Explaining Large Doppler Redshifts Without a Big Bang

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Sections **Page**

1. Introduction.

Just as the pitch (frequency) of the sound from an approaching vehicle shifts downward as it passes, so too does the color of light from a moving object shift toward blue or red depending on whether it is approaching or receding relative to the observer. By measuring the relative amount of frequency shift of light coming from a celestial object, it is possible to calculate the velocity of that object relative to the observer. These are called Doppler shifts [Wik22].

According to past telescopic measurements, what has become known as Hubble's Law states that outer space objects are receding from Earth at a relative velocity (V) approximately in direct proportion to their distance (R) from Earth:

$$V = HR, \tag{1}$$

where H, is Hubble's Constant.

Distance (R) vs Recession Velocity (V)

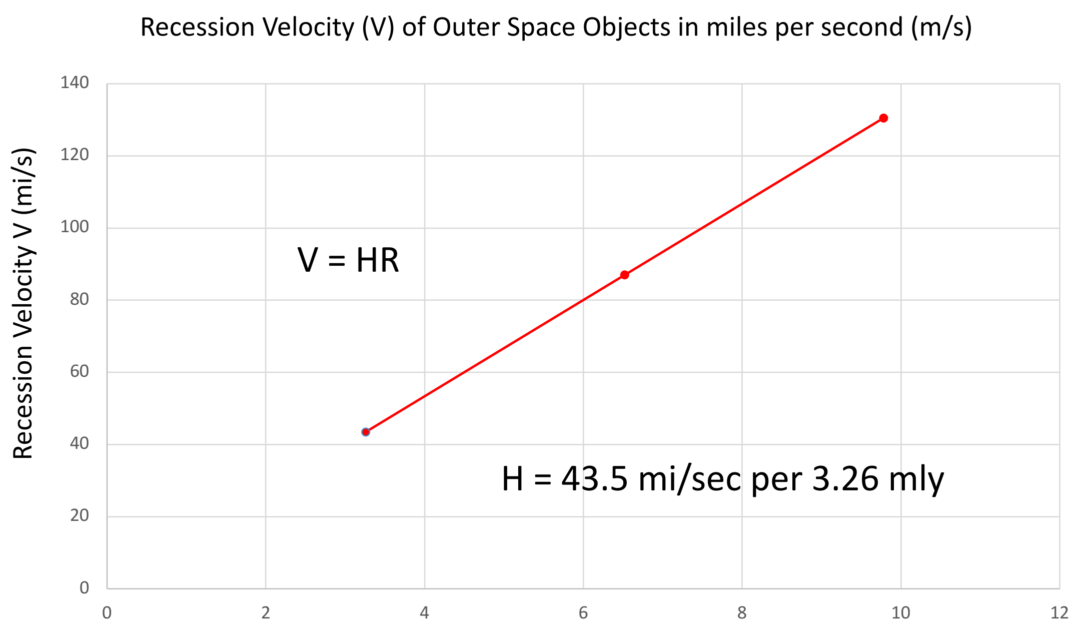

Fig. 1. Distance (R) from Earth in units of 3.26 million light years (mly)

As though due to a "big blast", this increasing recession velocity V is faster the further away we look. Numerically, V is estimated to be an additional 43.5 mi/sec faster for each 3.26 million light years (R) the object is distant from Earth. So, H = 43.5 (mi/sec) per 3.26 mly, which is also about 70 (km/sec) / megaparsec[1].

Notice that at ten times the distance R (32.6 ly), the velocity V = 435mi/sec, and at 326 mly, V = 4,350 mi/sec, which is 2.34% of the speed of light. At 3.26 billion ly, V = 43,500 mi/sec or 23.4% of light speed. Another factor of 5 in distance R would make V faster than light speed!

Time of the Big Bang. If the object traveled at velocity V for time T to reach distance R, then

$$R = VT = (HR)T. \qquad 2)$$

Therefore, dividing through by R, yields 1 = HT. So, the time T of the Big Bang = 1/H.

$$\begin{aligned} T = 1/H &= 3.26 \text{ mly} / (43.5 \text{ mi/sec}) \\ &= 3.26\,(10^6) \text{ ly} / [(43.5 / 186{,}000)\,(1.0 \text{ ly/yr})] \\ &= 3.26\,(10^6)\,(186)(10^3) \text{ yr} / (43.5) \\ &= 13.9\,(10^9) \text{ yr} = 13.9 \text{ billion years.} \end{aligned} \qquad 3)$$

[1] A parsec = 3.26 light years; a megaparsec = 1 million parsecs (mpc) = 3.26 million light years (mly).

This cosmic process is said to have started from a singularity (a place of infinity).

Skepticism about the Big Bang. A few scientists, like Halton Arp, the former assistant of Edwin Hubble, never were inclined to swallow this theory of a faster and faster expanding "Big Bang" universe bursting into existence a mere 14 billion years ago. They cited conflicting astronomical evidence such as photos of gravitationally connected systems with very different redshifts [Sco06]. These skeptics of large recessional velocities offered other possible explanations for the large redshifts toward lower, less energetic, frequencies and longer wave lengths that light quanta coming from far distant objects display.

Tired Light. One such alternate interpretation is "tired light", the conjectured frequency attenuation of light from far distant outer space in passage through space by partial absorption or other energy leakage thereby reducing the frequency (increasing the wave length) of the light quanta [Bal05]. If true, this theory would explain the "*approximately*" linear relation Hubble discovered between red shift and distance without implying recession at greater and greater speeds the further out we look. But "tired" light appears to have just as much clarity as (less-tired) light arriving from nearby objects. The hypothesis needs a plausible mechanism of frequency attenuation of light quanta passing long distances through space. For instance,[2] could universal "space dust" of 1 electron per cubic inch slow light down enough via refraction to cause wave lengths to significantly lengthen?

Oscillating Cosmos. One possible cause of receding motions, but without a Big Bang, is a conjectured oscillating cosmos, one that happens to be in an expansion phase. Such a universe of periodic "space respiration" (periodic space inflation & deflation) would be a non-linear model but still quite consistent with the current experimental evidence of an expanding universe. After all, a simple linear solution a la Occam's razor must give way to a more complex one as needed. In a later section of this paper, I will estimate how important this effect might be.

Fast Cosmic Rotations. Still another possible source of significant but again periodic and bounded recession velocities is the unrecognized small (or large) scale rotations in the universe still being charted. Astronomers were initially surprised to find galaxies spinning rapidly with rims circling as fast or even faster than inner zones [Cor82]. These observations led to early estimates that 90 - 95% of galaxies must be "dark matter" to account for the fact that such fast-spinning luminous systems were not flying apart.

