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February 2011

Can Distant Starlight be Explained? (in a six-day creation account)

Topics

- What is the distant starlight problem?
- Contrasting timelines of history
- Standard model of cosmology – the “Big Bang”
- Big Bang scientific problems
- Creationist theories

What is the distant starlight problem?

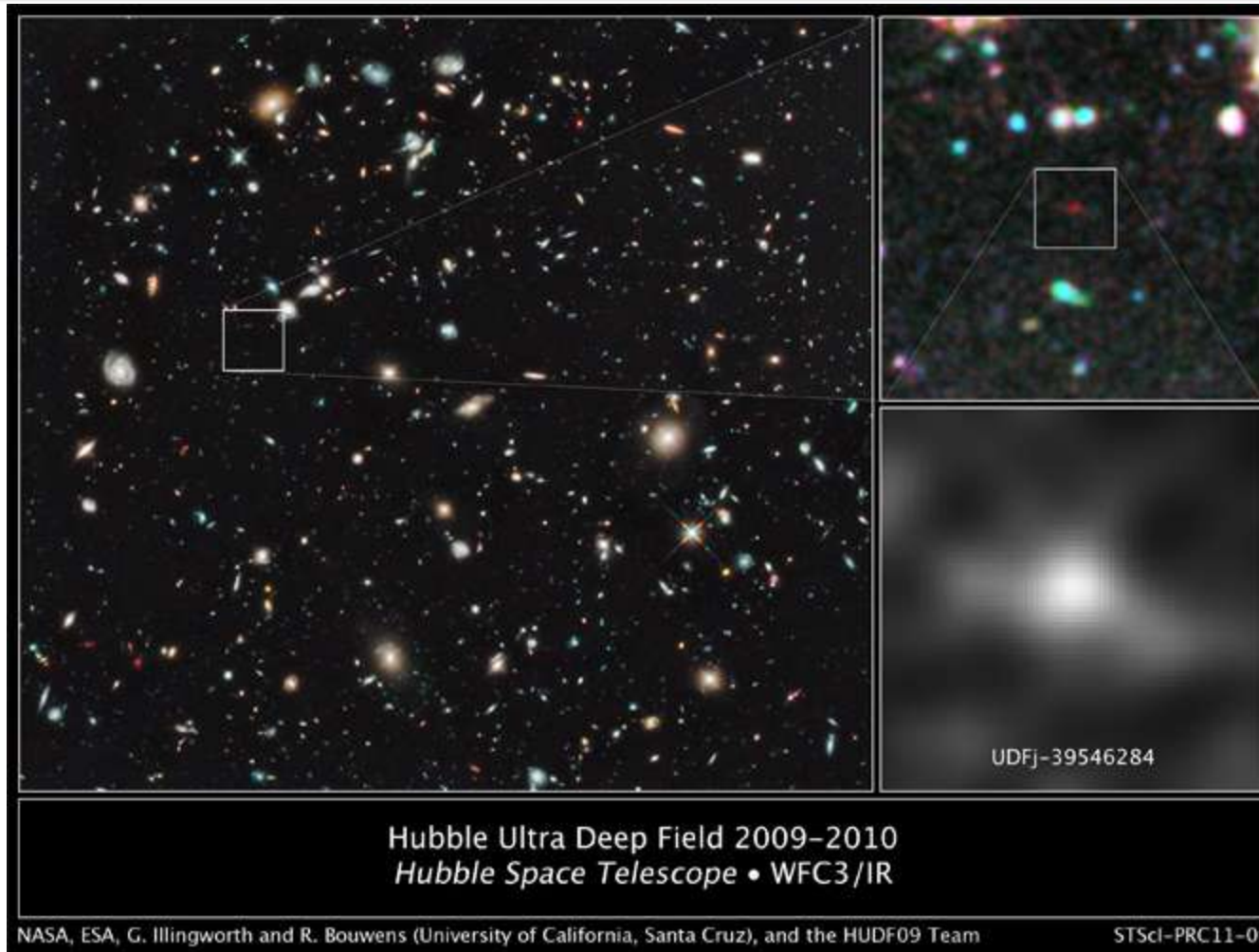
- A straightforward reading of the Bible indicates that the universe was created about 6,000 years ago, yet we can see light from stars that are billions of light-years away
- How can we reconcile this apparent dilemma if we accept the biblical age as true?



Hubble Space Telescope
repairs May 17, 2009

The most distant object ever seen in the universe. Compact galaxy of blue stars 13.2 billion light-years away.

January 26, 2011



Keeping perspective

- The most important focus of biblical creation is that the universe, earth, and people were created by God for a purpose, and are not the result of chance events
- Of secondary importance is the age of the earth, and possibly of yet less importance, the age of the universe

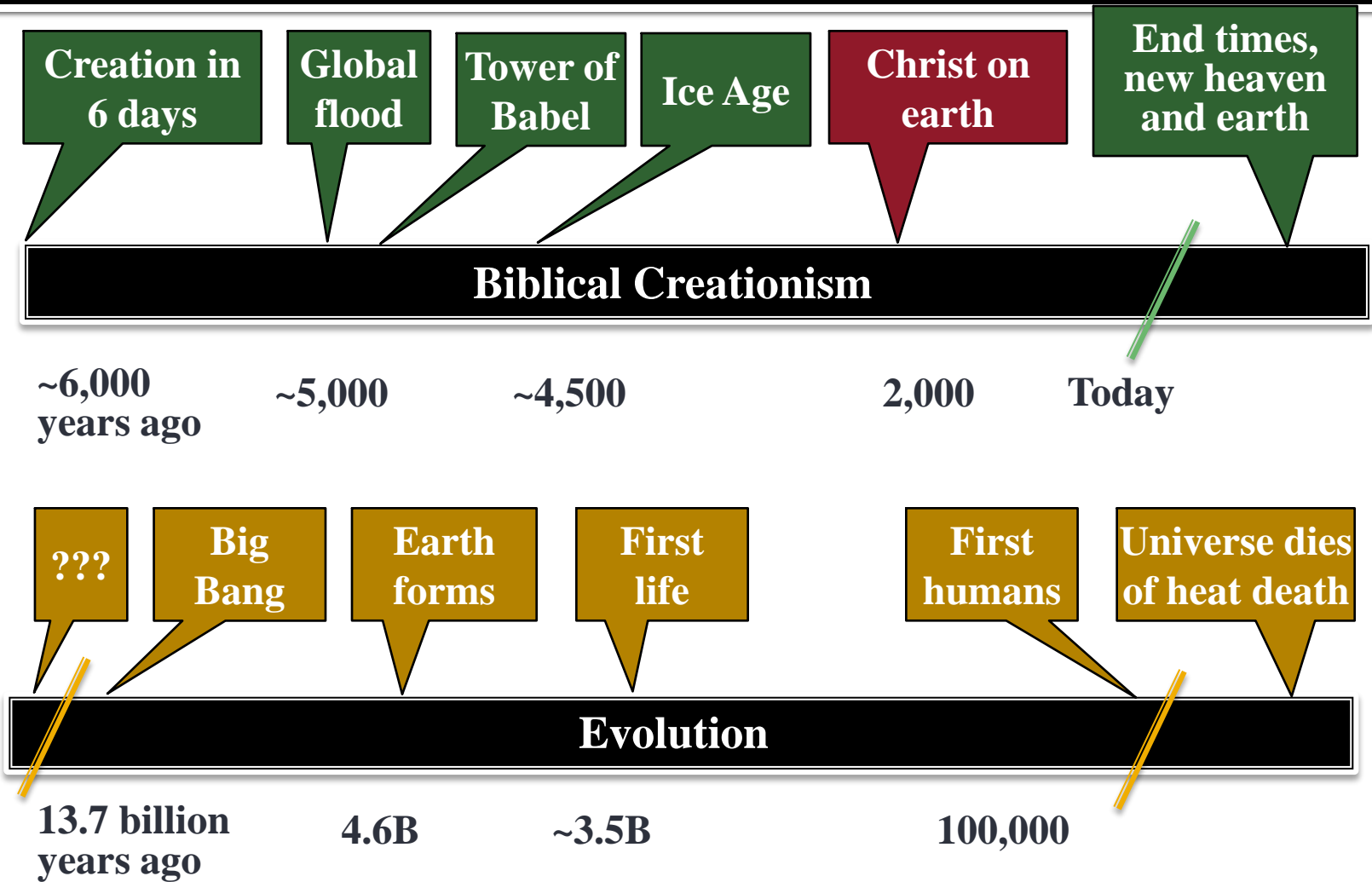
The Bible is God's story of people on earth. There are not many details about the universe. The creation account simply states: "He also made the stars." (Gen 1:16)

The real question: What institution has more authority?

The Bible	Secular Science
Authored by God (through men)	Authored by men
Unchanging over time	Theories change over time
Honors God	Does not acknowledge God
Truth revealed from God	Discovers facts but true interpretation is sometimes false due to materialistic assumptions

Do we keep adjusting our interpretation of the Bible to match current scientific theories?
Or should we fit our science into the biblical framework?

Timelines of History



Contrasting evolutionary and biblical beginnings



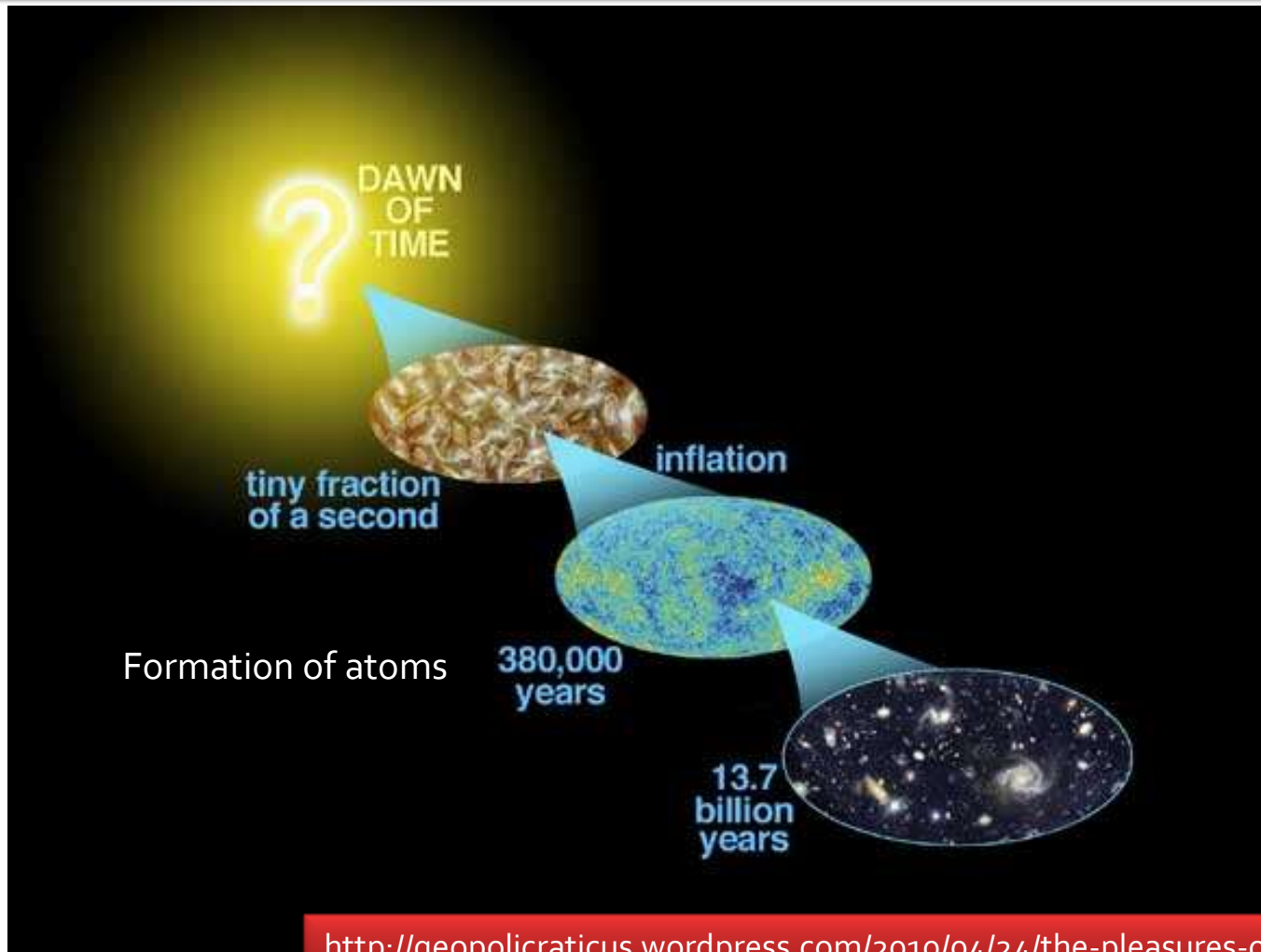
Contrasting evolutionary and biblical endings



The standard model of cosmology

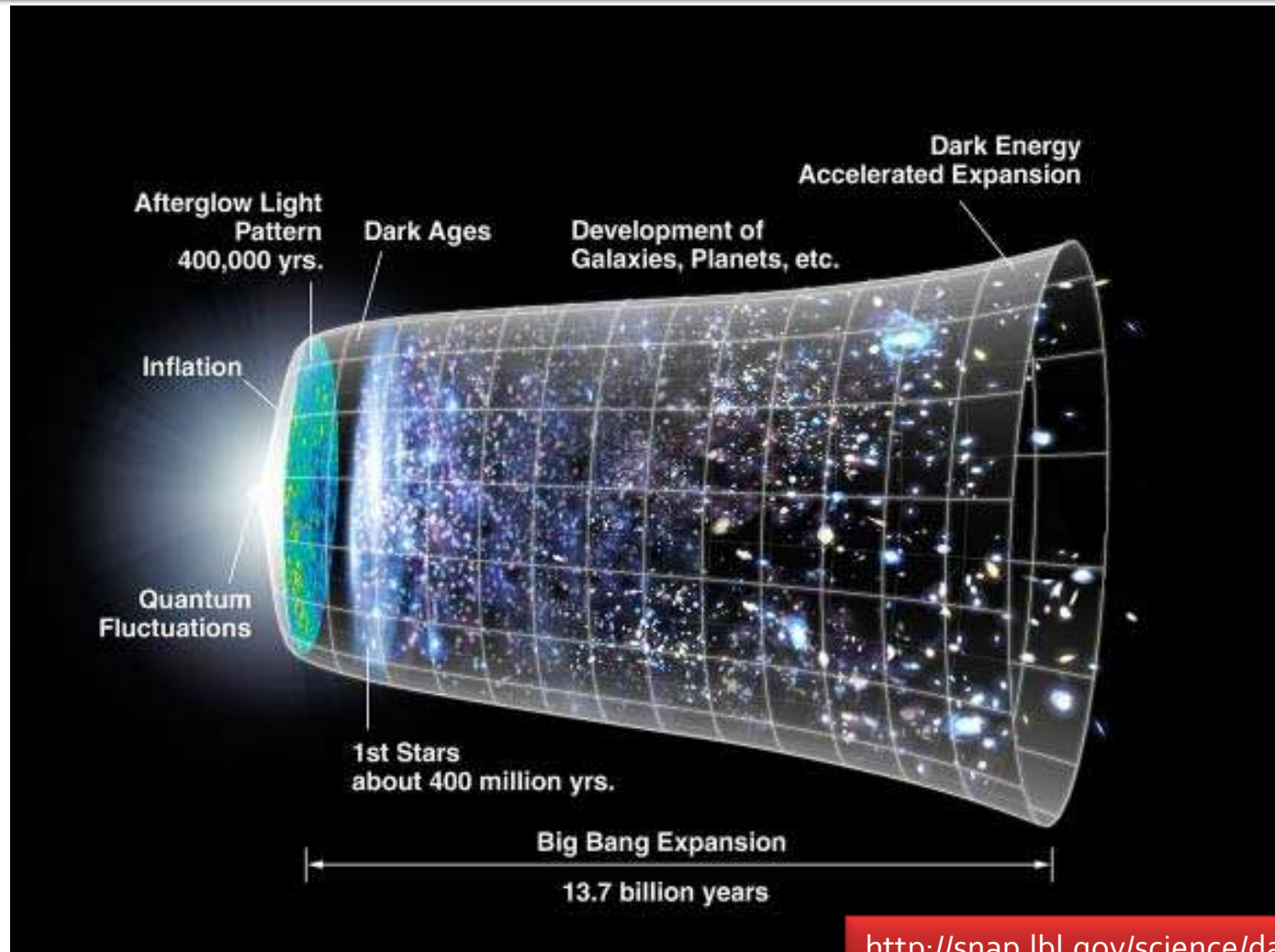
What is the “Big Bang”?

