble particle

times ordinary, local time, ($x=v_H t_L$), and (ct) will equal the speed of light times local time, t_L . S will have a value of c times the Hubble time and will define the spacelike interval between the local observer and the Hubble particle. The Hubble time appearing on the clock of the Hubble particle should be considerably greater than the relative ordinary time, t_L , showing on the clock of the local observer at the same instant.

Equally, under the Lorentz transformation equation for time, a local observer, at any local time, t, will see the Hubble clock of the Hubble particle record a time, t' , given by

$$t' = \frac{t - vx/c^2}{\sqrt{1 - v^2/c^2}} \tag{6}$$

As discussed earlier, the radial velocity of the Hubble particle will be superluminal in value. This will cause the local particle and the Hubble to be separated by what is termed a "spacelike" interval, usually meaning that a causal relationship is broken because not enough time passes between events given their distance of separation. However, this model has claimed that there exist two time dimensions in our universe oriented at right angles, thus ensuring that causal contact between the local and Hubble particle is preserved. (See Figure 3).

Because spacelike event pairs will produce negative squared spacetime intervals ($s^2 < 0$), the measurement of the spacelike interval will be taken to be the proper distance and will be a real number value (Wikipedia, 2008).

When values for t are sufficiently small and values for vx/c^2 and v^2/c^2 sufficiently large, then

$$t'^2 = \frac{(-vx/c^2)^2}{-v^2/c^2} \tag{7}$$

If the Hubble radius of the universe is assumed to be 6.91 centimeters at a local time of Planck, 5.39 e-44 second, a local particle will see a Hubble particle receding at a velocity of

$$.0691 \text{ m} / 5.39 \text{ e-44s} \text{ or } 1.28 \text{ e42m/sec.} \tag{8}$$

The local particle will see the clock of the Hubble particle record a time of

$$t'^2 = \frac{(-9.8407 \text{ e23 s})^2}{-1.8228 \text{ e67}} = -5.3124 \text{ e-20 s}^2 \tag{9}$$

$t' = 2.305 \text{ e-10 secs}$ or $7.308 \text{ e-18 Hubble years}$.

Further, it might be assumed that before time opened up, God spread out matter particles in the Hubble domain to a spherical boundary having a present-day radius, R_p , the size of the current Hubble age times the speed of light:

$$1.37 \text{ e10 years} * c = 1.295 \text{ e26 m} = R_p. \tag{10}$$

In this case, today's strict creationist would like to

see a local time of ~6,000 years at this radius and Hubble particles speeding away at a velocity of R_p divided by local time.

Using $1.295 \text{ e}26\text{m}$ for x in the numerator of equation (7) and setting it equal to the value in the numerator of (9), a value for velocity can be obtained for receding Hubble particles at R_p . Since the universe horizon is expanding radially according to a non-constant deceleration, the velocity obtained will not be an instantaneous velocity at R_p , but rather, a *mean velocity* over the time span from the beginning to the present:

$$\begin{aligned} (-vx/c^2) &= -9.8407 \text{ e}23\text{s} \\ v_1 &= \frac{-9.8407 \text{ e}23 \text{ sec s } (c^2)}{-1.295 \text{ e}26 \text{ meters}} \\ v_1 &= 6.83 \text{ e}14 \text{ m/sec.} \end{aligned}$$

In this manner, the corresponding local time can be obtained:

$$R_p/v_1 = \text{local time}$$

$$\frac{1.295 \text{ e}26 \text{ m}}{6.83 \text{ e}14 \text{ m/s}} = 1.896 \text{ e}11 \text{ secs or } \sim 6000 \text{ years. (11)}$$

While 13.7 billion years has passed on the Hubble clock of the Hubble particle, only about 6,000 years has passed locally on CMB and earth-based clocks.