Clearly, spin is a fundamental phenomenon in the universe both as a macro phenomenon as well as a micro phenomenon [Tom97] and something holds both galaxies and spinning particles together.

When astronomers announced that Andromeda is actually three times as big as they thought, they found it hard to derive such huge rotating systems based on the accretion models for galaxy evolution being postulated [Spa05]. The discovery[3] in 1995 [Nas21] of the hundreds of millions of galaxies in far outer space and huge empty zones (explicitly

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[2] A question posed by Stuart Kerr at SSIII.
[3] Taken over the course of 10 days in 1995, the *Hubble Deep Field* captured roughly 3,000 distant galaxies.

predicted by *The Urantia Book*) further complicated the supposed Big Bang genesis of the cosmos less than 14 billion years ago. And since this light was coming to us from a distance of 13 billion light years, how did it get there so fast after the big bang?

Space Inflation. To the rescue came the idea of unfettered "space inflation", which could expand space (and its matter) far and wide at an effective speed of many times the speed of light! This could explain the early existence of so much structure in far outer space whose light traveled 13 billion years to reach us. The evenly-spread cosmic background radiation (CBR) needed to be out there quickly at over 1000 times the speed of light! By adjusting the initial (early time) premises of this quick "inflation" process, the resulting cosmos can supposedly be modeled as far as our experimental evidence can tell.

Controversy about Cosmic Inflation. Recently however [Ijj17], the suggestion[4] has been made by three physicists from Princeton and Harvard that early time "inflation" premises are not subject to experimental test and refutation, and that practically anything can be generated by such a flexible use of "inflation". They also suggested that space expansion might have followed a contraction --- a "bounce" cosmology. This prompted a rather large defensive reaction from 33 eminent physicists including 4 Nobel Prize winners [Sci17]. (The way is hard for reformers --- anyone questioning the current orthodoxy --- be it in science, industry or religion. It takes intellectual integrity and professional courage, and being right only guarantees eventual vindication. Every paradigm shift precipitates a social crisis among the community. The use of oxen to plow fields was resisted because it put people out of work.)

Rotating Universes. The alternative solutions of Einstein's general field equations discovered by K. Gödel [Göd49] are "rotating universe" solutions in which "Matter everywhere rotates *relative* to its compass of inertia[5] with the angular velocity: $2(\pi\kappa\rho)^{1/2}$, where ρ is the mean density of matter and κ is Newton's gravitational constant." This angular velocity ω, for which $\omega^2 = 4\pi\kappa\rho$, was chosen by Gödel to exactly balance the gravitation attraction toward the center of inertia of a rotating body[6] whose mass density is ρ.

Considering that the great logician Kurt Gödel imagined it, surely a macroscopically and microscopically rotating universe should not be summarily discarded based on its supposed implausibility. Einstein had discarded any solution with a cosmic Center because he wanted no special system of coordinates, which a Center would imply.

The mysteriously authored Urantia Book [UB55], which presents itself as a divine "epochal revelation of truth" - a purported gift to our world from a higher culture - informs us that the material cosmos is closer to Gödel's [Göd49] solution of Einstein's field equations.

According to *The Urantia Book*, the total material cosmos is basically flat consisting of huge concentric zones of galaxies rapidly orbiting a Center C in alternate directions all held

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[4] See [Ijj17], Pop Goes the Universe, Scientific American, Feb 1, 2017.
[5] Center of Inertia
[6] See [Sea55] for a derivation of the formula for the angular velocity resulting from an angular acceleration through a given angle, in this case 2π.

together by dark gravity bodies. In addition, the whole cosmos undergoes periodic space inflation and deflation in 2-billion-year cycles.

If andromeda is spinning so fast due to unseen "dark" masses in the cosmos, then our own galaxy (The Milky Way) is also likely to be spinning more rapidly than we currently estimate. Furthermore, our part of the galaxy, and Earth in particular, is probably spinning more rapidly around relatively nearby celestial centers (besides the sun) that we have not yet accounted for.

It appears that the whole cosmos is rapidly spinning, held together by immense masses, and having stabilized angular momenta and energies by virtue of micro and macro concentric space zones orbiting in opposite directions.

2. Velocity to Wave Length Shifts and Vice Versa. In order to estimate the amount of redshift possibly due to opposite cosmic orbits, we need to understand exactly how and how much does recession velocity lead to redshift of light wave lengths? How does redshift imply recession velocity? The derivation of these relationships is important and informative.

The speed of light c is constant in all moving reference frames, so that the time of light travel depends only on distance traveled, not on the motion of the object emitting or receiving the light. Light from an object moving relative to an observer does not travel faster or slower than light from an object at rest. (In any case, we will not have object velocities (v) close enough to c to require any Special Relativity considerations.)

Although all light photons travel through open space at the same speed c, they differ widely in energy content. The energy of a single photon is determined by its frequency f (in cycles per second), a measure of its rapid internal electromagnetic spin rate. The time T (in seconds) for a single cycle of spin is 1/f.

The wave length λ of a photon of frequency f can then be defined as the distance (cT) that the photon travels during the time of one cycle T. So,

$$\lambda = cT = c/f \qquad 4)$$

$$c = \lambda f \qquad 5)$$

Let

c = light velocity = One (1) light-year per year = 186,282 miles per second (mi/sec),

λ_r = wave length of light coming from object J when *at rest* (r) with respect to Earth,

T = time period of one cycle of light of wave length λ_r, and

λ_n = the *new* (n) wave length of light from object J moving at velocity V with respect to Earth. During the time T of one cycle, J moves a distance VT.

Since the distance traveled by light coming from J to the observer differs by the change of position VT of J during the period of time T of one cycle, the apparent (new) wave length of the photon will be greater or less by the magnitude of VT, depending on whether V is positive (away) or negative (toward) Earth. Therefore,

$$\lambda_n = \lambda_r + VT \quad 6)$$

$$\lambda_n - \lambda_r = VT \quad 7)$$

$$(\lambda_n - \lambda_r) / \lambda_r = VT/ \lambda_r = VT/cT = (V/c) \quad 8)$$

Thus,

$$V = c\ (\lambda_n - \lambda_r) / \lambda_r \quad 9)$$

Knowing the *relative wave length shift* $(\lambda_n - \lambda_r) / \lambda_r$, one can solve for the velocity V of object J simply by multiplying by c; knowing the velocity V of object J, one can find the expected relative wavelength shift of light coming from it by dividing by c. The ratio V/c of the velocity of the object to that of light is often referred to as it's z value. Thus z = V/c.