Standard model of cosmology (the "Big Bang")



<http://geopoliticatus.wordpress.com/2010/04/24/the-pleasures-of-model-drift>

The Big Bang (a second view)

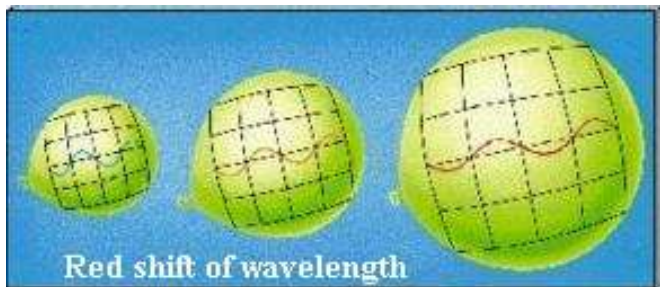


<http://snap.lbl.gov/science/darkenergy.php>

Big Bang concepts

- Space and time begin with the Big Bang
- It is not really an explosion, it is an expansion
- It is not an expansion into pre-existing space, space is being created with the expansion
- It is an expansion in a “fourth dimension”
 - The expansion has no center
- The universe is homogeneous (the same in every direction)
 - There is no special place in the universe

Expansion is in a fourth dimension



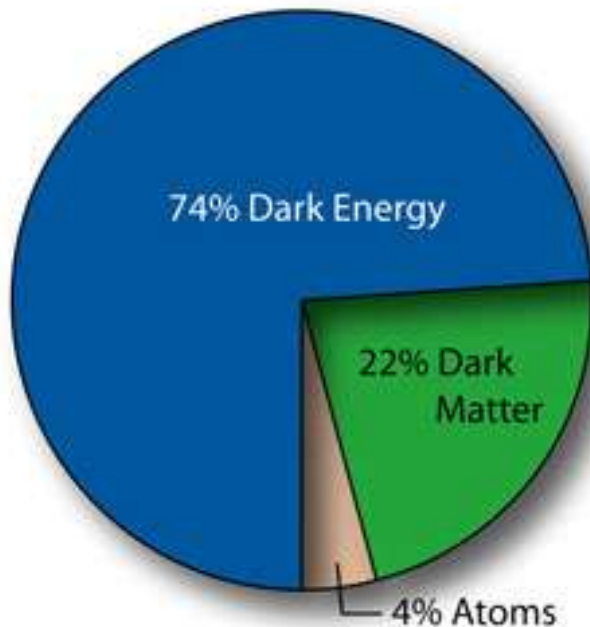
Buttons on a balloon provide a 2D objects expanding in 3D analogy – here 3D galaxies are expanding into a 4D space



Expanding distance between galaxies

<http://universe-review.ca/Fo2-cosmicbg.htm>

Dark matter and dark energy



- Dark matter: needed to account for gravitational forces within and between galaxies
- Dark energy: needed to account for the accelerating expansion of the universe

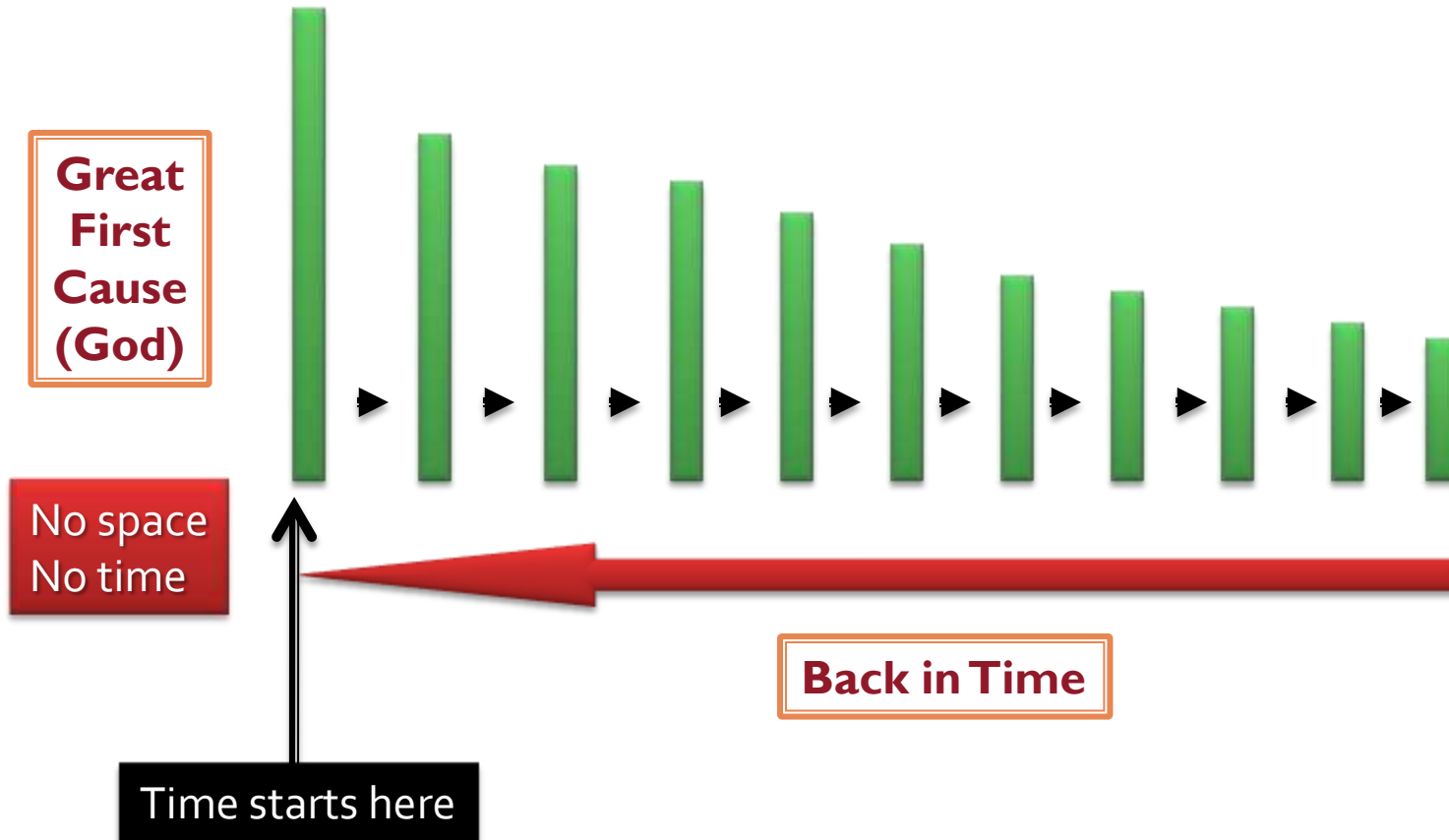
Nobody knows what they really are!

<http://www.nrao.edu/index.php/learnsciencedarkmatteranddarkenergy>

Can the Big Bang be used to prove God?

- **No:** The question “what happened BEFORE the Big Bang?” is an invalid question as time starts with the Big Bang
 - Cause and effect operate within time
- **Yes:** The Big Bang requires an uncaused cause, greater than itself (the Big Bang is the “effect”)
 - God is a sufficient uncaused cause (all-powerful)
 - It is not clear that a “quantum fluctuation” is a sufficient uncaused cause (the entire mass of the universe appears from nothing?)

Cause and effect illustration



The existence of the universe

- ① **Fact 1:** Nothing cannot produce something
- ② **Fact 2:** We have something (the universe)
- ③ **Therefore:** Something is eternal:
 - 1) the universe, or
 - 2) something greater than the universe (God)
 - Otherwise there was a time when there was nothing, but nothing cannot produce something
- ④ **Fact 3:** The universe has been shown to have a starting point (the Big Bang) and is therefore not eternal
- ⑤ **Conclusion:** An eternal God must exist!

Big Bang scientific problems

- Explaining the singularity
- Producing order (“information”) from an expansion
- The universe is not homogeneous (as expected)
- Quantized redshifts (unexpected)
- Missing antimatter
 - Energy \rightarrow matter produces equal amounts of matter and antimatter, we find only trace amounts of antimatter
- “Inflation theory”
 - What caused the inflation to start and stop?

Big Bang scientific problems Explained by inflation theory?

- The horizon problem
 - The temperature of the CMB (Cosmic Microwave Background) radiation is essentially the same in all directions yet there has not been enough time for thermal equilibrium to be reached
- The flatness problem
 - The expansion rate of the universe is very finely balanced with gravity – this is a fantastic coincidence as the accidental byproduct of a Big Bang
- Missing monopoles
 - Hypothetical massive particles that should have been created in the high temperature conditions of the Big Bang

Explaining the singularity

- The first, and main, problem is the very existence of the big bang. One may wonder, What came before? If space-time did not exist then, how could everything appear from nothing? What arose first: the universe or the laws governing it? Explaining this initial singularity—where and when it all began—still remains the most intractable problem of modern cosmology

Linde, Andrei (1994), "The Self-Reproducing Inflationary Universe,"
Scientific American, 271[5]:48-55, November

Guth's Grand Guess



THE UNIVERSE AT
ABOUT 10^{-34} SECONDS
(ACTUAL SIZE)

The universe burst into **something** from absolutely **nothing**—zero, nada. And as it got bigger, it became filled with even more stuff that came from absolutely **nowhere**. How is that possible? Ask Alan Guth. His theory of inflation helps **explain everything**.

We no longer have to rely on stories we were told when we were young – Alan Guth, 2002

- [The] primordial vacuum, a boiling stew from which pairs of positive and negative subatomic particles bubble into being for the briefest of instants. Inflationary theory suggests that what erupted was a "false vacuum," a peculiar form of matter predicted to exist by many particle theorists, although the real article has never been observed. A false vacuum is characterized by a repulsive gravitational field, one so strong it can explode into a universe.

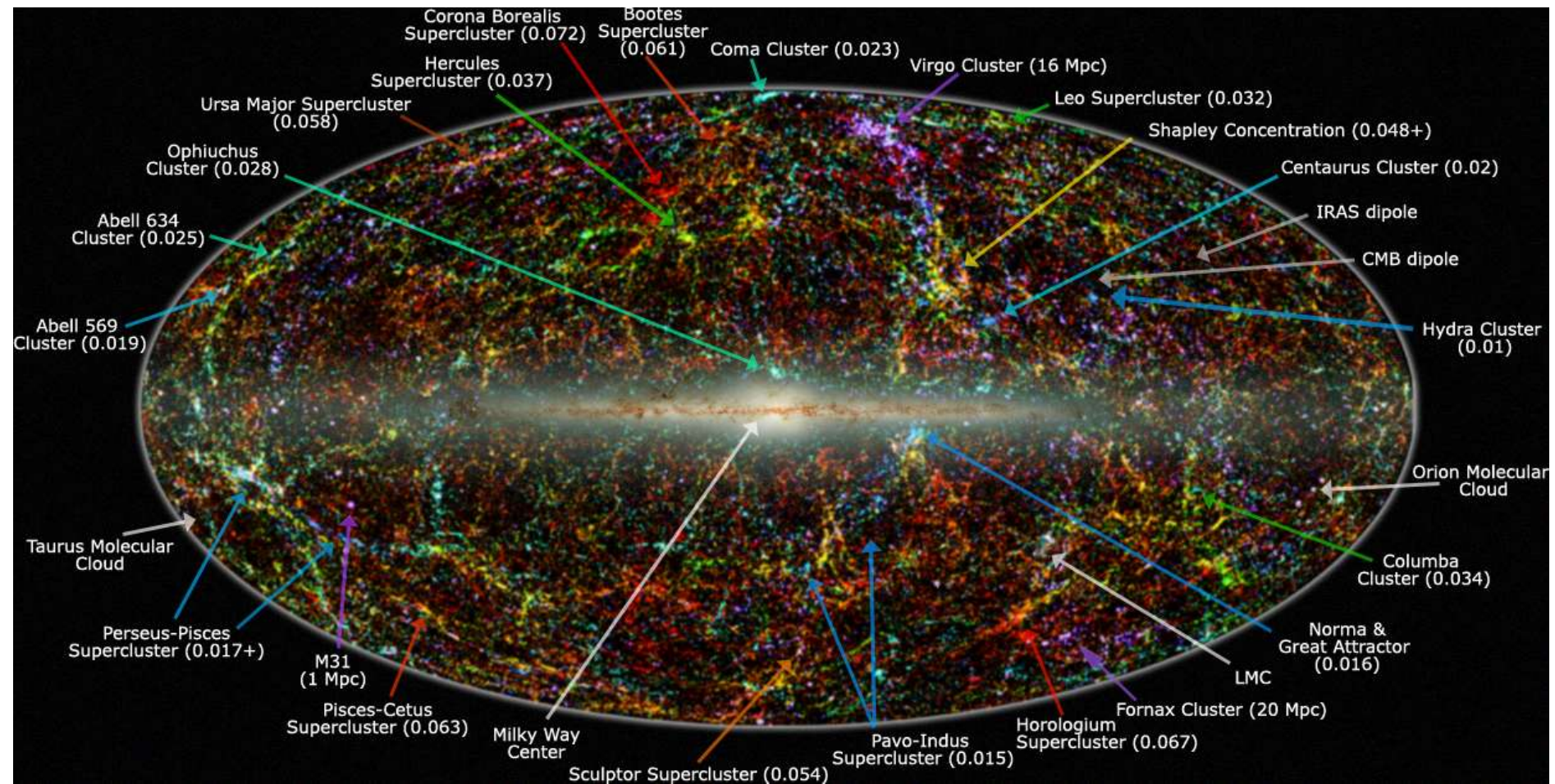
<http://discovermagazine.com/2002/apr/cover/?searchterm=Guth%27s%20Grand%20Guess>