Similarly, if at Planck time, a small surface area, k_s , is assumed for the expanding blackbody, then the ratio of ordinary time to Planck time, t_L/t_p , can be used to determine the expanded surface area, A_E , at any local time t_L . For instance, using 6.91cm for radius, r , at the first Planck time interval, k_s is

$$4\pi r^2 = .060 \text{ m}^2.$$

Now using the value in years in equation (11) and recording Planck time in years, we multiply by the ratio t_L/t_p to obtain A_E :

$$k_s(t_L/t_p) = A_E \tag{12}$$

$$(.060)(6000/1.709 \text{ e-}51) = 2.107 \text{ e}53 \text{ m}^2.$$

Then, the present-day radius, R_p , of A_E is

$$R_p = \sqrt{A_E/4\pi} = 1.295 \text{ e}26\text{m} \tag{13}$$

the identical value of the expanded radius in equation (10).

This approach of multiplying a small surface area by the ratio t_L/t_p , will be useful when working with the Stefan-Boltzmann thermodynamic equation for an ideal blackbody radiator (of which the universe is a prime example):

$$\frac{P}{A} = \sigma T^4 \tag{14}$$

where energy density of the radiating blackbody is

given by power, P , per unit surface area, A . It will also supply a method for tracking local time at any temperature, T , or blackbody surface area, A , in the history of the expanding universe.

Imaginary time

In reality, the Hubble time zone is presumed to be a dimension of imaginary time. Velocities (apparently) greater than c for expanding Hubble particles will create this additional time domain.

At the first tick of Planck time, a local observer in the CMB time zone will peer into the Hubble dimension in order to read the Hubble clock on board a receding Hubble particle, equation (9):

$$t'^2 = \frac{(-9.8407 \text{ e}23 \text{ s})^2}{-1.8228 \text{ e}67} = -5.3124 \text{ e-}20 \text{ s}^2$$

and

$$t' = 2.305 \text{ e-}10 \text{ sec}$$

or

$$7.308 \text{ e-}18 \text{ Hubble years.}$$

Because of the nature of imaginary numbers, in that they appear as negatives under radical signs, the solution above will then take on the imaginary form:

$$7.308 \text{ e-}18i \text{ Hubble years.}$$

This would mean that we peer into a plane of two-dimensional time with our every gaze into space. But for the creationist, there are benefits to this view. First, it sets forth two distinct, but interrelated, time coordinates—a construction that creation cosmology almost has to have in order to explain widely disparate ages in the universe. Second, it allows for a practically infinite number of local and Hubble time intersection points in an orthogonally configured coordinate system of real and imaginary time. This reality immediately seems to solve the starlight-travel-time problem since at any local time, t_L , in the history of the CMB expansion, the universe also possesses a corresponding apparent age equal to its intersecting Hubble time coordinate. Living in a 6,000-year-old CMB time zone, the oldest radiation or information we can ever receive is 6,000 light-years away, though the intrinsic, Hubble age of the signal may be remarkably older. This means that in a 6,000-year-old universe with dual time dimensions, we should behold the selfsame distant structures one would see in a single time-dimensioned 14 billion-year-old universe.

Hubble Parameter

A critical part of this cosmological model will be its ability to predict the Hubble parameter, H_0 . Today's value will be given by the current expanded radius, R_p (in kilometers), divided by the corresponding Hubble

time, t_H (in seconds), divided by the current distance t of the expanded radius, D (in megaparsecs):

$$H_o = \frac{R_p}{t_H D} = 71.4 \text{ km/s/Mpc} \quad (15)$$

However,

$$t_H = R_p/c.$$

Substituting for t_H in the Hubble equation,

$$H_o = c/D.$$

Since $D = R_p M$ (where $M = 3.24 \times 10^{-20} \text{ km}^{-1}$, a conversion factor for megaparsecs), then substituting for D in the Hubble equation,