Solving for the new wave length λ_n in terms of the at-rest wave length λ_r and the z value V/c, yields

$$\lambda_n = (1 + V/c)\lambda_r \quad 10)$$

$$\lambda_n = (1 + z)\ \lambda_r \quad 11)$$

The 30-year Sloan Digital Sky Survey (SDSS) is ongoing as of 2022 having measured the redshifts of around 3 million objects and published a 3-D map in July, 2020. “The SDSS has recorded redshifts for galaxies as high as z = 0.8, and has been involved in the detection of quasars beyond *z* = 6.” [Slo20]

Such incredible redshifts of z = 6 implying space expansion at greater than light speed were necessary to explain so much early structure in a cosmos with a 14-billion-year limit to cosmic evolution. As used inflation amounts to a wildcard to explain the cosmos genesis in 14 billion years starting from a Big Bang of space and energy-matter expansion. The CMB (cosmic background radiation) supposedly has a redshift of *z* = 1089 having undergone extreme space “inflation” to explain its present uniformity. Does this sound fantastic?

According to *The Urantia Book*, [12:4.12] The present relationship of your sun and its associated planets, while disclosing many relative and absolute motions in space, tends to convey the impression to astronomic observers that you are comparatively stationary in space, and that the surrounding starry clusters and streams are engaged in outward flight at ever-increasing velocities as your calculations proceed outward in space. But such is not the case. You fail to recognize the present outward and uniform expansion of the physical creations of all pervaded space. Your own local creation (Nebadon) participates in this movement of universal outward expansion. The entire seven superuniverses participate in the two-billion-year cycles of space respiration along with the outer regions of the master universe.

[12:4.13] When the universes expand and contract, the material masses in pervaded space alternately move against and with the pull of Paradise gravity. The work that is done in moving the material energy mass of creation is *space* work but not *power- energy* work.

12:4.14 Although your spectroscopic estimations of astronomic velocities are fairly reliable when applied to the starry realms belonging to your superuniverse and its associate superuniverses, such reckonings with reference to the realms of outer space are wholly unreliable. Spectral lines are displaced from the normal towards the violet by an approaching star; likewise these lines are displaced towards the red by a receding star. Many influences interpose to make it appear that the recessional velocity of the external universes increases at the rate of more than one hundred miles a second for every million light-years increase in distance. By this method of reckoning, subsequent to the perfection of more powerful telescopes, it will appear that these far-distant systems are in flight from this part of the universe at the unbelievable rate of more than thirty thousand miles a second. But this apparent speed of recession is not real; it results from numerous factors of error embracing angles of observation and other time-space distortions.

3. Alternating Universe Orbits with Relative Angular Velocity $\omega = \omega_1 + \omega_2$.

Question 1: As seen from Earth how would a universe of clockwise and counter-clockwise rotating rings of galaxies be manifest in Doppler shifts? How much of the observed phenomenon of large Doppler redshift can be explained by a "rotating rings" model of the universe?

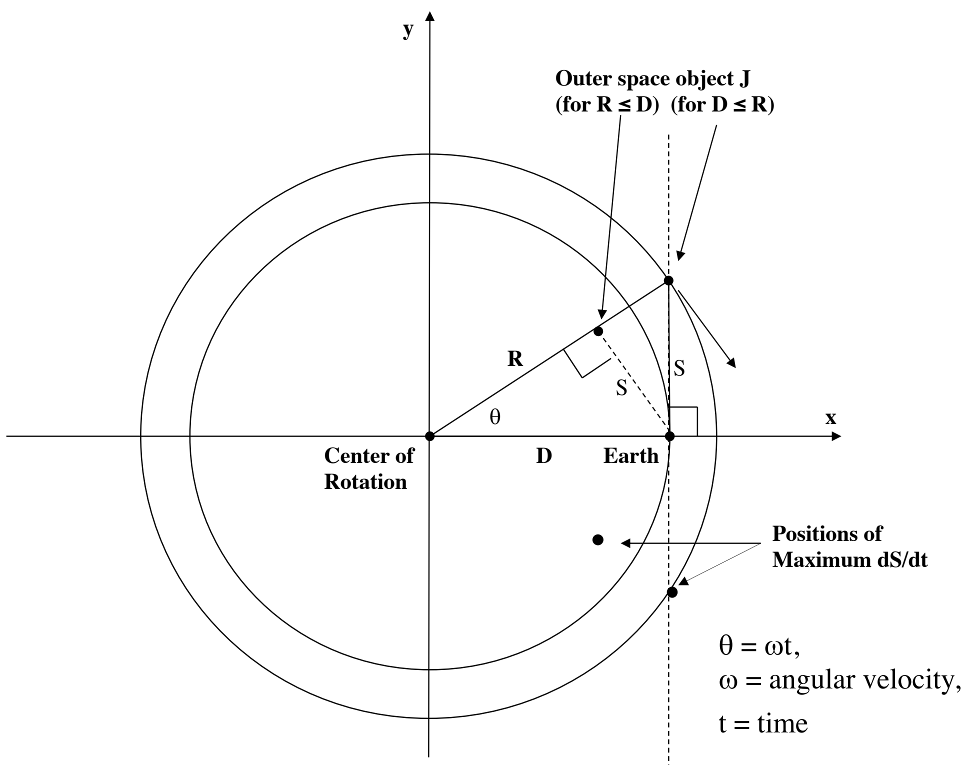

Figure 2. Angle θ and Positions of Object J of Maximum dS/dt for a given R

Answer to Q1: Given a common center C around which Earth and another celestial object J orbit in opposite directions at distances D and R respectively, the results of the analysis (See Appendix A) are that:

For D ≤ R, that is for all objects farther from C than Earth, the maximum and minimum relative velocities dS/dt of J relative to earth, are dS/dt = ±Dω, a constant - the distance D of Earth from the Center of Rotation C times the difference ω in the angular velocities of the assumed counter-clockwise and clockwise orbits of Earth and the observed object J.