Producing order from an expansion

The universe is structured

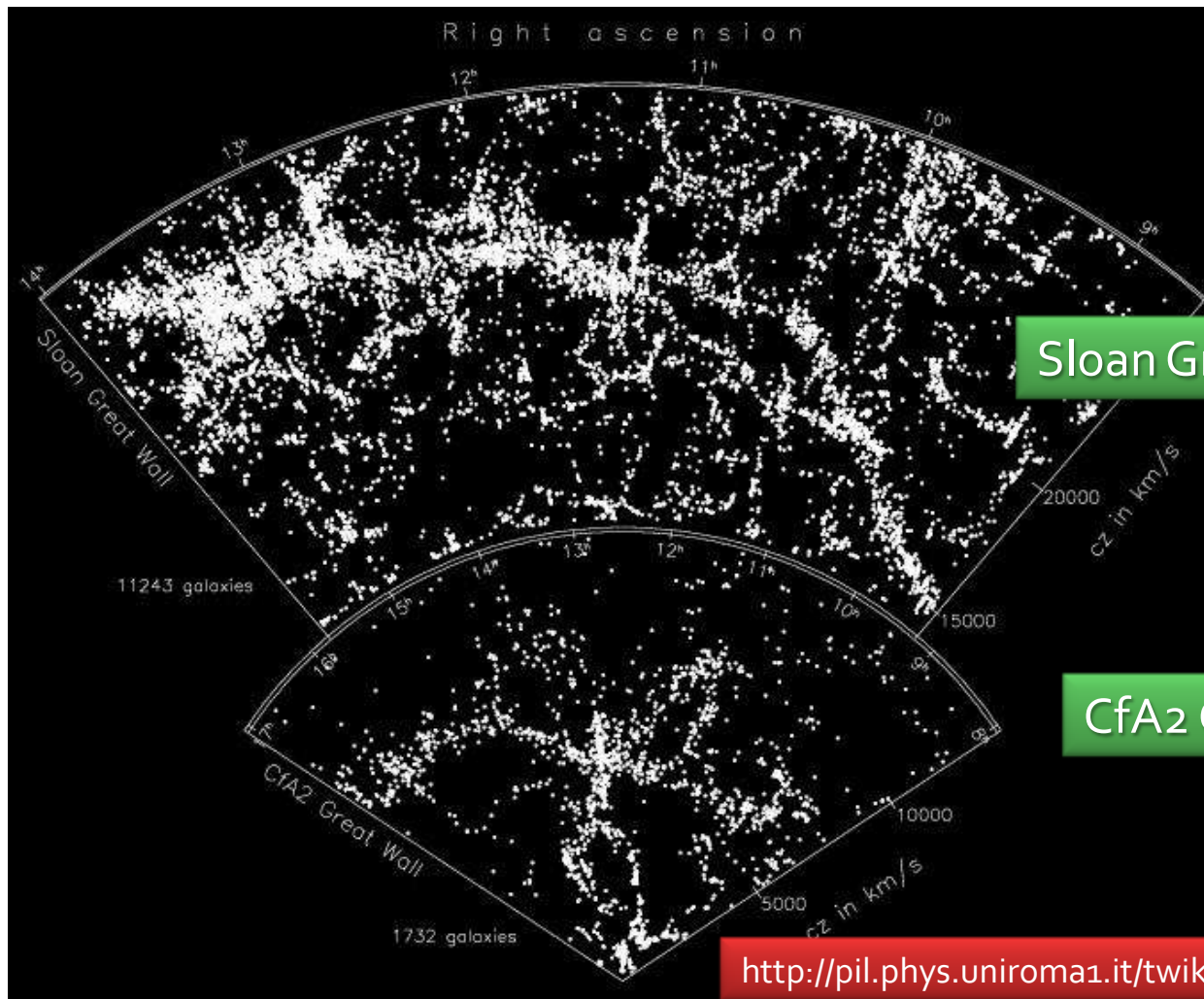
- Stars
- Organized into galaxies
- Form clusters
- Form filaments and superclusters
- Separated by immense voids
- Creating a “cosmic web”

Distribution of galaxies beyond the Milky Way



http://commons.wikimedia.org/wiki/File:2MASS_LSS_chart-NEW_Nasa.jpg

Large scale universal structures



Sloan Great Wall – 11,243 galaxies

CfA2 Great Wall – 1,732 galaxies

<http://pil.phys.uniroma1.it/twiki/bin/view/Pil/GalaxyStructures>

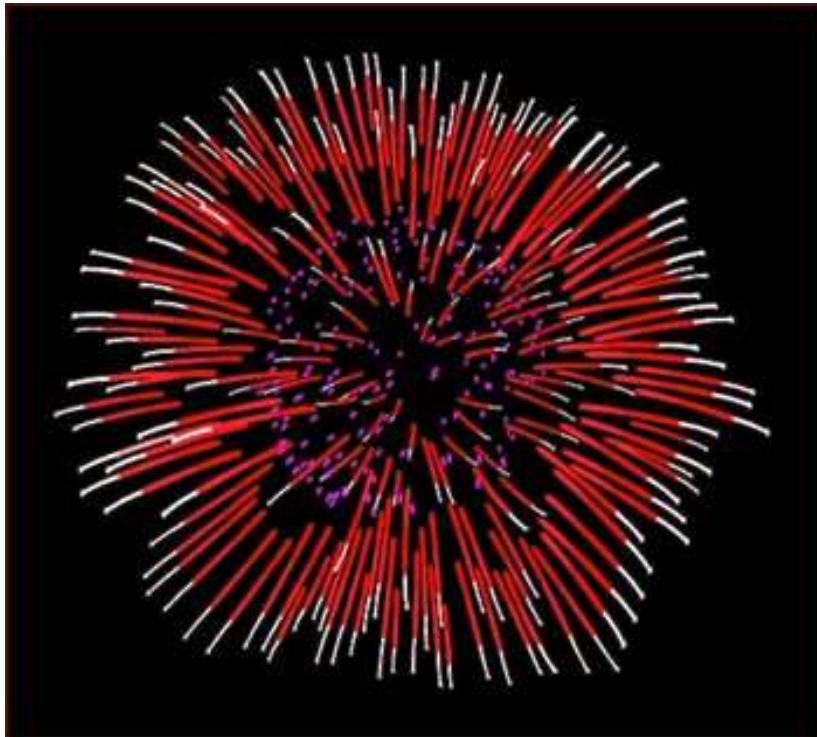
Big Bang scientific problems

Producing order from an expansion

- Sir Fred Hoyle put it succinctly when he referred to the Big Bang model as a
 - “dull-as-ditchwater expansion which degrades itself adiabatically [without loss or gain of heat] until it is incapable of doing anything at all. The notion that galaxies form, to be followed by an active astronomical history, is an illusion. Nothing forms; the thing is dead as a doornail”

Hoyle, Fred (1981), “The Big Bang in Astronomy,” *New Scientist*, 92:521-527, November 19

Structure cannot form from matter that is moving outward at high velocity



- There is no friction in space – no way to slow the particles
- Particles would maintain the same speed and direction forever
- Particles are traveling at high speed and getting further apart
- Particles will never change direction and form clumps
- Angular momentum (turning motion) is needed
- Particles could not even arrange themselves into simple atomic structures
- Gas molecules (hydrogen or helium) are widely separated in outer space
- Gas molecules do not clump, they push apart
- Gas clouds expand, they do not contract

Star formation

- “Despite numerous efforts, we have yet to directly observe the process of stellar formation.... The origin of stars represents one of the fundamental unsolved problems of contemporary astrophysics.”

Charles Lada and Frank Shu (both astronomers),
“The Formation of Sunlike Stars,” *Science*, 1990, p. 572.

Information problem

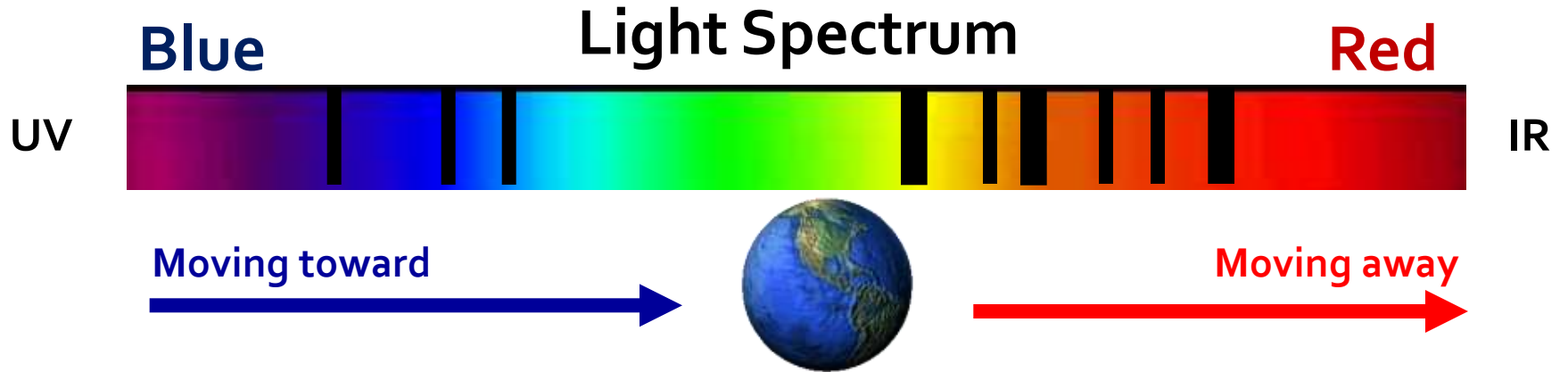
- Cosmic evolution (the Big Bang) has an “information problem”, similar to biological evolution – how do atoms form into complex ordered structures?

Cosmic evolution	Biological evolution
The formation of the initial energy/matter is a big question	The formation of first life is a big question
Gravity operating on density variations is said to form stars and eventually higher-order structures	Natural selection operating on mutations is said to form higher-order life
This has never been observed and seems to be scientifically impossible as outwardly moving particles will never clump together	This has never been demonstrated and seems to be scientifically impossible as coded information comes only from a mind

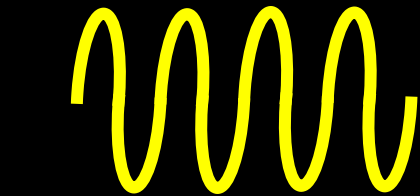
Big Bang does not match scripture!

Big Bang	Scripture
Elements beyond hydrogen and helium formed after millions of years	All elements made together
Earth formed long after stars	Earth formed before stars
Plants evolved after the sun	Plants formed before the sun
Sun formed before the earth	Sun formed on the fourth day after the earth
Sun formed from older stars together	Sun, moon and stars formed

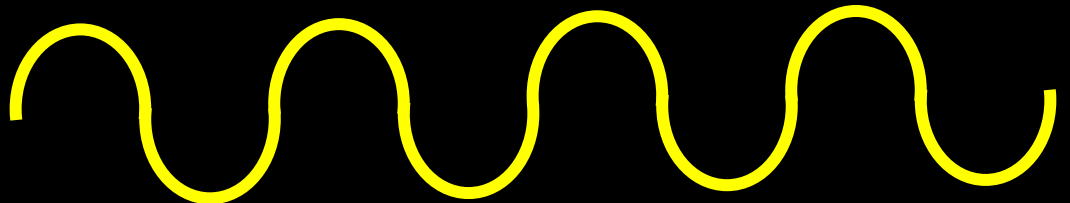
Redshift of starlight



Describes the expansion of the universe
The distance of a galaxy from the earth



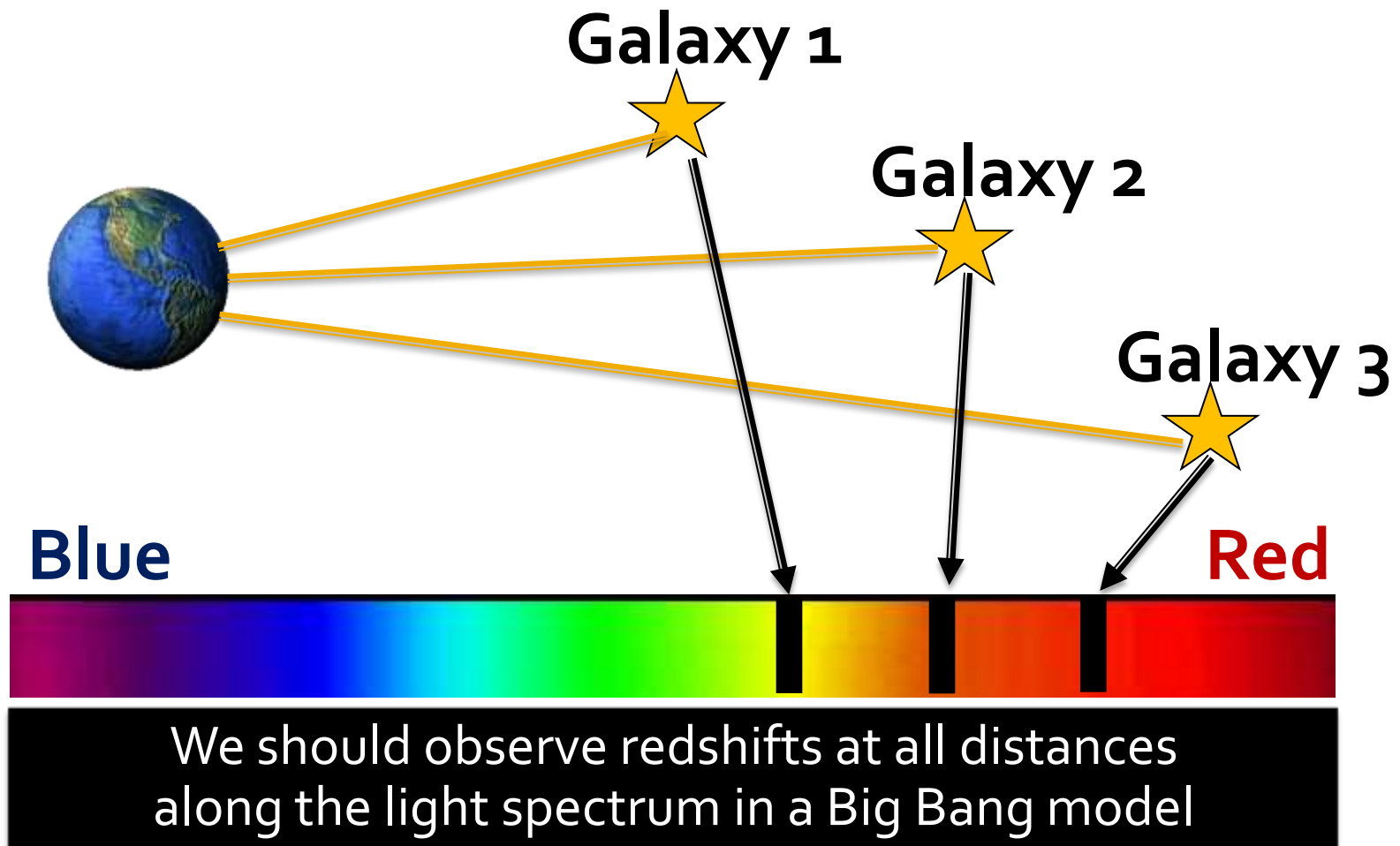
Compressed (blue side)



Stretched (red side)