$$H_o = \frac{c}{R_p M}$$

However, from equation (12) and equation (13) above,

$$R_p = \sqrt{\frac{A_E}{4\pi}}$$

and

$$A_E = k_s (t_L/t_p).$$

Substituting,

$$R_p = \frac{[k_s (t_L/t_p)]^{1/2}}{\sqrt{4\pi}}$$

Substituting for R_p in the Hubble equation,

$$H_o = \frac{c(4\pi t_p)^{1/2}}{M(t_L k_s)^{1/2}} \quad (16)$$

It can be seen that all are constants on the right side of the equation except for local time, t_L . The Standard Model understands the Hubble parameter to be a time dependent “constant,” where time is taken to mean Hubble time. However, equation (16) underscores creation cosmology and shows that the Hubble parameter can be defined in terms of local, earth-based time—a time synchronous at any point in history with the age of the Cosmic Microwave Background. [See equation (18) for a faster solution for H_o using local time, t_L].

Critical Density Formula

From equation (16) it is seen that

$$H^2 \propto 1/t_L \quad (17)$$

The square of the Hubble parameter and local time possess a constant of proportionality, k , such that

$$\frac{k}{t_L} = H^2$$

thus

$$k = 9.659 \times 10^{14} \text{ km}^2 \text{ s}^{-1} \text{ Mpc}^{-2}. \quad (18)$$

Substituting into the well-known equation for critical density of the universe,

$$\rho_c = \frac{3H^2}{8\pi G} \quad (19)$$

provides creation cosmology a look at critical density values at all histories of the expanding universe in terms of local time, t_L :

$$\rho_c = \frac{3(k/t_L)}{8\pi G} \quad (20)$$

Scale Factor, Temperature, and Matter Density

The expanding CMB wavelength drives space temperature. Since the CMB is pervasive, temperature is uniform throughout the cosmic sky. This isotropic temperature determines the perceived redshift, z , at any location in the universe and history by this formula:

$$T_{\text{obs}} = T_{\text{em}}/(1+z) \quad (21)$$

where T_{obs} is today’s observed cosmic temperature of 2.725 Kelvin, and T_{em} is the emission temperature of the CMB at any chosen redshift, z .

Redshift and scale factor, $a(t)$, are related in this manner:

$$a(t) = a(t_0)/(1+z) \quad (22)$$

where $a(t_0)$ has a value of 1 in today’s cosmological era.

However, in this model, scale factor must be considered along two separate dimensional photon routes since time exists in two “zones” - the CMB and Hubble. Scale factor along each route can be written in terms of redshift [rewrite equations (2) and (3)]:

$$\begin{aligned} a(t)_{\text{cmb}} &= 1/(1+z) \\ a(t)_{\text{H}} &= 1/(1+z)^2 \end{aligned}$$

Table 4 shows scale factor values in terms of local time and cosmic temperature.

Regarding cosmic temperature, this model will insist that it is retained in the “short” CMB dimension alone. Because the CMB dimension is at right angles to the “long” Hubble dimension, its temperature is space pervasive. Because both dimensions exist as distinct, the Hubble can in no wise be construed as a temperature dilution factor. Temperature isotropy, then, is maintained on a universal scale, which, in turn, allows for our claim that the entire system can only be as old as the age of the Cosmic Microwave Background.

However, conclusions surrounding two distinct

scale factors in the universe are not as easy to make. Since temperature is isotropic and determines perceived redshift, is the Hubble scale factor hidden from our view? In other words, does temperature isotropy “make” us see a CMB scale factor of .5 at $z=1$ and “overlook” the Hubble value of .25 at $z=1$? If so, then as we look into the past at increasing redshifts, are we getting an inflated view of a much smaller universe? And how would space matter density be affected by two cosmic scale factors? How would a hidden dimension influence our perception of matter in the universe?