For R ≤ D, that is for objects closer to C than Earth, the maximum and minimum recession or approach velocities, dS/dt, of J relative to Earth are

$$dS/dt = \pm R\omega, \qquad 12)$$

that is, plus or minus the distance of J from C times the difference in the opposite angular velocities of Earth and J. Thus, for R ≤ D, the result is like Hubble's law with ω as the constant of proportionality. The periodic maximum recession velocities would be balanced over long periods of time with similar approach velocities.

$$\max\frac{dS}{dt} = \begin{Bmatrix} R\omega, & R \le D, \\ D\omega, & D \le R \end{Bmatrix} \qquad 13)$$

Max dS/dt

Dω

D R

Figure 2. Maximum dS/dt

However, by hypothesis, the outer space object J is orbiting C with angular velocity ω, which implies an orbital speed V around C equal to the circumference 2πR divided by the period (1/ω). Thus

$$V = 2\pi R\omega = (2\pi\omega)R = H_o R, \qquad 14)$$

which is akin to Hubble's Law - the further away R an outer space object is, the faster it is going – except that all but the fixed maximum amount Dω of the increased speed would be orbital around C not directed outward from Earth. Such great orbiting motions would not be recessions in support of a Big Bang, but would account for some periodic recessions.

4. Estimates of Earth's Distance D to Paradise. Let us assume as premises what the Urantia Book says about the cosmos and explore the implications.

First consider D. By definition, D is the distance from Earth, in the system of Satania, to Paradise, the center of rotation C. Satania is now more than 200,000 light years (ly) from the center of its superuniverse Orvonton (32:2.11). And the superuniverses are shaped like flat spokes (15:0.1) not like circular or low eccentricity ellipsoids. The local universes of

Orvonton are closer together as they approach Havona in their orbit around the physical center of Orvonton (15:3.16). The local universes spread out in Orvonton as they move away from C. Thus, there is only another 50,000 to 100,000 ly from the nucleus of Orvonton to the closest approach to Havona as the local universes swing quickly between Havona and the orbital center of the superuniverse of Orvonton. Add another 50,000 to 100,000 ly for the distance from this closest approach of the superuniverse to the center of Paradise. That yields a minimum estimate of 300,000 ly and a maximum of 400,000 ly for D.

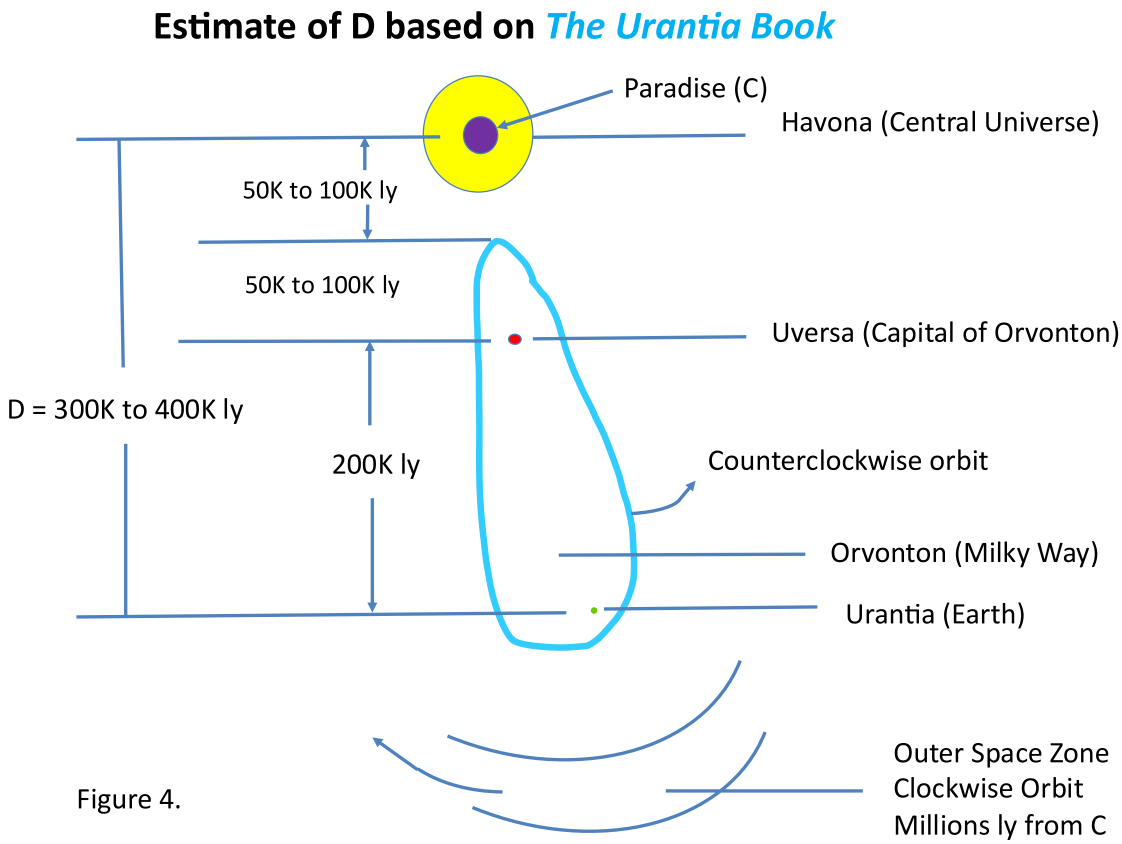

Figure 4.

5. Estimate of ω_1 and ω_2 based on *The Urantia Book*. Next consider ω. By definition, ω is the angular velocity of Earth, orbiting the center C, at distance D, ***relative to*** object J orbiting C in the opposite direction at distance R. So, to estimate ω, we need to estimate the angular velocity ω_1 of Earth around C and the angular velocity ω_2 of J around C and add. The angular velocity ω_1 of Earth around C can be expressed as 1 (complete circuit) per some time period T_1. Similarly, the angular velocity ω_2 of J is 1 per T_2.

Earth is orbiting C as part of Orvonton's orbit around Paradise. This orbit is nearly circular being in the shape of the dimensions of Paradise – a flat 7 by 6 ellipsoid, with north & south occupying the long axis endpoints [UB55, 1:2.2 (119.3)].

Contemporary scientists have recognized that a great amount of dark (unseen) matter must be present to explain how luminous galaxies can spin so observably fast about their cores without flying apart. The point here is that evidently, most matter spins at higher-than-expected rates. For instance, according to Wikipedia [Wik01], Andromeda has an angular velocity of 140 mi/sec at a distance of 1300 ly from its core, and 140 mi/sec is 140/186,282 = 1/1330 of the speed of light. Therefore, the period of Andromeda's rotation at radius 1300 ly is the circumference there divided by the speed there = 2π(1300 ly) / (1/1330)(ly/yr) = 10.86 million years, quick by astronomic standards.