From "Astronomy and the Bible", Mike Riddle

Redshift interpretation



Redshift values

Blue

Red



What we observe

Big Bang model predicts a homogeneous universe

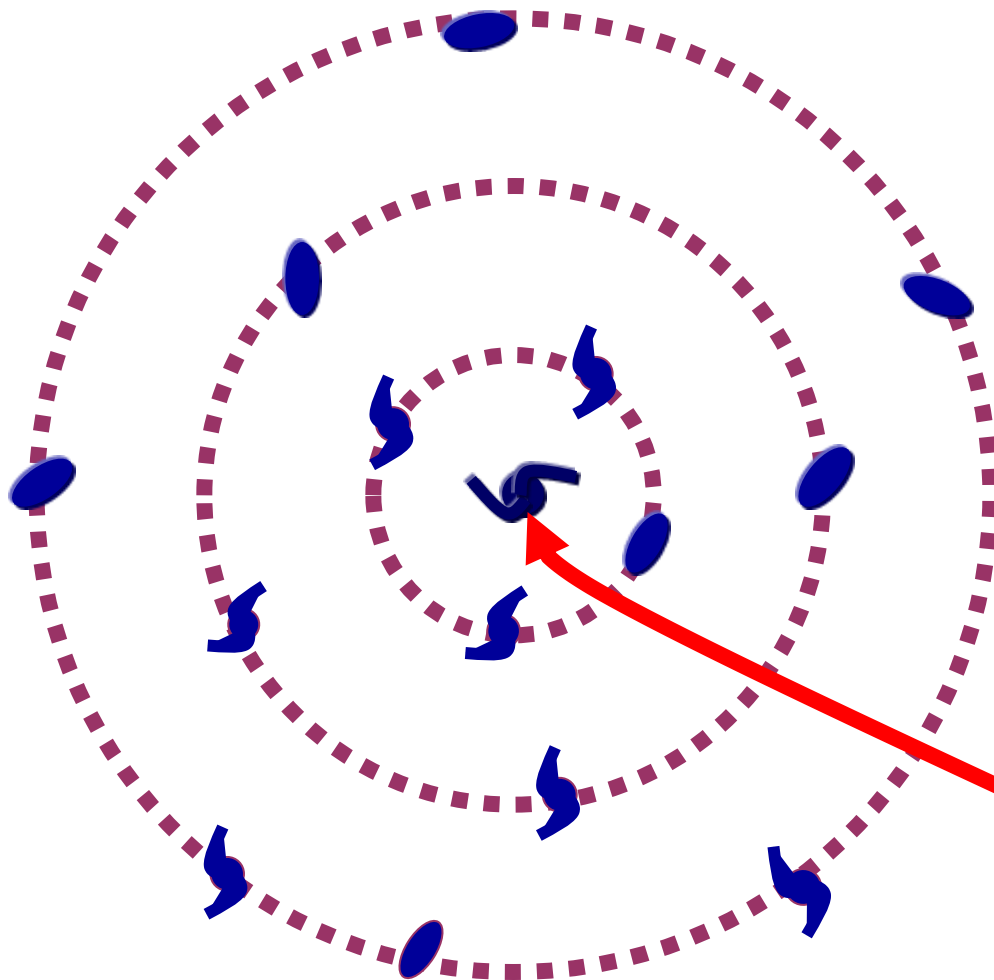
Blue

Red



Distinct quanta (one million light year intervals)

Redshifts and galaxy distances



Concentric circles one million light years apart

Secular scientists claim this effect is actually minimal and can be explained by galaxy clustering

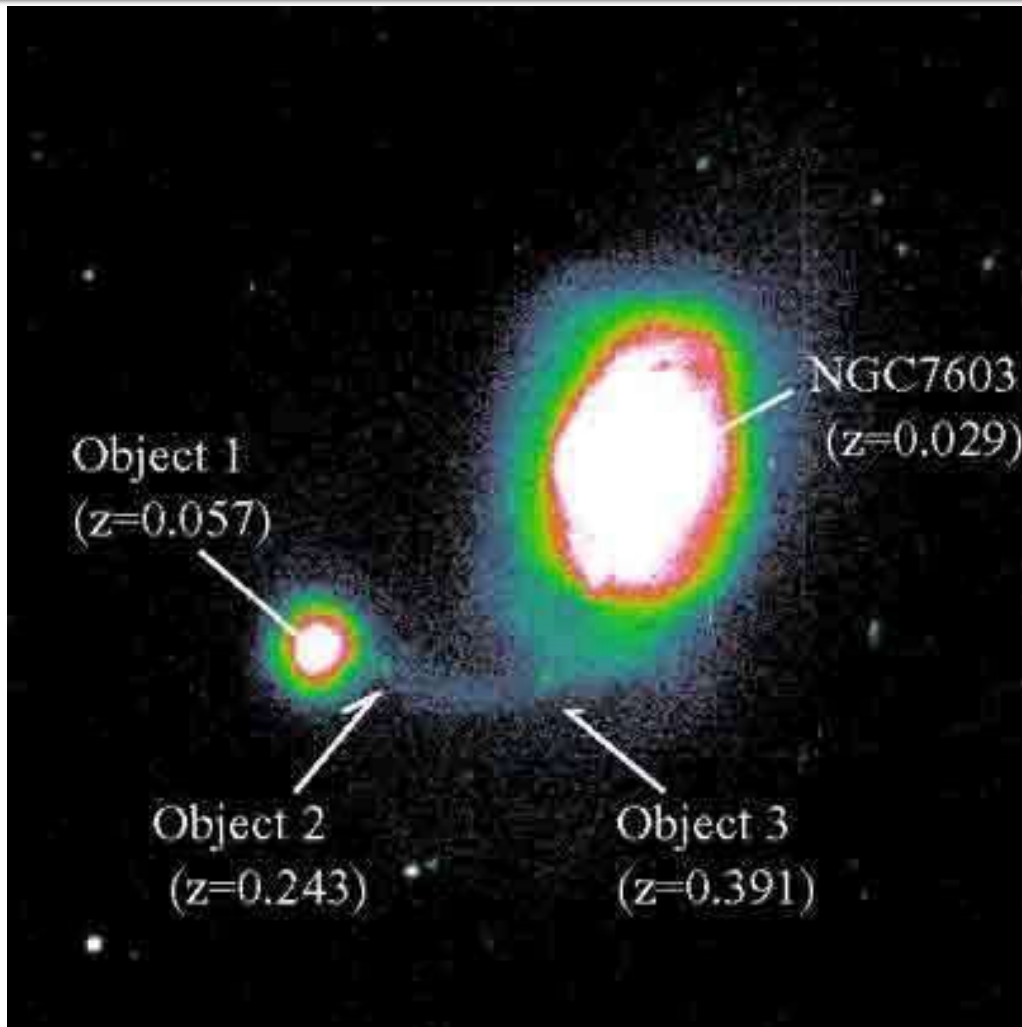
Milky Way

Implications of quantized redshifts

- “The fact that measured values of redshift do not vary continuously but come in steps – certain preferred values – is so unexpected that conventional astronomy has never been able to accept it, in spite of the overwhelming observational evidence.”

Halton Arp (Staff astronomer at the Mount Wilson and Palomar Observatories for 29 years), *Quasars, Redshifts and Controversies*, 1987, p. 195.

Discordant redshifts (Halton Arp)



Z = redshift value
Higher value = further away

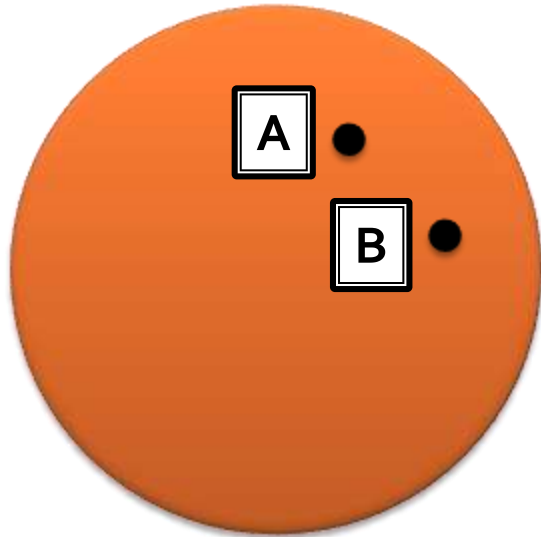
Two galaxies connected by luminous bridge have different redshifts

<http://davidpratt.info/bol.htm>

The horizon problem

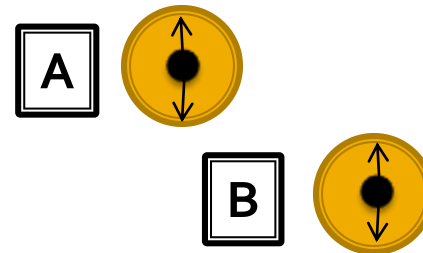
How can A & B have uniform temperatures if they have never communicated? (solved by inflation?)

Big Bang expansion



A & B have different random temperatures

Maximum distance light could have travelled since



A & B became far apart due to expansion. Not enough time for light to travel between A & B and establish equilibrium temperature

Distant starlight from a young age biblical perspective

What creationist theories have been proposed?

What is the biblical purpose of the universe?

Practical

- “And God said, “Let there be lights in the vault of the sky to separate the day from the night, and let them serve as signs to mark sacred times, and days and years, and let them be lights in the vault of the sky to give light on the earth.” – Genesis 1:14-15

Theological

- “The heavens declare the glory of God; the skies proclaim the work of his hands.” – Psalm 19:1

Young or Old? The options

- ① The universe and earth are actually old
 - Standard science: universe 13.7 billion years, earth 4.5 billion
- ② The universe and earth are actually young but appear old (mature)
 - This is a “classic” creationist view that is still popular
- ③ The universe and earth are actually young and appear young if data is interpreted properly
 - This view was popular recently but less so today
- ④ The universe is old but the earth is young from the reference point of the earth, due to relativistic time effects or simple time-keeping conventions
 - This view is increasingly popular today and is the subject of much research

Some starting points for biblical “young age” creationists

- The six days of Genesis 1 are to be taken as 24-hour days, as a straightforward reading would indicate
- The universe really is very big - billions of light-years in extent, much bigger than the approximate 6,000 year history indicated by the biblical chronologies
- The earth is a special place to God because mankind lives here - so earth could be near the physical center of the universe
- God exists outside of time
 - 2 Peter 3:8b: “With the Lord a day is like a thousand years, and a thousand years are like a day”

Biblical references to the universe being “stretched out”

- **Job 9:8** - He alone stretches out the heavens
- **Ps 104:2** - He stretches out the heavens like a tent
- **Isa 40:22** - He sits enthroned above the circle of the earth, and its people are like grasshoppers. He stretches out the heavens like a canopy, and spreads them out like a tent to live in.
- **Isa 42:5** - He who created the heavens and stretched them out
- **Isa 45:12** - My own hands stretched out the heavens
- **Jer 10:12** - [God] stretched out the heavens by his understanding
- **Zec 12:1** - The LORD, who stretches out the heavens

Meaning of “Day” in Genesis 1

- Calendar-Day Interpretation
 - Literal, 24-hour view
- Day-Age Interpretation
 - Each “day” is a period of indefinite length
- Framework Interpretation
 - The creation week is a metaphor with exact timings unspecified
- Analogical Days Interpretation
 - Each “day” is God’s workday, successive periods of unspecified length

Distant starlight needs
an explanation

Genesis 1

© AIG 2002

vs.5

And God called the light Day, and the darkness he called **night**.

And the **evening** and the **morning** were the **first day**.



vs.8

And God called the firmament Heaven.

And the **evening** and the **morning** were the **second day**.



vs.13

And the **evening** and the **morning** were the **third day**.



vs.19

And the **evening** and the **morning** were the **fourth day**.



vs. 23

And the **evening** and the **morning** were the **fifth day**.



vs. 31

And God saw every thing that he had made, and, behold, it was very good.

And the **evening** and the **morning** were the **sixth day**.



AiGCREATIONS

www.AnswersInGenesis.org

USES OF "DAY" OUTSIDE OF GENESIS 1

©AIG 2001

A "DAY" + NUMBER

- 410 TIMES (in plural or singular)
- **ALWAYS** means an ordinary day!

B "EVENING" & "MORNING" TOGETHER WITHOUT "DAY"

- 38 TIMES
- **ALWAYS** means an ordinary day!

C "EVENING" OR "MORNING" WITH "DAY"

- 23 TIMES each
- **ALWAYS** means an ordinary day!

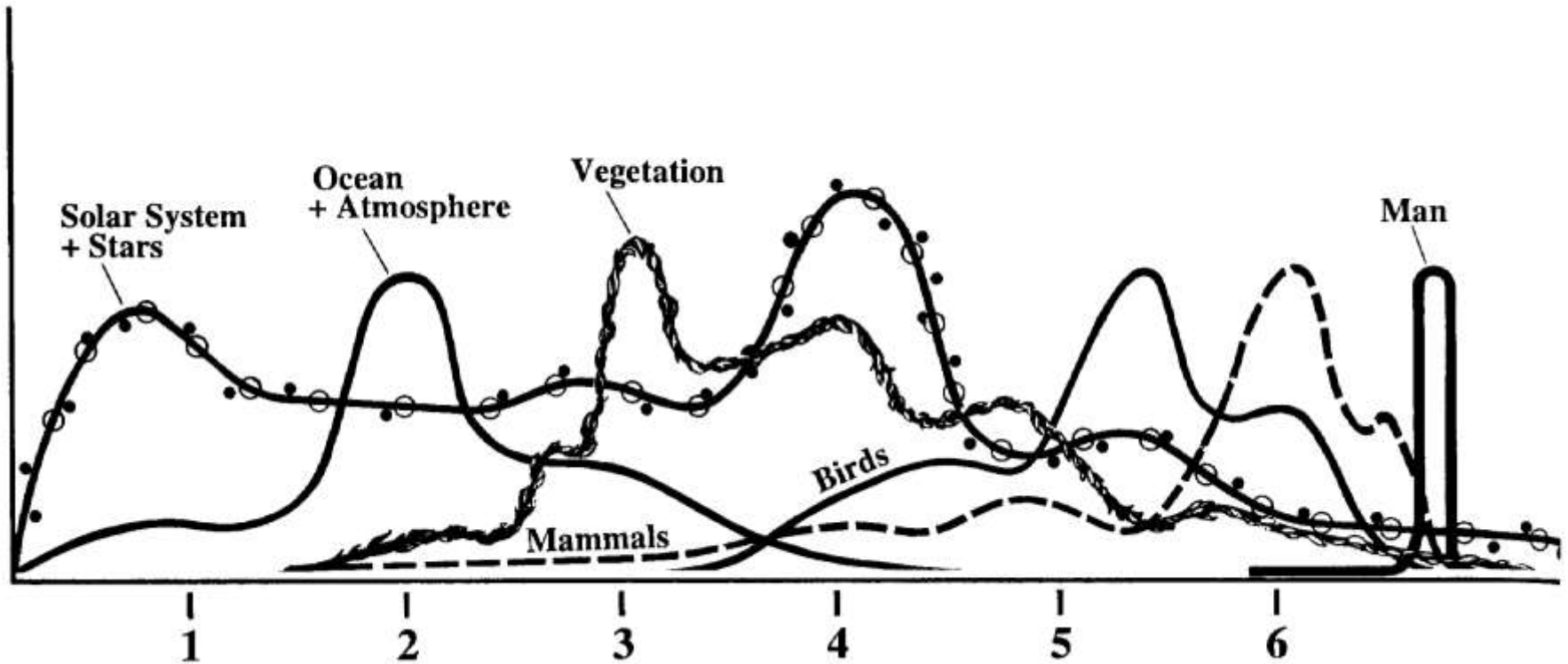
D "NIGHT" WITH "DAY"

- 52 TIMES
- **ALWAYS** means an ordinary day!