An Inductive Graph

Working inductively within well-defined creation parameters, one can construct a reasonable relationship to graphically plot the temperature of space, T , against the ratio of the full measure of Hubble time (today’s Hubble age is here used as a constant) to ordinary earth time, t_H/t_L . Assumed should be a hot beginning from an opaque, isothermal radiating source and a steadily expanding symmetrical sphere where temperature drops by the fourth root [equation (14)] over increments of time. Since creationists have a reliable history of the world archived in the Bible with key scientific data about the first moments and days of time, the results obtained in this exercise should be bound to a certain reasonableness within a creation framework—namely, (a) that earth should be central as the preferred creation frame of reference and should possess local time, (b) that the current temperature of the cosmic background radiation (~2.73 Kelvin) would be achieved in around 6,000 years of local earth time, and (c) that Creation Days 3 through 6 would see space temperatures sufficiently low so as not to harm newly-created plant, animal, and human life, and (d) that though high temperatures and gamma-ray radiation may rule the first brief moments of creation Day 1, space would have to cool rapidly in order for high-energy radiation levels to drop to the optical range (creation light) of the spectrum very early on Day 1.

It seems reasonable that very hot space and matter at the earliest unit of time, Planck, should be a perfect blackbody radiator since severe time dilation and length contraction would dictate thermal equilibrium in a hot, (and what appeared to be) opaque plasma. We know from the COBE data that today’s CMB is “well-described by a single temperature blackbody” (Smoot, 1997) and is thought to be a relic of its initial conditions. Since the Stefan-Boltzmann law states that the energy flux density of a blackbody is directly proportional to the fourth power of its thermodynamic temperature, the temperature in the graph equation should likewise fall by the fourth root per increment of local time, t_L .

Considering all parameters, I plotted temperature along the y axis and the ratio of Hubble age (13.7 billion years, used as a constant) to local earth time, t_H/t_L , along x . In the end, I found this relationship:

$$f(x) = (\alpha^2 x / 2)^{1/4},$$

where α is a constant equal to the dimensionless fine structure constant. The graph of the function

$$f(x) = y, \text{ if } x = (\alpha^2 t_H / 2 t_L)^{1/4}$$

$$\text{is } \{(\alpha^2 t_H / 2 t_L)^{1/4}, y\}.$$

The temperature to time relationship took on this form:

$$T^4 \equiv \frac{\alpha^2 t_H}{2 t_L} \quad (23)$$

For Days 1 through 6 of Creation week, all the values for temperature fell well within the bounds described in Figures 5 and 6 and predicted the age of the universe, t_L , to be around 6,600 years based on the current temperature of space (2.725 Kelvin):

$$t_L \equiv \frac{\alpha^2 t_H}{2 T^4} \quad (24)$$

$$t_L \equiv \frac{\alpha^2 (1.37 \text{ e}10 \text{ years})}{2 (2.725 \text{ K})^4}$$

$$t_L \equiv 6,615 \text{ years.}$$

The Stefan-Boltzmann thermodynamic equation was used to help confirm these results. Equation (14) is again shown here:

$$\frac{P}{A} = \sigma T^4$$

As stated earlier, surface area, A , in equation (12) is substituted by the expanding ratio of local time to Planck time, t_L/t_p , multiplied by a small, groundfloor surface area of the blackbody universe, k_s , at Planck time. Substituting,

$$T^4 = \frac{P t_p}{\sigma k_s t_L} \quad (25)$$

Comparing relationship (23) and equation (25) reveals that all factors for both are constants with the exception of t_L , which both show to be inversely proportional to T^4 :

$$T^4 \propto 1/t_L.$$

Clearly, equations (23) and (25) exhibit a consonance. Though equation (23) may remain an underived relationship, it still holds some intriguing

values such as the fine structure constant and today's Hubble age—used as a constant—which, as stated earlier, some cosmological models, including this one, have already proposed. Overall, it possesses a stark character in that it forces a beginning temperature to the universe when Planck time is substituted for t_L and mandates a current local time in keeping with creationism after a current temperature measurement from space is entered into T^4 .

Dating the CMB—the Stefan Approach

Equation (25) has rewritten the Stefan-Boltzmann thermodynamic equation in a form more compatible with creation models in that it contains a variable for the fully expanded surface area of a blackbody with the inclusion of local time. Equation (25) is again written here:

$$T^4 = \frac{P t_p}{\sigma k_s t_L}$$

We will work inductively using the value for today's fully expanded surface area of the universe, A_E , shown in equation (12) and the current known value for the CMB temperature in order to obtain a value for P , which should remain constant throughout the history of the expanding blackbody.