Therefore, discovering that the Grand Universe, including Orvonton, is circling C at a high angular rate should be expected because all the dark matter is holding the universes together while they spin and orbit faster than the luminous material alone could support. Indeed, such rapid spin is necessary to balance the great gravity of the dark matter.

So, the question is: How long does it take for the seven superuniverses to make one complete orbit around Paradise? Or equivalently, how long does it take for our superuniverse of Orvonton to swing around Paradise once?

[15:1.5] Your local universe of Nebadon belongs to Orvonton, the seventh superuniverse, which swings on between superuniverses one and six, having not long since (as we reckon time) turned the southeastern bend of the superuniverse space level. Today, the solar system to which Urantia belongs is a few billion years past the swing around the southern curvature so that you are just now advancing beyond the southeastern bend and are moving swiftly through the long and comparatively straightaway northern path. For untold ages Orvonton will pursue this almost direct northerly course.

[15:1.6] Urantia belongs to a system which is well out towards the borderland of your local universe; and your local universe is at present traversing the periphery of Orvonton. Beyond you there are still others, but you are far removed in space from those physical systems which swing around the great circle in comparative proximity to the Great Source and Center.

Thus, "a few billion years" is enough time for Orvonton and our solar system to go from the southernmost position of the orbit to "beyond the southern bend" and now "moving swiftly through the long and comparatively straightaway northern path".

Taking "a few billion years" to be "3 or 4", say 3.5 billion years, during which Orvonton moved about 1/7 of the way around the Grand Universe orbit, implies about 7 x 3.5 = 24.5 billion years is the time of circuit. If this seems like too small a number, consider that we are told that the whole Master Universe undergoes 2-billion-year expansion and contraction cycles [11:6.5 (124.1)]. For a billion years of Urantia time the vertical space reservoirs above and below C contract while the master [total] cosmos and the force activities of all horizontal space expand. It thus requires a little over two billion years to complete the entire expansion-contraction cycle. If the orbital period is somehow synchronized with the expansion-contraction cycle, then 24 billion years could easily be too large.

Taking ω_1 to be = 1 per 24 billion years and ω_2 to be = 1 per 24 billion years **in the opposite direction**, $\omega = \omega_1 + \omega_2$ = 1 cycle per 12 billion years. Therefore, the maximum relative wave length shift z = (v/c) is

$$z = \max (v/c) = D\omega/c = (400{,}000 \text{ ly}) (1/12 \text{ billion years}) / (1 \text{ ly/yr}) = (4 \times 10^5) / (1.2 \times 10^{10}) = 3.33 \times 10^{-5} = 1/30{,}000 \qquad 15)$$

Based on these assumptions, this is the maximum relative wave length shift z due to the orbit of Orvonton around C relative to an outer space object J orbiting C in the opposite direction. This velocity V is c/30,000 or about (186,000 / 30,000) mi/sec = 6.2 mi/sec or about 9.9 kilometers per second.

For comparison, since the radius of earth's orbit around the sun is about 93 million miles, the circumference is 2π (93) million miles, and so the orbital velocity is 2π(93) million miles per year, or about[7] 18 mi/sec. That number is about 3 times the maximum recession (or approach) velocity of object J just calculated. Therefore, the earth's orbit around the sun can vary significantly contribute to the total red or blue shift measured and must be accounted for. Relative to c, 18 mi/sec has a z value of 18/186,000 or about 1/10,000, which is one ten thousandth of the speed of light.

6. Multiple Orbits. However, this counts only the orbit of the whole Milky Way galaxy (Orvonton) around C, not the orbit of the Milky Way itself about its own gravitational center. This orbit is also counter-clockwise to the clock-wise orbit of the 1st outer space zone of galaxies.

We are informed that these newly discovered [circa 1995] outer space zone of galaxies orbiting C in the opposite direction as our galaxy *produce the largest distortion* in our measurements among many caused by numerous "factors of error" [UB55 12:4.14 (134.3)] - including unrecognized rotations [UB55, 15:3.7] each potentially adding to others in certain astronomic phases and positions. Our time could be such a period of coordinated red shifting due to rotating motions of orbits and sub-orbits in which Earth happens to find itself. A spinning within a circling produces Doppler peaks approaching the sum of the redshifts of the individual rotations. And inner orbits are usually significantly faster than outer ones. At each level, the inner angular velocity can easily be 3 or more times the outer one. For 3 such inner orbits[8] ω_1 could reach, say, $3^3 = 27$ times the assumed outer frequency of 1/(24 byr), or about 27/24 = 1.125 per byr.

Therefore, were Earth part of a rotation within a rotation within a rotation, and so forth, all rotating in the same counter-clockwise direction, the net effect during certain periods would be that all these counter-clockwise angular velocities would add up to a large angular velocity with respect to far distant objects rotating clockwise in the opposite direction in an outer space zone. Such periods could easily last hundreds of years. In such a context as

[7] $(186\pi)(10^6)/(365.24)(24)(3600) = 18.5$ mi/sec

[8] Orbits around Orvonton, the Major Sector, the Minor Sector, the Local Universe of Nebadon, the Constellation of Norlatiadek, the sun, and the Andronover Nebula. Perhaps the times of orbits can be deciphered.

described above, the Earth's angular velocity (ω_1) could temporarily reach, say, 27 times the 1 per 24 billion years estimate for the outer Grand Universe circuit, yielding a value for $\omega = \omega_1 + \omega_2 = 27/24 + 1/24 = 28/24$ per byr. This would produce z value (28/24)/(1/12) = 14 times that of the outer orbit = (V/c) = (14/30,000) = 0.000467, and a velocity V = 0.0023c = 87.0 mi/sec.

7. Space Respiration. [11:6.4] "The cycles of space respiration extend in each phase for a little more than one billion Urantia years. During one phase the universes expand; during the next they contract. Pervaded space is now approaching the mid-point of the expanding phase, while unpervaded space nears the mid-point of the contracting phase, and we are informed that the outermost limits of both space extensions are, theoretically, now approximately equidistant from Paradise. The unpervaded-space reservoirs now extend vertically above upper Paradise and below nether Paradise just as far as the pervaded space of the universe extends horizontally outward from peripheral Paradise to and even beyond the fourth outer space level."

So, let us assume that the *space* holding the material cosmos undergoes such a periodic *expansion* and contraction in 2-billion-year cycles, and that we are now about midway in the *expansion phase* [11:6.4].

This unrecognized expansion phase could explain the 80% predominant redshifts vs. blueshifts observed now-a-days. Objects in space are now moving apart. However, that would not imply permanently greater receding velocities in the future, nor support the "big bang theory" of the whole cosmos exploding into existence a mere 13.8 billion years old.