AiGCREATIONS

www.AnswersInGenesis.org

Day-Age Theory: Overlap of the days

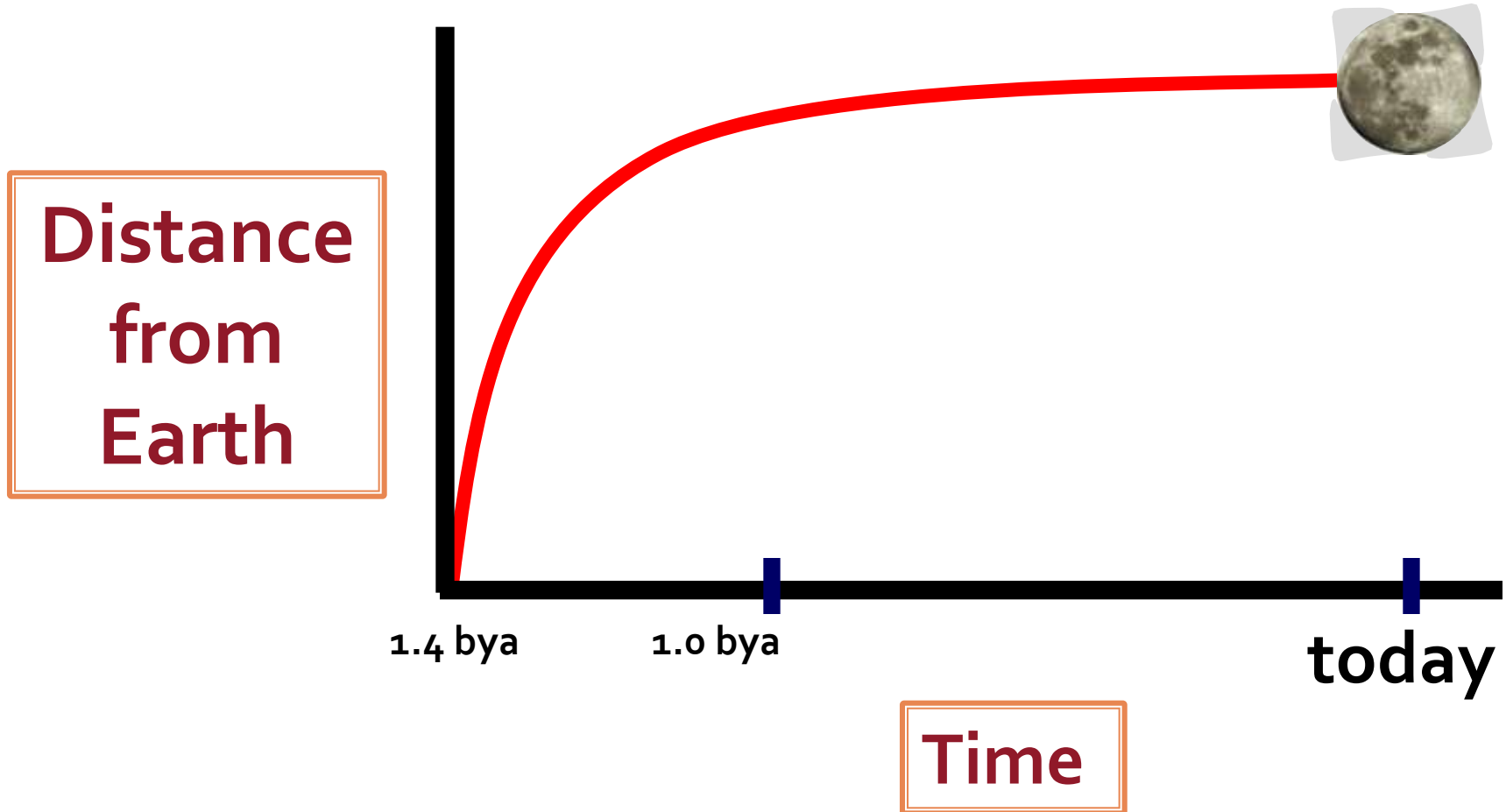


From "The Young Earth", Morris, p. 34

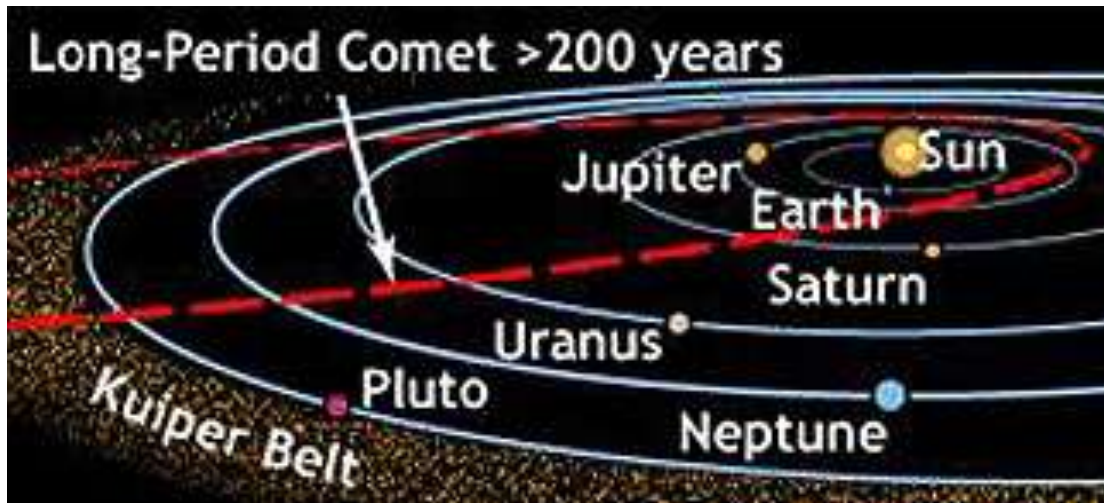
Theological difficulties with non-calendar day interpretations

- “God saw all that he had made, and it was very good.” – Genesis 1:31
- “Therefore, just as sin entered the world through one man, and death through sin, and in this way death came to all people, because all sinned” – Romans 5:12
- If God used cosmic and biological evolutionary processes, He could have/would have clearly told us so
- If Genesis chapters 1-11 are not historical, it places doubt on the remainder of the Bible

Young Solar System evidence: Recession of the Moon



Young Solar System evidence: Long period comets



These > 500 comets require the existence of the untestable "Oort Cloud".

"As yet, no Oort Cloud object *as it resides now within the Oort Cloud* has been imaged by either ground-based telescopes or the HST owing to their small sizes and great distances from Earth."

http://rst.gsfc.nasa.gov/Sect19/Sect19_22.html

Creationist theories

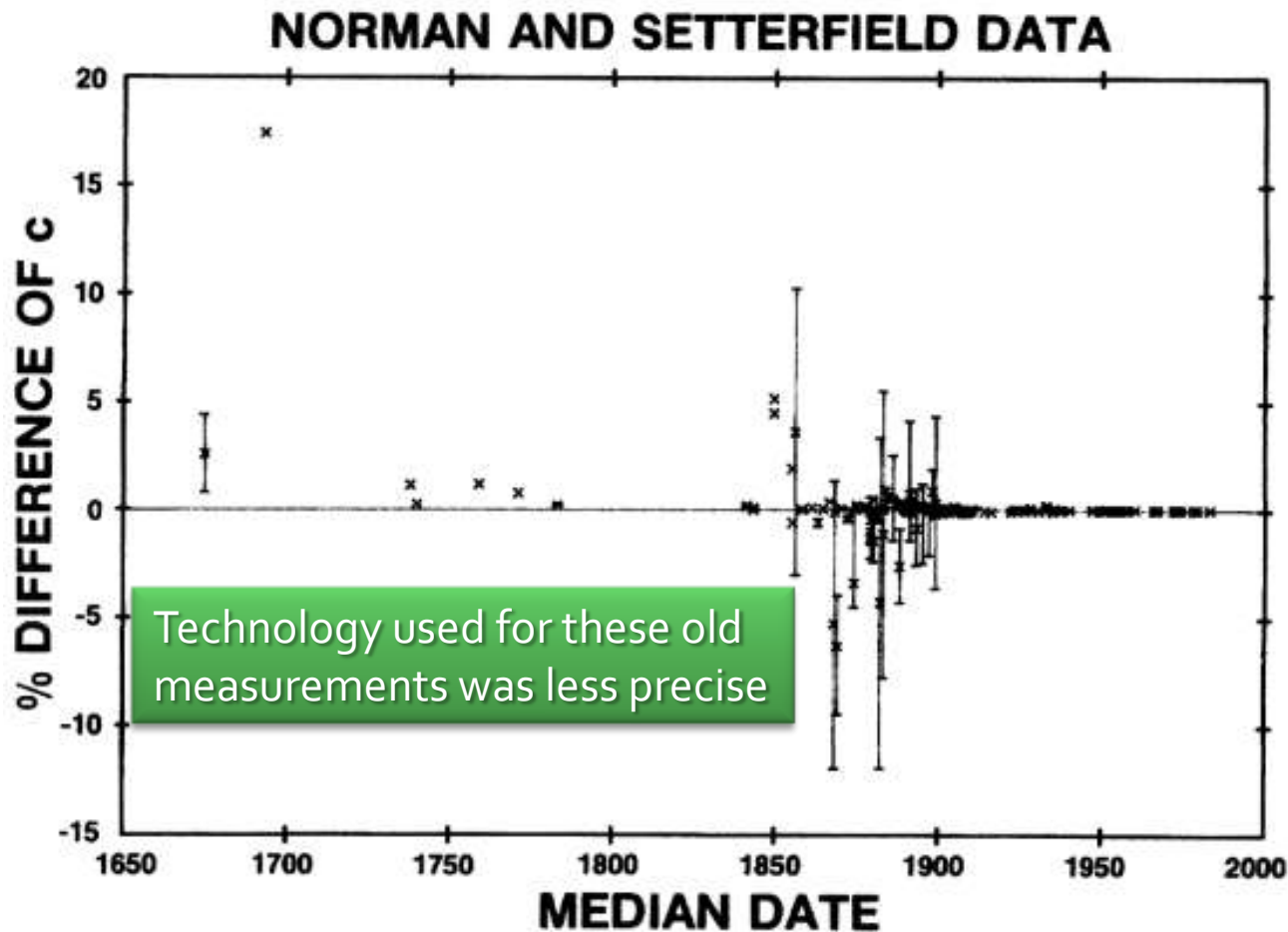
1. Speed of light was greater in the past
 - Norman and Setterfield 1987
2. Mature creation - light created in transit
 - DeYoung 2010
3. Instantaneous speed of light using different convention of simultaneous events
 - Lisle 2010
4. General relativity with appropriate boundary conditions
 - Humphreys 1994
5. General relativity timelessness
 - Humphreys and Vardiman 2010
6. General relativity with appropriate extensions
 - Hartnett 2007

1. Speed of light was greater in the past

Norman and Setterfield 1987

- **Summary:** Possibly the speed of light was much faster in the past, particularly during the creation week
 - First proposed by Barry Setterfield in 1981
 - Measurement plots from 1667-1960's seemed to show a decrease in c
 - However, when a more complete set of measurements is included this effect disappears
 - This explanation for distant starlight is not a good argument and was rejected by the *Institute for Creation Research* in a May 1988 article

When the data set of 163 points is analyzed using the standard, weighted, linear least squares method no decay trend is seen



<http://www.icr.org/index.php?module=articles&action=view&ID=283>

2. Mature creation – light created in transit

DeYoung 2010

- **Summary:** As the original biosphere is described in Genesis 1 as being mature and ready for use, so likewise the universe was created mature and ready to serve its purposes
 - A mature creation concept has a rich history with Bible scholars and even renaissance artists
 - We can see distant starlight because it was created “in transit”
 - Starlight contains a “virtual history” consistent with what may have been observed in the Garden of Eden (e.g. the trees may have had tree rings)
 - This history of information embedded within the light waves is not a deception because God tells us in Genesis what He did

“Mature creation and seeing distant starlight”, Don B. DeYoung,
Journal of Creation, Vol. 24(3) 2010

Creation of Adam, Michelangelo

Adam is shown with a navel



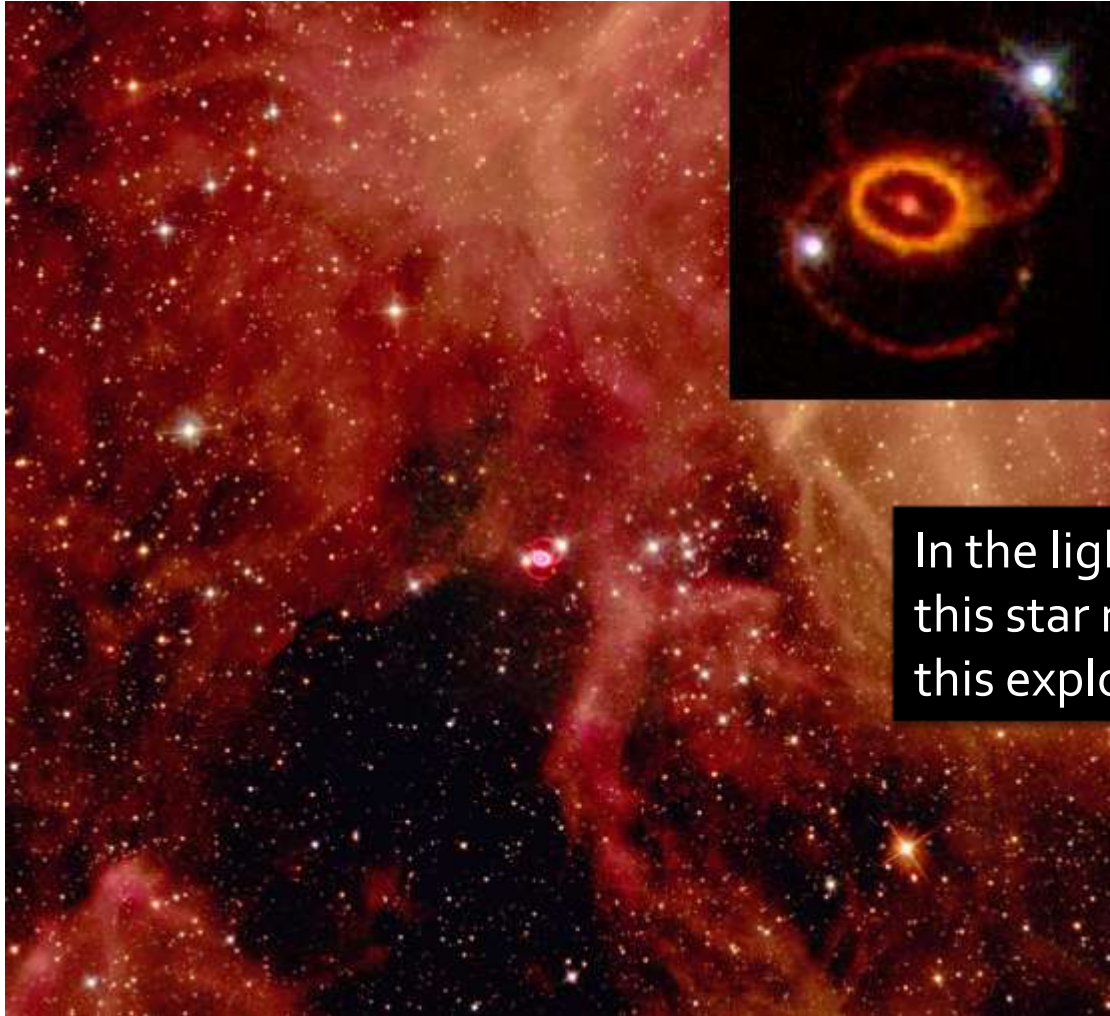
Issues

- It does not offer any technical explanations and “takes the easy way out”
 - But the creation week is in fact a miraculous supernatural event which may be beyond our understanding and scientific analysis
- At what point does the built-in appearance of age cease? Extending the concept, might all of history both on earth and in the heavens be false?
 - But appearance of age is not an issue if it is limited to events in the Bible that are clearly miraculous in nature