Since from equation (12) we know that

$$k_s(t_L/t_p) = A_E = 2.107 \text{ e}53 \text{ m}^2$$

and today's cosmic temperature is

$$T = (2.725 \text{ K})^4,$$

then

$$P = \sigma T^4 A_E$$

$$P = 5.67 \text{ e-}8 (2.725)^4 (2.107 \text{ e}53)$$

$$P = 6.587 \text{ e}47 \text{ J s}^{-1} \quad (26)$$

A double-check of the value for P can be done. Since, we know the energy density of the Cosmic Microwave Background today:

$$u_{\text{CMB}} = 4.17 \text{ e-}14 \text{ J/m}^3 \quad (27)$$

when the current temperature of space, 2.725 Kelvin, is substituted for T in the equation for energy density of a radiating blackbody:

$$u = \frac{\pi^2 k_B^4 T^4}{15(\hbar c)^3} \quad (28)$$

where k_B is the Boltzmann constant, \hbar is the reduced Planck constant, and c is the speed of light, and, since

energy density of a blackbody is also given by

$$u = 4P/cA \quad (29)$$

we can solve for P :

$$P = cuA/4.$$

Substituting values in equation (12) for A and equation (27) for u :

$$P = c (4.17 \text{ e-}14) (2.107 \text{ e}53)/4$$

$$P = 6.58 \text{ e}47 \text{ J s}^{-1} \quad (30)$$

(30)=(26).

With a value for P , we can now rewrite equation (25) in terms of local time, t_L :

$$t_L = \frac{P t_p}{\sigma k_s T^4} \quad (31)$$

and chart (Table 2) cosmic temperature, CMB wavelength [using Wien's Displacement Law in equation (1)], redshift, and scale factor from the earliest creation moment—Planck second—to the present, 6000AM (an approximate assumption for the purposes of this model given a *prima facie* reading of the biblical text).

Advancing values for the Hubble radius can be obtained in a manner similar to the calculation of P above. Using the value for local time, t_L , in the current era as a time dependent “constant,” allows one to extrapolate backwards from any theoretically satisfying surface area of the sphere of today's fully expanded universe to discover the surface area of the inflated “seed” from which it grew.

The solution in equation (13) offered a present-day universe with a radius, R_p , equal to the speed of light, c , times the current Hubble age, t_H (Hinshaw, 2006; Wright, 2005):

$$R_p = 1.295 \text{ e}26 \text{ meters.}$$

The present-day expanded surface area, A_E , in equation (12) is,

$$A_E = 4\pi R_p^2 = 4\pi(1.295 \text{ e}26)^2 = 2.107 \text{ e}53 \text{ m}^2.$$

Since equation (12) shows that the surface area of the expanding blackbody of the universe at any given local time is equal to $k_s(t_L/t_p)$, then

$$A_E = k_s(t_L/t_p)$$

where k_s is the groundfloor surface area from which A_E grew.

Solving for k_s :

$$k_s = \frac{A_E(t_p)}{t_L}$$

$$k_s = \frac{(2.107 \text{ e}53 \text{ m}^2)(1.709 \text{ e-}51 \text{ years})}{6000 \text{ years}}$$

$$k_s = .06 \text{ m}^2 \quad (32)$$

the radius of which equals the assumed value shown in equation (8):

$$r_H = .0691 \text{ m} \quad (33)$$

In this model, equations (32) and (33) describe the size of the “Planck seed” from which our universe grew and are understood to be constants so long as the universe possesses a local, or CMB, age of 6,000 years.