The scientific verification of this space expansion and contraction periodicity might also explain the recent observation of *acceleration* in recession velocities prompting the idea of some mysterious "dark energy" to account for the extra force needed to produce acceleration. Periodic space expansion-contraction cycles would naturally have space body accelerations and decelerations as the space that holds matter sinusoidally spreads out from the Center C for a billion years, reaches a peak, and then contracts over the next billion years. From an energy point of view, the redshift acceleration would be "space work" not the work of accelerating masses through space, therefore needing no additional energy. Bodies ride the space expansion, and participate in it.

If verified, *global space oscillation* could remove the need for "dark energy" as the explanation of the sometimes-observed *acceleration* of receding space bodies in space.

8. Estimate of Redshift Caused by Space-Respiration. Two billion years cycles of space expansion and contraction that significantly spreads out the pervaded cosmos during the expansion phase implies a significant recession velocity midway through the expansion phase. If the universes spread uniformly 5 percent[9] in 1/2 billion years, then the *distance* between the matter in space would also increase by 5% or 1/20.

[9] The percentage of space expansion relative to the whole of space is presently unknown and unrevealed.

A distance S_0 between Earth and an object J would become $(21/20)S_0$ during 1/2 billion years. That is an apparent average velocity of $(1/20)S_0$ per 1/2 billion years = $(1/10)S_0$ per byr. The space between Earth and an object at S_0 = 10 million light years distant would apparently move 1 million light years in 1 billion years, which is an average velocity of 1 mly / byr = c/1000 = 186 mi/sec, very significant in comparison to previously estimated values.

If the oscillating motion is sinusoidal, as $S = S_0 + (S_0/20)\mathrm{Sin}(\pi t)$ where t is time in billions of years (byr), then the maximum spread velocity $dS/dt = (S_0/20)(\pi)\mathrm{Cos}(\pi t)$ during the cycle would be at t = 0 where Cos = 1. So, $dS/dt = (\pi/20)S_0$ mly/byr = $c(\pi/20{,}000)S_0$ = $c(0.0001571)S_0 = (29.2)S_0$ mi/sec. Thus, for S_0 = 10 mly, the max dS/dt = c(0.001571) = 292 mi/sec, which is $(\pi/2)$ greater than the average velocity during the expansion phase.

Note that this space expansion (spreading) redshift is proportional to the distance S_0 of the object. An object 100 mly away would magnify the redshift 10-fold making z = 0.01571 and the recession velocity would reach 1.57% of light speed. An object a billion lyr away would reach 15.7% of light speed.

A 2.5% space respiration expansion would produce half the result of the 5% one for objects at 10 mly producing z = (0.001571) / 2 = 0.0007855. This value will be used[10].

Some of the space expansion might simply shift matter outward without spreading it. Such uniform global motion would not contribute to redshift. Only the spreading of matter would produce redshift. The degree of universe spreading during space expansion versus universe translational motion is presently unknown. In the above calculation, non-spreading expansion was assumed to be zero.

9. Redshift Summary. Since the speeds involved are not close to the speed of light, we can simply add the individual estimated z values to estimate the maximum total recession speed. The maximum z value of the alternating rotation orbits of Section 5 was estimated to be 1/30,000, but as magnified by 3 sub-galactic Earth orbits of Section 6, the max z was estimated to be about 14 times greater or about 0.000467.

The space respiration expansion (2.5%) was estimated at (z = 0.000786) for objects at a distance of 10 million ly. Thus, the total maximum z value for such objects is estimated to be 0.000467 + 0.000786 = 0.001253, which is 233 mi/sec. Recapping:

Outer Alternating Orbit Maximum z-Value = 1/30,000 =	0.000033
Outer orbit z (magnified by 3 sub-galactic Earth orbits) =	0.000467
2.5% space respiration z-value for objects at 10 mly =	0.000786
Sum total maximum z value for such objects is estimated =	0.001253

[10] To produce all of the Hubble expansion as a result of space respiration midway in the expansion phase, the respiration % (also called the scale factor) would need to be r = 2.28%, which is the solution for r of: $[(\pi/2)(r/100)(3.26\text{ mly})] / (1/2)\text{byr} = 43.5$ mi/sec

This velocity of 233 mi/sec is about 175% of the 133 mi/sec velocity expected by Hubble's Law for objects 10 mly away. Objects ten times that distance away (100 mly) could have 10 times the respiration expansion z-value (0.00786) plus the fixed alternating rotation contribution of 0.000467 producing a combined maximum z-value of 0.008327, still about 1.16 times the recession velocities Hubble's Law predicts.

10. Conclusion. The evidence for the "Big Bang" doctrine rests almost entirely on the interpretation of the redshifts and the uniformity of the cosmic background radiation (CBR) in all directions (interpreted to be the remnants of the initial blast). This paper, however, shows that alternative explanations for large redshifts exist. These alternative explanations are no less plausible than a simple linear acceleration of recession velocities (Hubble's Law) that necessitates a 14-billion-year maximum age for the cosmos and needs an initial space-matter "inflation" over 1000 times the speed of light in order to explain early structures at great distance. The CBR can be explained as primordial uniformly distributed cosmic dust in space that radiates at a temperature of a few degrees Kelvin, keeping intergalactic space from being totally empty and cold [UB55; 42:4.6 (473.4)]. This paper shows that observed large redshifts can be plausibly explained without a Big Bang Cosmos bursting from a singularity less than 14 billion years ago.

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Appendix A. Analysis: Assume that large concentric rings of stars and galactic systems rotate more or less as rigid disks with constant angular velocities in opposite directions, clockwise and counter-clockwise around the same Center of Rotation.

Assuming a counter-clockwise rotation for the Earth about the Center of Rotation C, without loss of generality for determining Doppler shift, adopt a counter-clockwise rotating coordinate system in which the Earth is fixed at x = D, y = 0. The outer space object J then has angular velocity ω equal to the difference of the angular velocities between Earth and J with respect to the Center of Rotation.

y

Outer Space Object J

R

S

θ

x

Center of Rotation C

D

Earth

$\theta = \omega t$,
ω = angular velocity,
t = time

Figure 1. Rotating Universe

By the law of cosines, $S^2 = R^2 + D^2 - 2RD \cos \theta$. [This of course can be proved directly by expressing the length of the dotted line as $R \sin \theta$ and the distance from the center of rotation to the base of the dotted line as $R \cos \theta$ and then using the Pythagorean Theorem and a little trigonometry. A less elementary, vector calculus solution is also available.]