Issues

- It would be deceitful for God to create an unreal history
- ➔ ■ But every single component of any conceivable supernatural creation faces this “problem” (even a pebble lying on the ground in the Garden of Eden)
- It makes astronomical inquiry futile
 - But the creation was made “coherently mature”, so studying of real and virtual events will produce the same scientifically valid conclusions
 - Virtual events (like distant starlight) are real events in the mind of God

Supernova 1987A



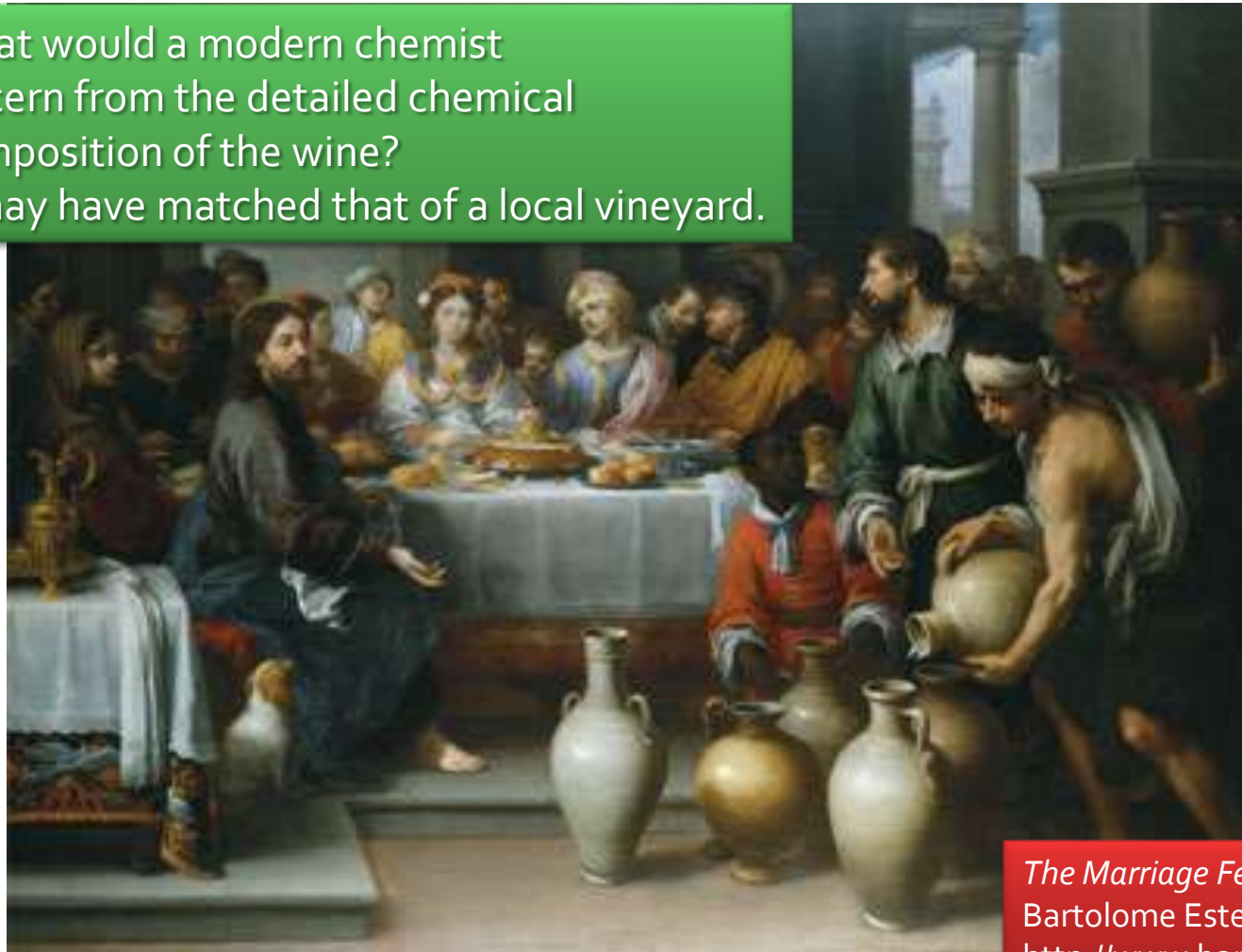
In the light-in-transit model
this star never actually existed and
this explosion never really happened

<http://www.romesg.com/?p=313>

First miracle of Jesus

Water into wine

What would a modern chemist discern from the detailed chemical composition of the wine?
It may have matched that of a local vineyard.



The Marriage Feast at Cana (1672)
Bartolome Esteban Murillo
<http://www.barber.org.uk/479.html>

3. Choice of convention for synchronizing clocks

Lisle 2010

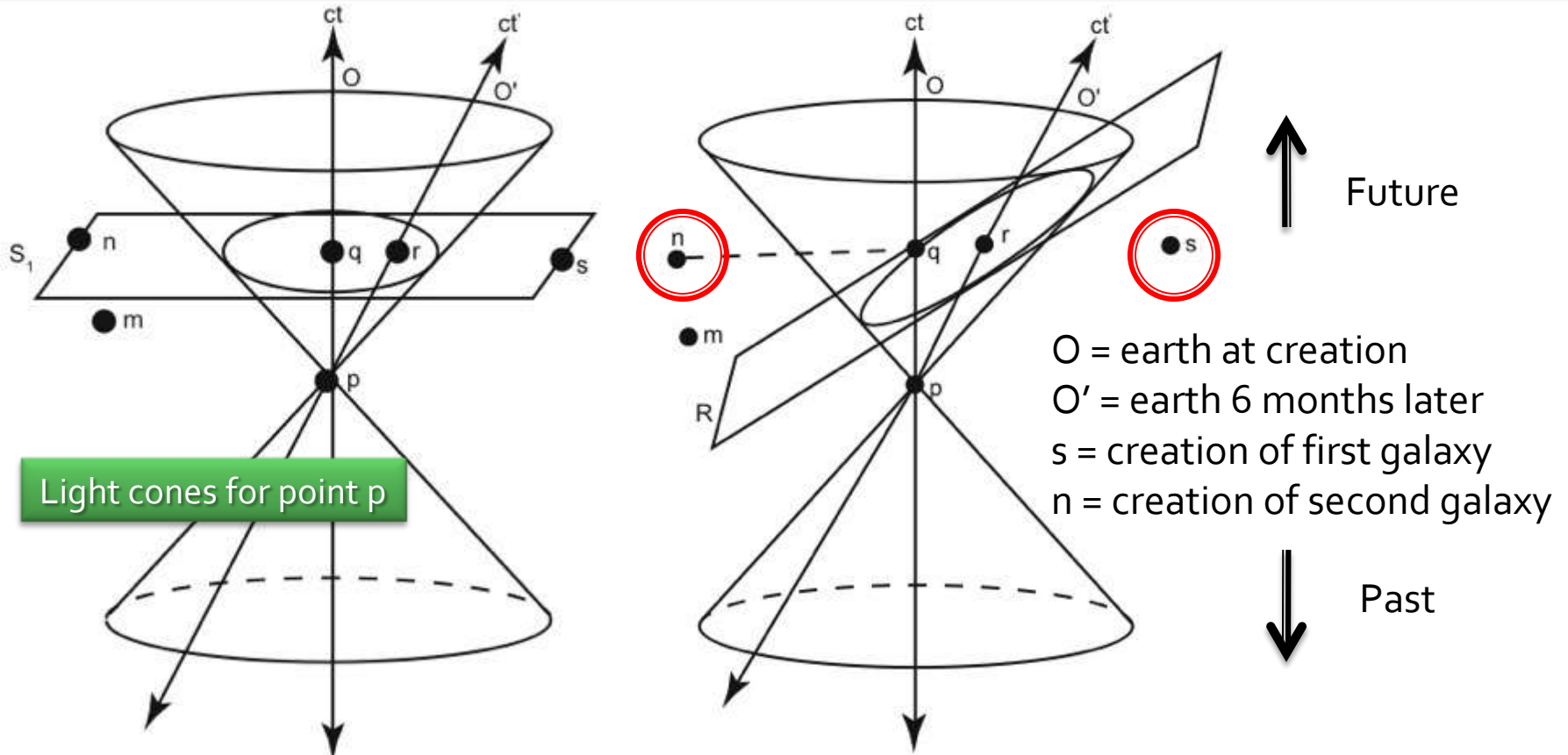
- **Summary:** The stars were created on the fourth day to fulfill their purpose immediately, therefore the light emitted by the stars must have reached the earth instantaneously
 - If the Bible is using an anisotropic synchrony convention (ASC) the creation of a star on day four happens at essentially the same time as the light from that star reaching earth
 - The Bible would seem to use ASC to mark time in Genesis
 - The one-way speed of light is not a constant of nature but is a matter of convention
 - Under ASC light is essentially infinitely fast when moving directly toward the observer

<http://www.answersingenesis.org/articles/arj/v3/n1/anisotropic-synchrony-convention>

The relativity of simultaneity

- The relativity of simultaneity (being observer dependent) under standard Einstein synchronization is well-known and represents a problem for a six-day creation as these days become spread out over millions of years when the earth changes direction in its annual orbit

Einstein synchronization problem for six-day creation



O = earth at creation
 O' = earth 6 months later
 s = creation of first galaxy
 n = creation of second galaxy

Events in S_1 are simultaneous with q and r for observer O (s and n are simultaneous on earth on day four)

Events in R are simultaneous with r as observed by O' (after 6 months s and n are not simultaneous, s is 2.6 million years in the past and n has not happened yet!)

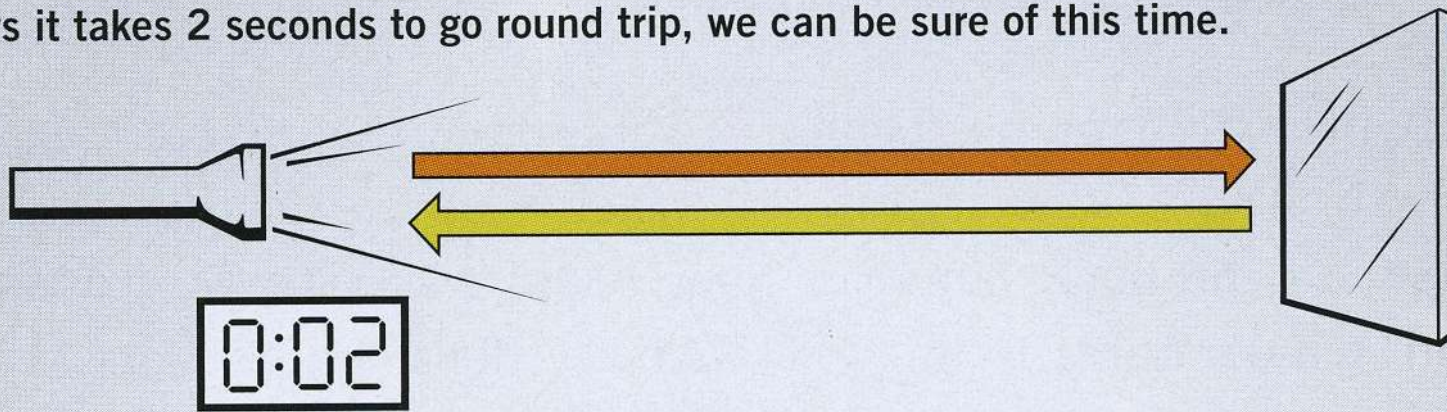
What is the ASC?

- This theory defines an ASC (Anisotropic Synchrony Convention) where light travels at different speeds depending on its direction or position relative to an observer
- It has the unique feature that observers at the same location all agree on which events are simultaneous regardless of the velocity of the observer (the standard Einstein synchrony convention lacks this feature)

Speed of light can be measured round-trip

WHAT WE KNOW ABOUT THE SPEED OF LIGHT

We can calculate the round-trip speed of light. Let's say, for example, we shine a light down a long hallway and it reflects off a mirror. If our stopwatch says it takes 2 seconds to go round trip, we can be sure of this time.

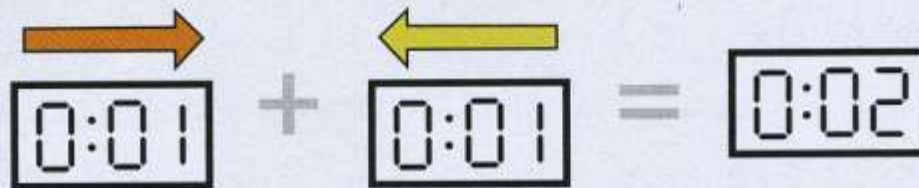


Time each way is uncertain

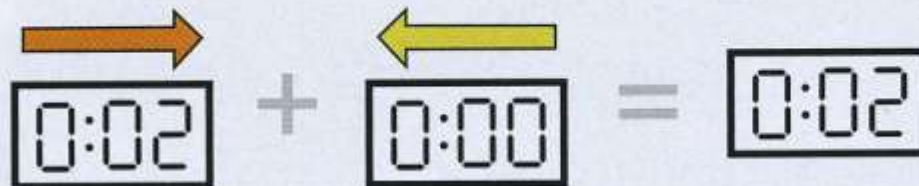
WHAT WE DON'T KNOW . . .

While we can be certain of the round-trip time, we cannot be certain of the time it took the light to travel to the mirror or the time it took to return.

- We might *assume* it takes light an equal amount of time to travel each direction.



- However, the light could travel at different speeds for each direction.