Using the value for groundfloor surface area, k_s , in equation (32) as a constant allows us to chart the expanding Hubble radius, r_H , for all values of local time, t_L (Table 2) using equation (12):

$$A_E = k_s(t_L/t_p)$$

$$r_H^2 = \frac{k_s t_L}{4\pi t_p} \quad (34)$$

Corresponding values for Hubble time, t_H , are obtained by dividing values for Hubble radius, r_H , by the speed of light, c , or by using equation (5) and solving for Hubble time in s^2 , the spacetime interval. The Hubble parameter for all local times, t_L , is obtained by using equation (18).

While this cosmological model does allow for matter particles pre-determinately spread *beyond* a boundary of the current Hubble age times the speed of light, as shown in equation (13), it is not prepared to offer hypotheses about exactly when or how those particles would finally be perceived, what nature they would assume, or how their presence might influence the overall expansion rate of the system. Regarding an accelerating universe driven by a cosmological constant, or “dark energy,” (Leibundgut & Sollerman, 2001; Wright, 2007) this model can certainly accommodate at least the underlying principle as shown previously. However, it must be iterated that nothing has here been granted other than a decelerating, free-coasting universe.

Conclusion

For the strict creationist it is paramount that the universe be found to possess an age of around 6,000 years in keeping with the accurate biblical account which archives history from the beginning Creation moment. For the better part of the last 100 years, even

with the advent and experimental confirmation of the general and special theories of relativity, it is has only been recently that creationists have begun to piece together a picture of the cosmos where relative ages describe seemingly old structures in the universe at extreme distances while simultaneously asserting a remarkably young local system—or, if possible, a young system throughout.

The cosmological model at hand has tried, again, to do just that. It assigns a system-wide age of 6,000 years to the universe while attempting to scientifically explain much older, relative ages contained in the system. Moreover, it has offered a possible solution to the starlight-time-travel problem. But any good cosmology should be subjected to the usual rigors endured by any proposed model of the universe. For that reason, this one has tried to exhibit a consonance with observational data and hold as much as possible to key assumptions like universal isotropy, homogeneity, Hubble Law, the Hubble parameter, redshift, and scale factor (though it does possess two differing scale factors). It has not challenged co-moving points and synchronous aging except to assert a CMB age of 6,000 years in contrast to the 13.7 billion presumed in the Standard Model. It hypothesizes a cosmological constant and opens queries surrounding a possible hidden dimension that may help offer solutions to the problem of dark matter in the universe.

It is asked of the creationist that this model be allowed to demonstrate its intrinsic differences with big bang cosmology. While the Big Bang model begins with a primordial eruption, and is silent about what came before, this model begins with God. The big bang describes an infinitely small, dense, hot, singularity with a subsequent 14-billion-year expansion that began as a “quark soup” of matter, energy, forces, space, and time. This one proposes a cosmogony that required on-purpose, pre-determinative action on the part of God, the Supreme Creator, to ultimately design the elegant universe we behold today. While it is true that the universe proposed here—at least to a hypothetical inside observer—was initially very small and hot and began to expand rapidly after an initial high-energy burst of radiation in the gamma-ray range, it must be reiterated that, (1) the Planck temperature was 18 orders of magnitude lower than that of the big bang, (2) of matter, space, time, energy, and forces, only time was the singular element, but not a “singularity,” (3) quantum or thermal fluctuations (Magueijo & Pogosian, 2003) did not “seed” the universe to give it its structure, but rather, the structure had already undergone a pre-design phase by its Maker, and (4) the universe was staggeringly vast after tracking a mere 6,000 years of ubiquitous, local time.

Regarding the problem of reconciling Creation

Day 4 with the events of Creation week, this proposal has only briefly mentioned the creation of stars and their corresponding redshift. A Creation Day 4 redshift of $z \approx 26$ was satisfactory in that it lined up with standard theories about the formation of early stars. Moreover, one should recall that this model asserts a “deep time” occurring over a matter of mere days and that Creation Day 4 local time corresponds to a Hubble time interval of 16,028,000 years to 18,508,000 years. (Table 2). Thus, in a single day, by the CMB clock, God, still actively creating, brought about 2.5 million years of stellar activity in the rapidly developing heaven⁴. A hypothetical observer at that time, anywhere in the universe, could not have sworn to any time frame but a local one. Thus, from our point of view, all we could possibly know is that in a single, 24-hour period, God created the stars. That is precisely why the Bible records it in that manner, Hubble ages notwithstanding.