The Doppler shift is due to the change in the distance of object J as seen from the Earth as the object swings around C. This change in distance with respect to time is the first derivative dS/dt. During the rotation only θ and S change with time t although we will also want to examine dS/dt for objects of varying distances R from the Center of Rotation.

Setting $\theta = \omega t$ and taking the derivative of both sides with respect to time t yields:

$$2S\,(dS/dt) = 0 + 0 + 2RD\omega \sin(\omega t) \qquad \text{A1)}$$

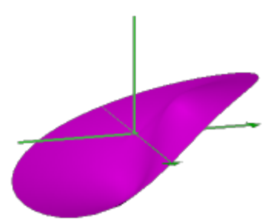
and so

$$S\,(dS/dt) = (RD\omega) \sin(\omega t) \qquad \text{A2)}$$

$$dS/dt = (RD\omega/S) \sin(\omega t) \qquad \text{A3)}$$

$$dS/dt = RD\omega \sin(\omega t) / (R^2 + D^2 - 2RD \cos \omega t)^{1/2} \qquad \text{A4)}$$

$$dS/dt = D\omega \sin(\omega t) / (1 + (D/R)^2 - 2(D/R) \cos \omega t)^{1/2} \qquad \text{A5)}$$



Graph 1. Doppler Shift, dS/dt, Due to Rotation

In terms of D, ω and R, this is the speed of recession (or approach) of J due to the assumed rotating motion. This speed will change signs when $\theta = 0$ or π because at those angles J will stop getting closer (or farther) away from Earth and start receding (or approaching) again, thus changing the sign of dS/dt.

Fixing any angle θ and letting R (and S) increase in equation 5), (D/R) goes to zero and the Doppler shift velocity approaches $D\,\omega\,\sin\theta$. That is,

$$\lim_{R\to\infty} dS/dt = D\omega\sin\theta \qquad \text{A6)}$$

which is a constant, positive or negative, depending on θ.

Notice that when $\omega t = \theta = 0$ or π there is no Doppler shift since $\sin\theta = 0$. For $\theta = \pm\pi/6$, dS/dt approaches constant $\pm D\omega/2$ as R and S approach ∞.

At $\theta = \pm\pi/2$, the Doppler shift is $dS/dt = \pm RD\omega/S = \pm RD\omega/(R^2 + D^2)^{1/2} = \pm\omega/(R/D + D/R)^{1/2}$, whose absolute value is still about $\omega/10$ when R is 100 times D indicating that this effect can be significant.

Fixing R and D and letting θ and S vary again, the maxima and minima of this sinusoidal function dS/dt in equation 3) occur when the 2nd derivative vanishes. Taking derivatives (implicitly again) on both sides of equation 2) yields:

$$S\, d^2S/dt^2 + (dS/dt)\,(dS/dt) = (RD\omega^2)\cos(\omega t). \qquad \text{A7)}$$

So, the maxima and minima must occur when

$$(dS/dt)^2 = (RD\omega^2)\cos(\omega t). \qquad \text{A8)}$$

That is, using equation 3), the maximum or minimum Doppler shift values are when

$$(RD\omega^2)\cos(\omega t) = (RD\omega/S)^2 \sin^2(\omega t) \qquad \text{A9)}$$
$$S^2 \cos(\omega t) = RD \sin^2(\omega t) \qquad \text{A10)}$$
$$(R^2 + D^2 - 2RD\cos\theta)\cos\theta = RD\sin^2\theta$$
$$(R^2 + D^2)\cos\theta - 2RD\cos^2\theta - RD\sin^2\theta = 0$$
$$(R^2 + D^2)\cos\theta - RD\cos^2\theta - RD(\cos^2\theta + \sin^2\theta) = 0$$
$$-RD\cos^2\theta + (R^2 + D^2)\cos\theta - RD = 0$$

Thus, the angles θ at which dS/dt attains its maximum or minimum value satisfy

$$\cos^2\theta - (R/D + D/R)\cos\theta + 1 = 0 \qquad \text{A11)}$$

Solving this quadratic equation for $\cos\theta$ yields

$$2\cos\theta = R/D + D/R \pm ((R/D + D/R)^2 - 4)^{1/2}$$

$$2RD\cos\theta = R^2 + D^2 \pm ((R^2 + D^2)^2 - 4R^2 D^2)^{1/2}$$
$$2RD\cos\theta = R^2 + D^2 \pm ((R^2)^2 + 2R^2 D^2 + (D^2)^2 - 4R^2 D^2)^{1/2}$$
$$2RD\cos\theta = R^2 + D^2 \pm ((R^2)^2 - 2R^2 D^2 + (D^2)^2)^{1/2}$$

$$2RD\cos\theta = R^2 + D^2 \pm ((R^2 - D^2)^2)^{1/2}$$
$$2RD\cos\theta = R^2 + D^2 \pm |R^2 - D^2| \qquad A12)$$

Therefore, the maxima or minima dS/dt occur when

$$S^2 = R^2 + D^2 - 2RD\cos\theta = \pm|R^2 - D^2|. \qquad A13)$$

$$S^2 = \begin{cases} R^2 - D^2, & D \le R, \\ D^2 - R^2, & R \le D \end{cases} \qquad A14)$$