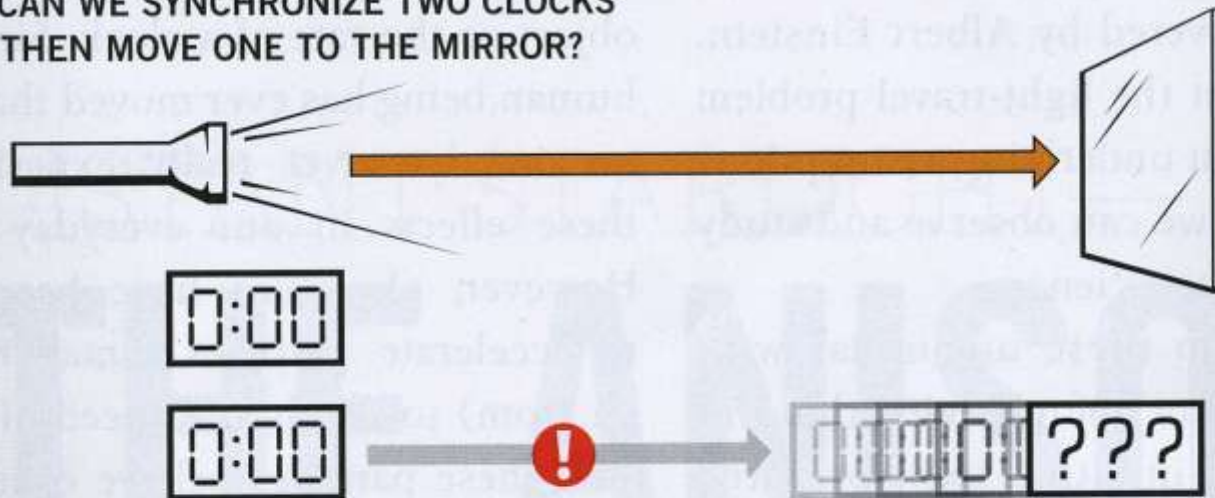


Cannot measure the one-way speed of light by synchronizing two clocks and moving one

FINDING THE ONE-WAY SPEED OF LIGHT . . .

In order to avoid assuming the time for one-way speed of light, we need to be able to measure the one-way trip. But it is impossible because moving a clock to the mirror may change the time on the clock!

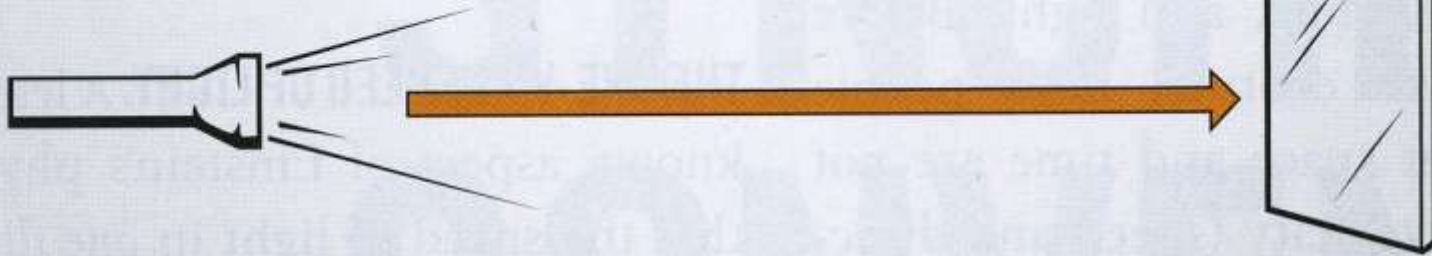
- CAN WE SYNCHRONIZE TWO CLOCKS THEN MOVE ONE TO THE MIRROR?



No. According to Einstein, travel affects time, so we cannot be certain the clocks are still in sync after one moves to the mirror.

Cannot measure the one-way speed of light by synchronizing two clocks at a distance

- CAN WE MOVE ONE CLOCK TO THE MIRROR THEN SYNCHRONIZE THEM?



0:00



???

No. When one clock sends a radio signal to the other clock at the speed of light, we can't be sure how long the signal took unless we already know the one-way speed of light!

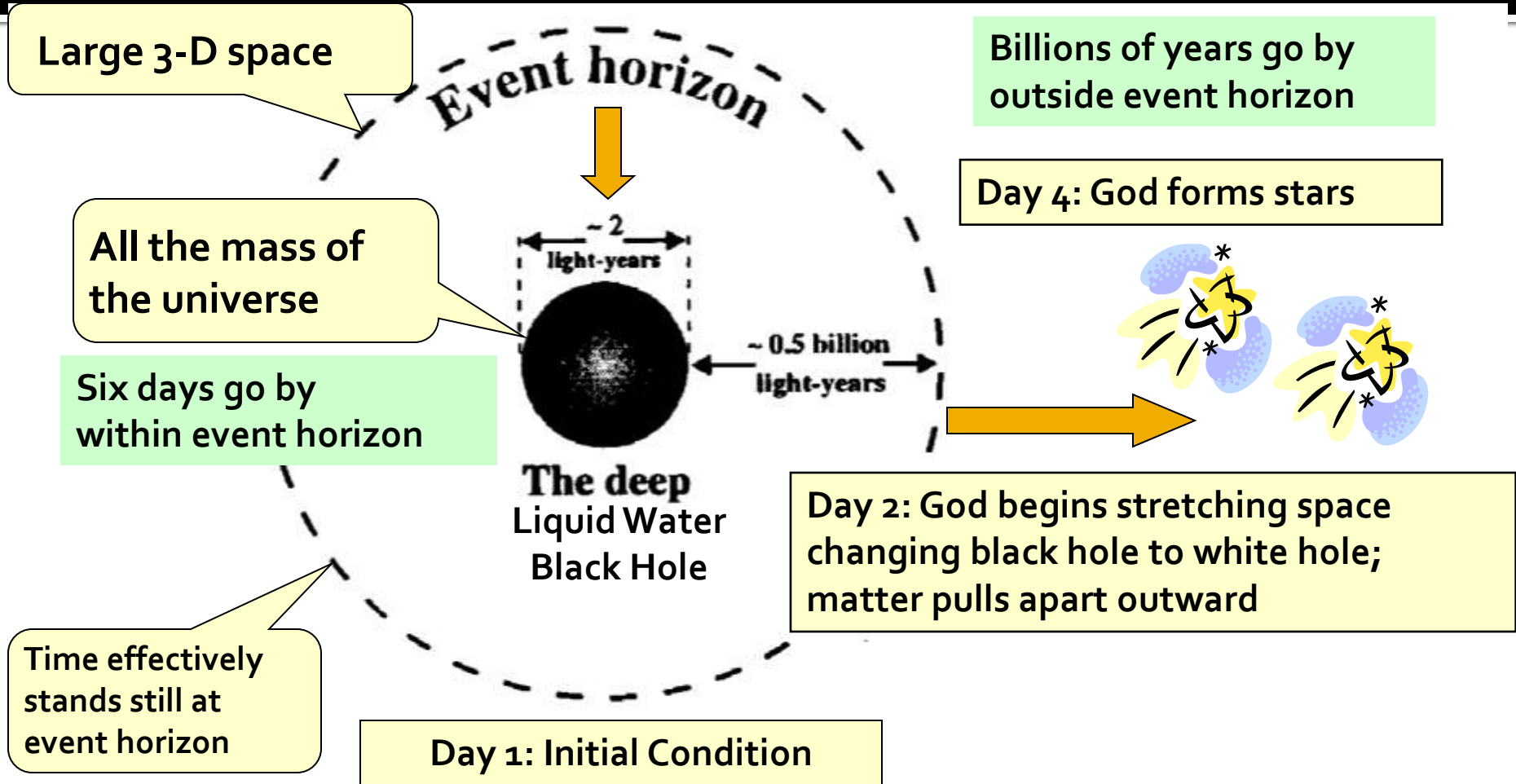
4. General relativity theory with appropriate boundary conditions

Humphreys 1994

- **Summary:** Based on general relativity theory, billions of years can pass in the universe while only six days pass according to clocks on earth
 - Assumes that “the deep” was a liquid ball of water a few light years in diameter
 - God stretched out the deep and formed the stars
 - Due to relativistic time dilation effects, a shrinking “event horizon” causes time to pass much faster outside the horizon, giving distant light time to travel to earth on day four



White Hole Cosmology



Issues

- It is not clear that enough time dilation would have occurred
- Difficulties occur when considering the Milky Way Galaxy (the “near” universe)
 - Would lead to large distortions which are not observed
 - Would require our Solar System to be (supernaturally) suspended in a timeless bubble orbiting the galaxy for several billion years before being released during the creation week

5. General relativity timelessness

Humphreys and Vardiman 1994

- **Summary:** On the fourth day of creation it took no time to make the stars and bring their light to earth, according to clocks on earth
 - This feature of time dilation is called achronicity or timelessness
 - It causes all physical process and therefore time to stop in a region that could be very large
 - A timeless sphere moved inward from the outer universe to the earth as waves of new creation by God took place
 - This is a re-working of Humphreys original model to eliminate the issues

Basic concepts

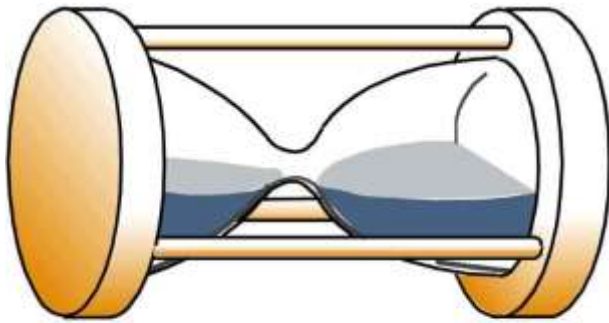


Figure 1. Time stops when all physical processes stop.



*Figure 2. Rolling up the heavens like a scroll.
Galaxy image: M81, Spitzer Space Telescope.*

Space is not empty – it is a material that we cannot see or feel. The heavens are thin in a fourth dimension we cannot see, but which God can manipulate.

Comparing space to a trampoline

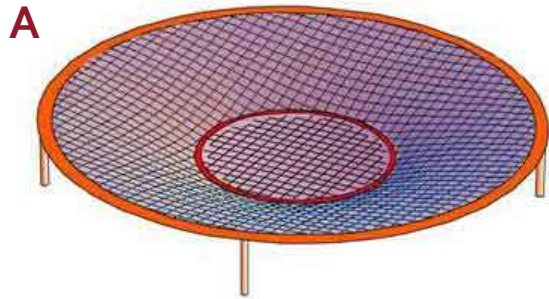


Figure 3. Heavy ring (red) inside the orange circular frame indents the fabric of a trampoline.

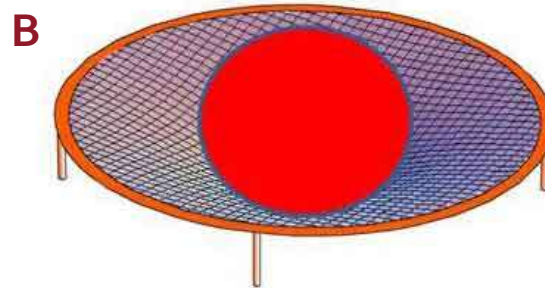


Figure 4. Heavy metal ball representing "the deep."

A. Presence of a mass bends the fabric of space

B. "The deep" was a ball of liquid water a few light years in diameter

C. God marks off a small region in the center of the deep, surrounds it with a thin region of space, and begins to carry the waters above the space outward

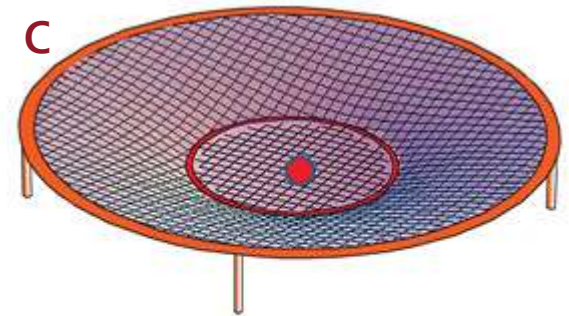


Figure 1. Trampoline with small ball and ring representing earth within an expanding shell.

On day four the earth enters a timelessness zone

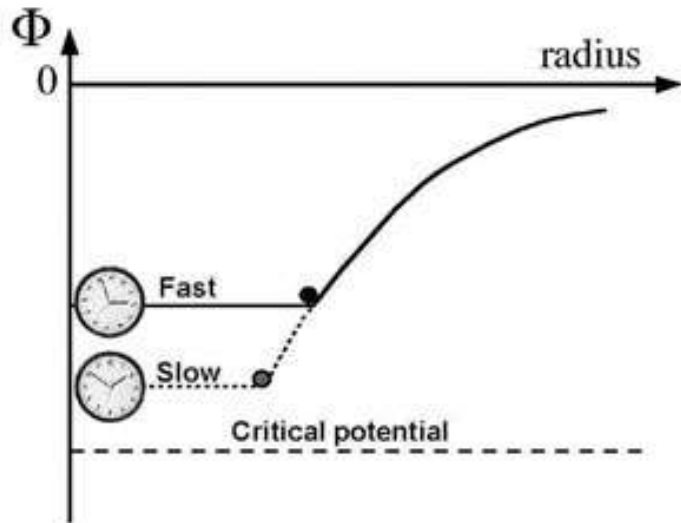


Figure 2. Time dilation depends on the depth of the gravitational potential energy.

Relative speed of clocks as a function of distance from the center of the cosmos where the initial mass was created

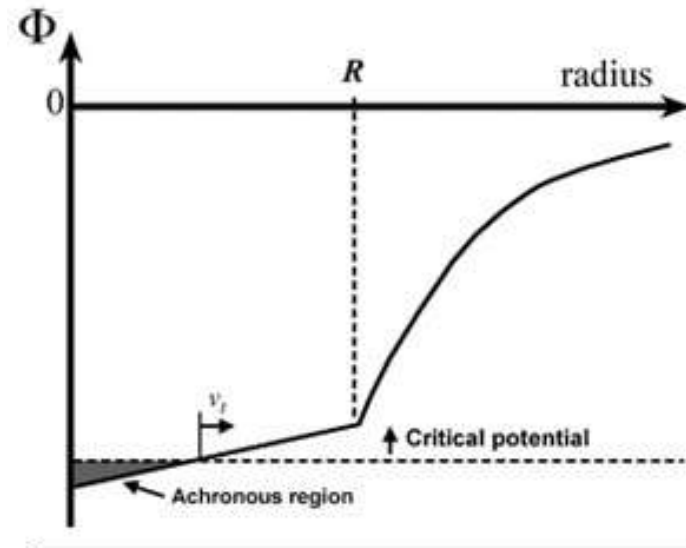
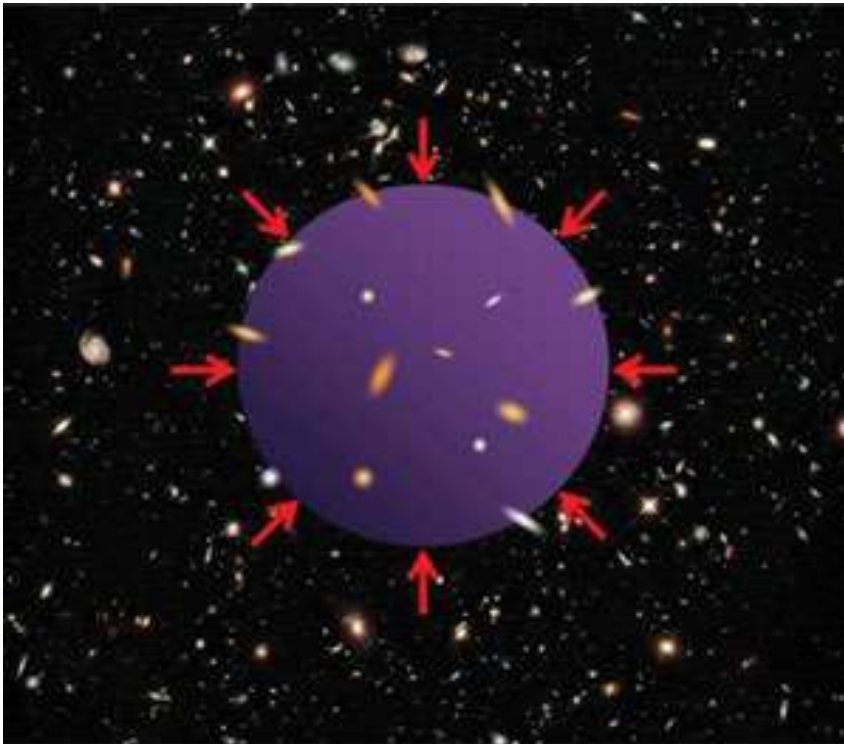


Figure 3. Rising critical potential level (or descending fabric of space) which, in turn, makes the achronous region expand with velocity v_t .