References

- Baez, J. (2006). What's the energy density of the vacuum? <http://math.ucr.edu/home/baez/vacuum.html>.
- Bromm, V., & Loeb, A. (2006). *GRB cosmology and the first stars* (p. 5). http://arxiv.org/PS_cache/astro-ph/pdf/0601/0601216v1/pdf [astro-ph].
- Chaisson, E., & McMillan, S. (2002). *Astronomy today* (p. 727). New Jersey: Prentice-Hall.
- Chattopadhyay, T., Misra, R., Chattopadhyay, A. K., & Naskar, M. (2007). *Statistical evidence for three classes of gamma-ray bursts* (p. 1). http://arxiv.org/PS_cache/arxiv/pdf/0705/0705.4020v1.pdf [astro-ph].
- Conselice, C. (2007). The universe's invisible hand. *Scientific American*, 296(2), 35–41.
- Corbett, D., Stafford, K., & Wright, P. (2007). *Imaginary time*. <http://library.thinkquest.org/27930/time.html>.
- Davis T., & Lineweaver, C. (2003). *Expanding confusion: Common misconceptions of cosmological horizons and the superluminal expansion of the universe* (p. 24). http://arxiv.org/PS_cache/astro-ph/pdf/0310/0310808v2.pdf. [astro-ph].
- Greene, B. (2003). *The elegant universe* (pp. 365–366). New York: Vintage Books.
- Hamilton, A. (2006). Falling to the singularity of the black hole. <http://casa.colorado.edu/~ajsh/singularity.html>.
- Hartnett, J.G. (2003). A new cosmology: Solution to the starlight travel time problem. *TJ*, 17(2), 98–102.
- Hartnett, J.G. (2007). A 5D spherically symmetric expanding universe is young. *Journal of Creation*, 21(1), 69–74.
- Hawking, S. (1996). *A brief history of time* (p. 141). New York: Bantam Books.
- Hinshaw, G. (2006). *The age of the universe with new accuracy*. http://map.gsfc.nasa.gov/m_mm/mr_age.html.
- Hubble, E. (1929). A relation between distance and radial velocity among extra-galactic nebulae. In R. Pearl (Ed.), *Proceedings of the national academy of sciences of the United States of America* (Vol. 15, issue 3, pp. 168–173).
- Leibundgut, B., & Sollerman, J. (2001). *A cosmological surprise: The universe accelerates*. <http://www.eso.org/~bleibund/papers/EPN/epn.html>.
- Magueijo, J., & Pogosian, L. (2003). *Could thermal fluctuations seed cosmic structure?* <http://arxiv.org/abs/astro-ph/0211337>.
- Meszáros, P. (2006). *Gamma-ray bursts* (p. 6). http://arxiv.org/PS_cache/astro-ph/pdf/0605/0605208v5.pdf [astro-ph].
- Smoot, G. (1997). *COBE: Cosmic background explorer*. <http://aether.lbl.gov/www/projects/cobe/>.
- Wikipedia (2008). *Spacetime*. <http://en.wikipedia.org/wiki/spacetime>.
- Wright, N. (2005). *Age of the universe*. <http://www.astro.ucla.edu/~wright/age.html>.
- Wright, N. (2006). Vacuum energy density, or how can nothing weigh something? http://www.astro.ucla.edu/~wright/cosmo_constant.html.
- Wright, N. (2007). *Frequently asked questions in cosmology*. http://www.astroucla.edu/~wright/cosmology_faq.html#ct2.

⁴ Actually, the entire 18.5 million Hubble years spanning creation's first moment to the close of Creation Day 4 to accomplish great and rapid heavenly activity deserves a full discussion under separate research.