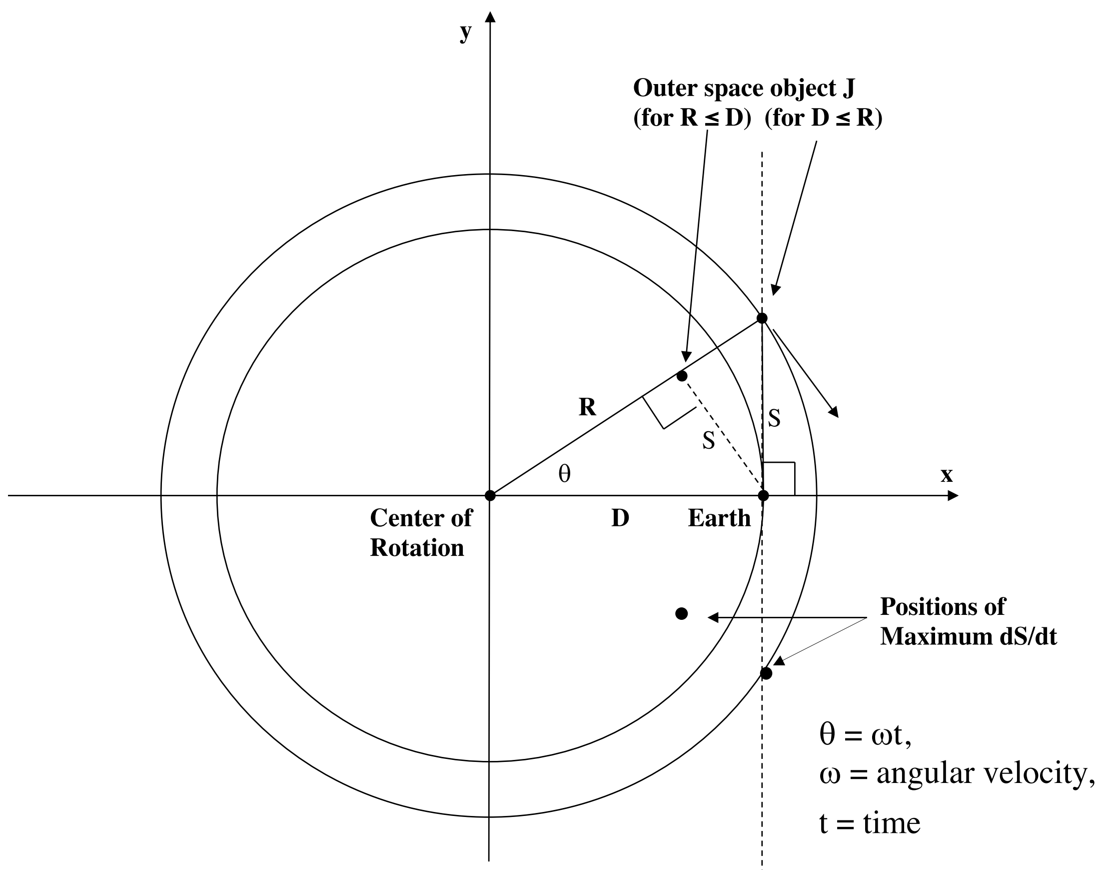


Figure 2. Angle θ and Positions of Object J of Maximum dS/dt for a given R

In case $D \le R$, a circle of radius R about the Center of Rotation will intersect the vertical (dotted) line "x = D" through the Earth in two places making $D^2 + S^2 = R^2$, which is both necessary and sufficient that D, R and S form a right triangle with R as hypotenuse. So

$$\cos\theta = D/R \text{ and } \sin\theta = \pm S/R. \qquad A15)$$

Therefore, the maximum and minimum relative velocities dS/dt in case $D \le R$ are: $dS/dt = (RD\omega/S) \sin \theta = (RD\omega/S) (\pm S/R) =$

$$dS/dt = \pm D\omega \qquad \text{A16)}$$

$D\omega$ is a constant, the distance D of Earth from the Center of Rotation C times the difference in the angular velocities of the assumed counter-clockwise and clockwise rotations of Earth and an observed object J.

Therefore, for a given R the maximum Doppler effect of such rotations is to add at most this constant red or blue velocity-caused wave-length shift to light coming from object J.

However, by hypothesis, the outer space object J is orbiting C with relative (to Earth) angular velocity ω, which implies an orbital speed V around C equal to the circumference $2\pi R$ divided by the period $(1/\omega)$. Thus

$$V = 2\pi R\omega = (2\pi\omega)R = H_o R, \qquad \text{A17)}$$

which would be Hubble's Law - the further away R an outer space object is, the faster it is receding – except that all but the fixed maximum amount $D\omega$ of the increased speed would be orbital not away from Earth. Such great orbiting motions would not be expansions in support of a Big Bang.

With "Up" taken in the direction perpendicular to the plane of rotation making Earth's rotation counter-clockwise, objects far out in outer space off the left (west) edge of the Milky would have a red shift due to the rotations, and objects off the right (east) edge of the Milky Way would have at most this constant blue shift added to their spectrums. Other motions would be circular about C, not an uncharted expansion.

In case $R \le D$, the right triangle in Figure 2 has D as hypotenuse and $S^2 + R^2 = D^2$; a circle of radius R about the Center of Rotation has two tangent lines that intersect the Earth's position and which form right triangles. One is depicted (slanted dotted line) in Figure 2. So

$$\cos \theta = R/D \text{ and } \sin \theta = \pm S/D \qquad \text{A18)}$$

Therefore, the maximum and minimum dS/dt in case $R \le D$ are $dS/dt = (RD\omega/S) \sin \theta = (RD\omega/S) (\pm S/D)$. So

$$dS/dt = \pm R\omega \qquad \text{A19)}$$

Again, this is a linear relationship akin to Hubble's law with ω as the constant of proportionality.

For larger and larger R, the two intersections of the dotted line "x = D" and the circle of radius R about the Center will occur further up (or down) the dotted line and the angle θ will approach $\pm\pi/2$. The two values of R, $R \le D$ and $D \le R$, corresponding to the same θ will approach 0 and ∞ respectively.

Thus, as a function of the distance R of object J from the Center C of rotation, the maximum dS/dt is given by the following equation and is depicted in Figure 3.

$$\max\frac{dS}{dt} = \begin{cases} R\omega, & R \le D, \\ D\omega, & D \le R \end{cases} \quad \text{A20)}$$

Max dS/dt

Dω

D R

Figure 3. Maximum dS/dt

This maximum value of dS/dt occurs at

$$\theta = \begin{cases} \arcsin\left(\frac{S}{D}\right), R \le D, \\ \arcsin\left(\frac{S}{R}\right), D \le R \end{cases} \quad \text{A21)}$$

This is the same angle for two values of R. For any given direction θ, there are two distances R, one smaller and one larger than D, that maximize dS/dt over all other directions at those distances R.

Symmetrically, the minimum (negative) value of dS/dt of an object J as a function of its distance R from the center of rotation C has a graph that is the mirror image (relative to the horizontal axis) of the graph of Figure 3.

Astronomic Data. The verification of this cosmological hypothesis hinges on evidence of asymmetry in the Doppler shifts when looking in the plane of the Milky Way off one edge of the galactic disk or the other. The difference between the Doppler shifts of far distant objects off the left edge versus objects off the right edge of the Milky Way would be as much as 2Dω. But this would be complicated by any periodic space "inflation" - expansion and contraction cycles of space itself, and the matter within space.

The large-scale motions of the stars are not yet known well, but the existence of a "great attractor" lends credence to the notion that unrecognized rotational motions, especially nested motions of systems and subsystems, may partially account for the appearance of a rapidly expanding universe.