As God created the galaxy masses the fabric of space began sinking and the central part containing the earth dropped below the critical potential, into a timelessness zone

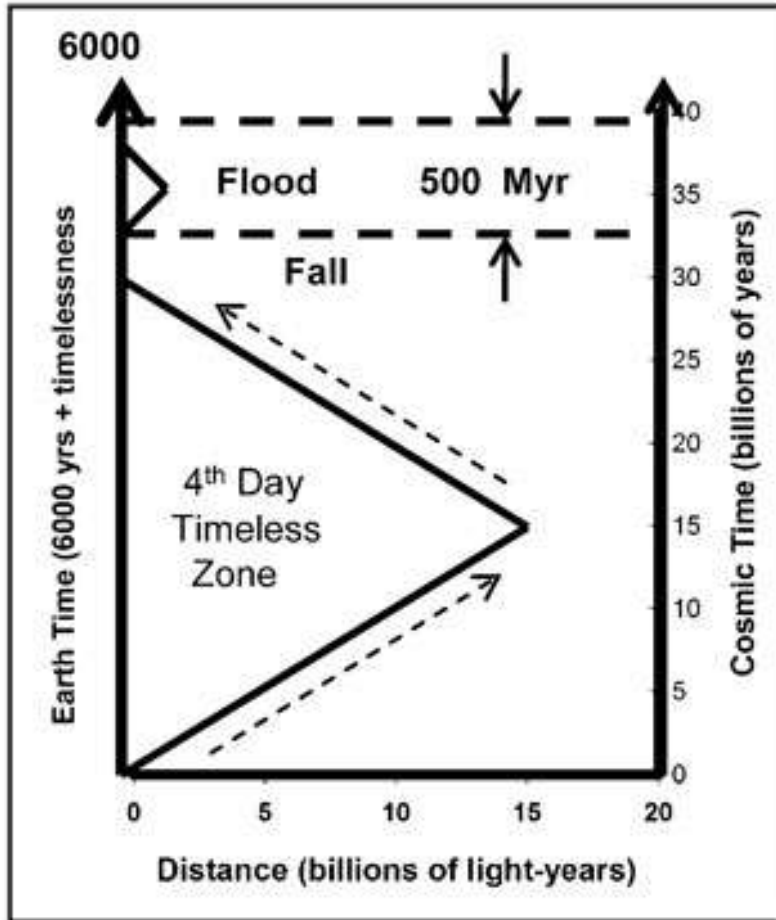
Distant starlight follows a shrinking timelessness sphere to earth during day four



The timeless sphere moves inward at the speed of light. Light from emerging created galaxies follows the sphere to the earth, even light that started billions of light years away!

Figure 4. Shrinking sphere of timelessness surrounded by newly emerged galaxies, some of whose light follows the sphere inwards at the same speed.

Timeless zone illustration



Timeless zone enable galaxy light to arrive on earth quickly due to the stretching of the heavens on day four

A secondary stretching event may have occurred during Noah's flood

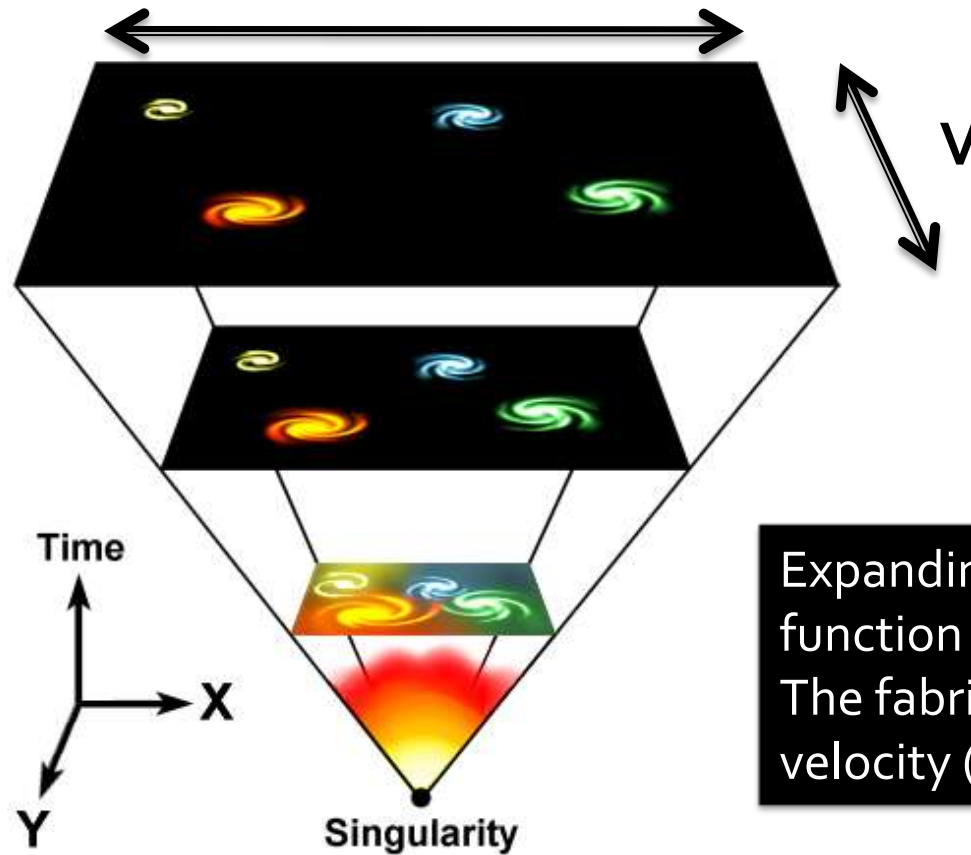
6. General relativity theory with appropriate extensions

Hartnett 2007

- **Summary:** Extension of work done by theoretical physicist Moshe Carmeli. The universe is an expanding white hole with our galaxy at the center.
 - The theory is a 5-dimensional modification and extension of Einstein's general theory ("spacevelocity" instead of "spacetime") – the fabric of space itself is expanding
 - Assumes a spherically symmetric, finite, bounded universe with the earth near the center
 - Does away with need for dark matter and dark energy
 - We are seeing the creation process in the heavens as it was happening on day four of the creation week

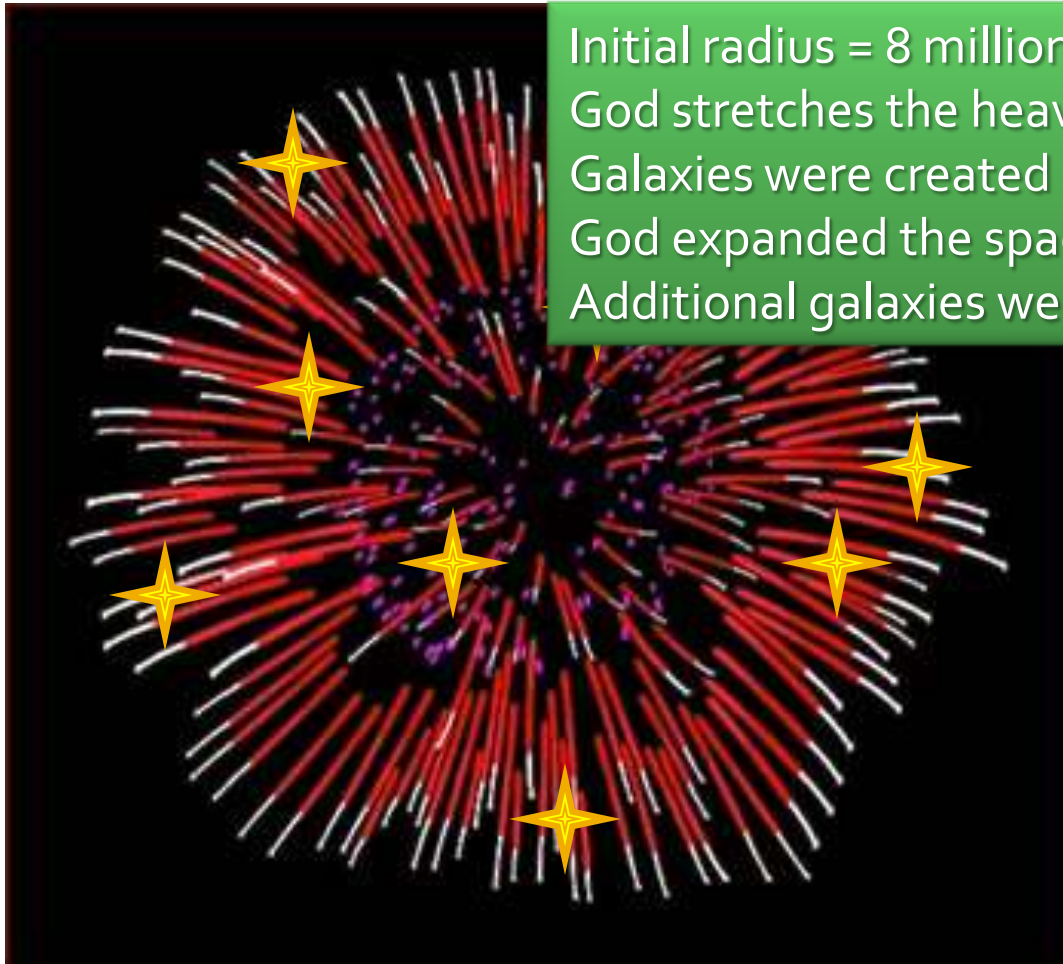
Starlight, Time and the New Physics, Dr. John Hartnett, 2007

Expanding space over time



Expanding space shown as a function of time.
The fabric of space is stretched with velocity (v) the new dimension.

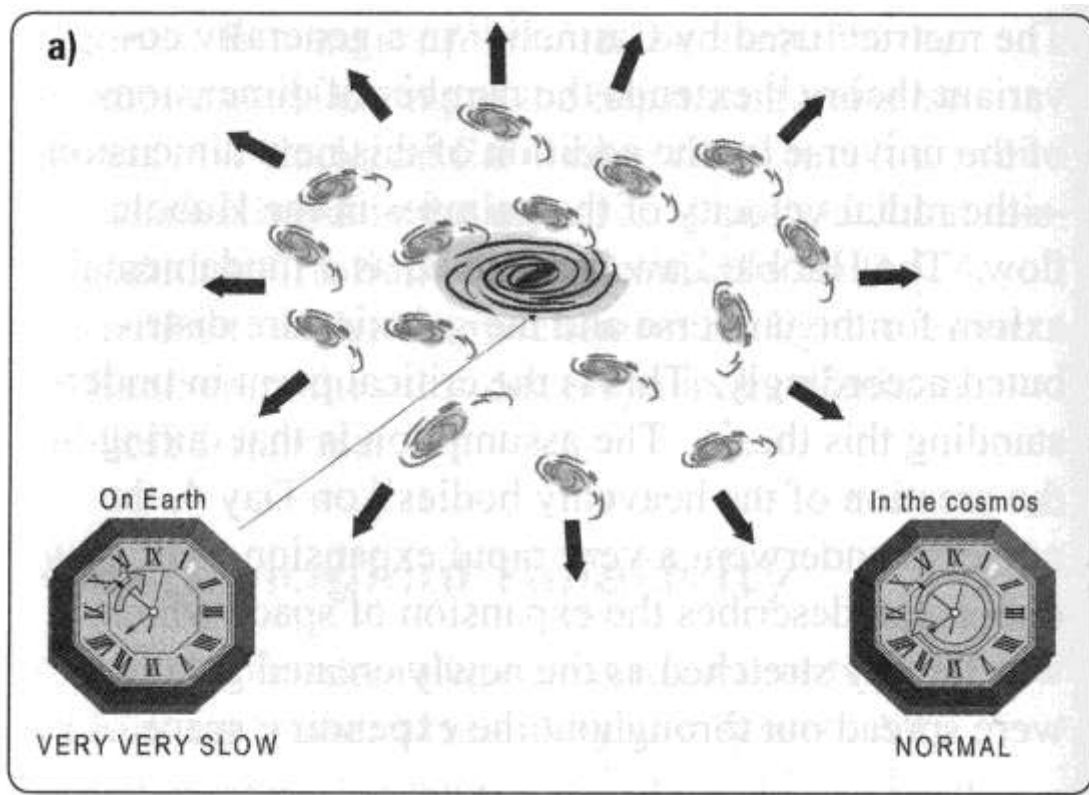
Day four process



Initial radius = 8 million light years
God stretches the heavens on day four
Galaxies were created closer to earth
God expanded the space dragging them apart
Additional galaxies were created during the expansion

Distant starlight explained

- The expansion of space caused earth/Solar System clocks to be slowed by a few trillion times compared to cosmic clocks



Comparison with Big Bang

Big Bang	Carmelian
All material from singularity	Singularity (“the deep”) + galaxy creation during expansion
Expansion of space in extra dimension	Expansion of space in extra dimension
Inflation + continuous expansion	Expansion only during day four
Expansion is accelerating	Expansion was finished after day four
Requires dark energy to drive acceleration	No dark energy
Requires dark matter	No dark matter
Distant starlight took billions of years	Distant starlight took one day with respect to earth/Solar System clocks

Creationist theories summary

Theory	Main Feature	Issues
Speed of light change	Faster light during creation	No scientific evidence
Mature creation	Extension of mature biosphere biblical concept	Would God include supernova in a virtual history?
One-way speed of light convention	Starlight travel time is instantaneous towards earth	Seems contrary to intuitive view that one-way = $\frac{1}{2}$ two-way speed
White hole time dilation	First theory to make use of relativistic effects	Superseded by next theory due to issues
Earth in timelessness zone	Starlight follows timelessness zone to earth	Very new theory not critiqued yet
Carmelian physics	Expansion during day four leads to slow earth clocks	

Young universe model issues

- Oscillations in the CMB (Cosmic Microwave Background)
- Galaxy clustering features - Baryon Acoustic Oscillations (BAOs)
- Large-scale structures
- Galaxy properties (blue/red color, spiral/elliptical shape)
- Interacting galaxies
- Structure of galaxies
- Streams of stars
- Clusters of stars

“Beyond Distant Starlight:
Next Steps for Creationist Cosmology”,
James Upton, *Answers Research Journal* 4 (2011):1-9

Conclusions

- The Big Bang model has some explanatory power, but
 - Requires a belief that the entire mass of the universe came into existence through some sort of “quantum fluctuation”
 - Requires an ad-hoc “inflation” period to solve some scientific problems
 - Has remaining significant scientific problems, including the most basic question of how particles caught up in expansion clump together to eventually form all the structures / information content of the universe
- The best young-age biblical answer to distant starlight would seem to encompass:
 - The concept of a mature creation
 - Some type of relativity-based time dilation concept (Hartnett/Humphreys type solution)
 - Plus remembering that the creation week was, after all, a miraculous event outside of normal physical processes



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**God created.
The Bible says so.
Science confirms it.**