

CHRONOLOGY OF THE UNIVERSE

THOUGHTS ON GENERAL RELATIVITY

HOW DOES OUR HEAVENLY FATHER DESCRIBE HIMSELF IN SCRIPTURE?

²⁵ “To whom then will you liken Me, Or *to whom* shall I be equal?” says the Holy One.

²⁶ Lift up your eyes on high, And see who has created these *things*,
Who brings out their host by number; He calls them all by name,
By the greatness of His might And the strength of *His* power;
Not one is missing (Isaiah 40:25-26).



THE GRANDEUR

First deep field image (July '22) from new James Webb Space Telescope

Galaxy cluster SMACS 0723 in center

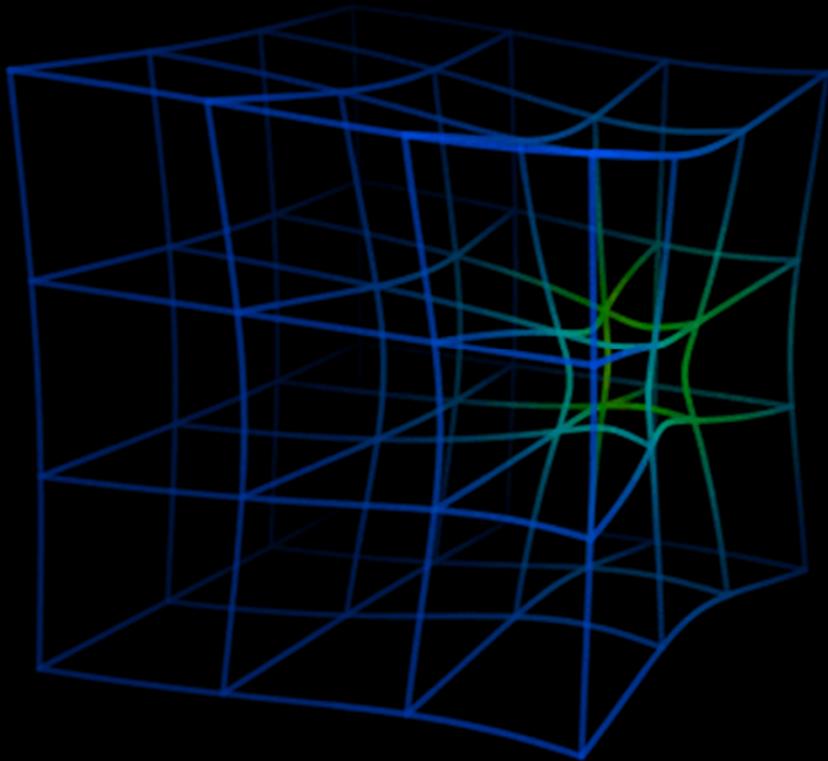
Viewed in infrared spectrum

Shows what the galactic cluster looked like about 4.6 BYA

<https://www.digitaltrends.com/space/james-webb-first-image-released/>

He counts the number of the stars; He calls them all by name (Psalms 147:4)

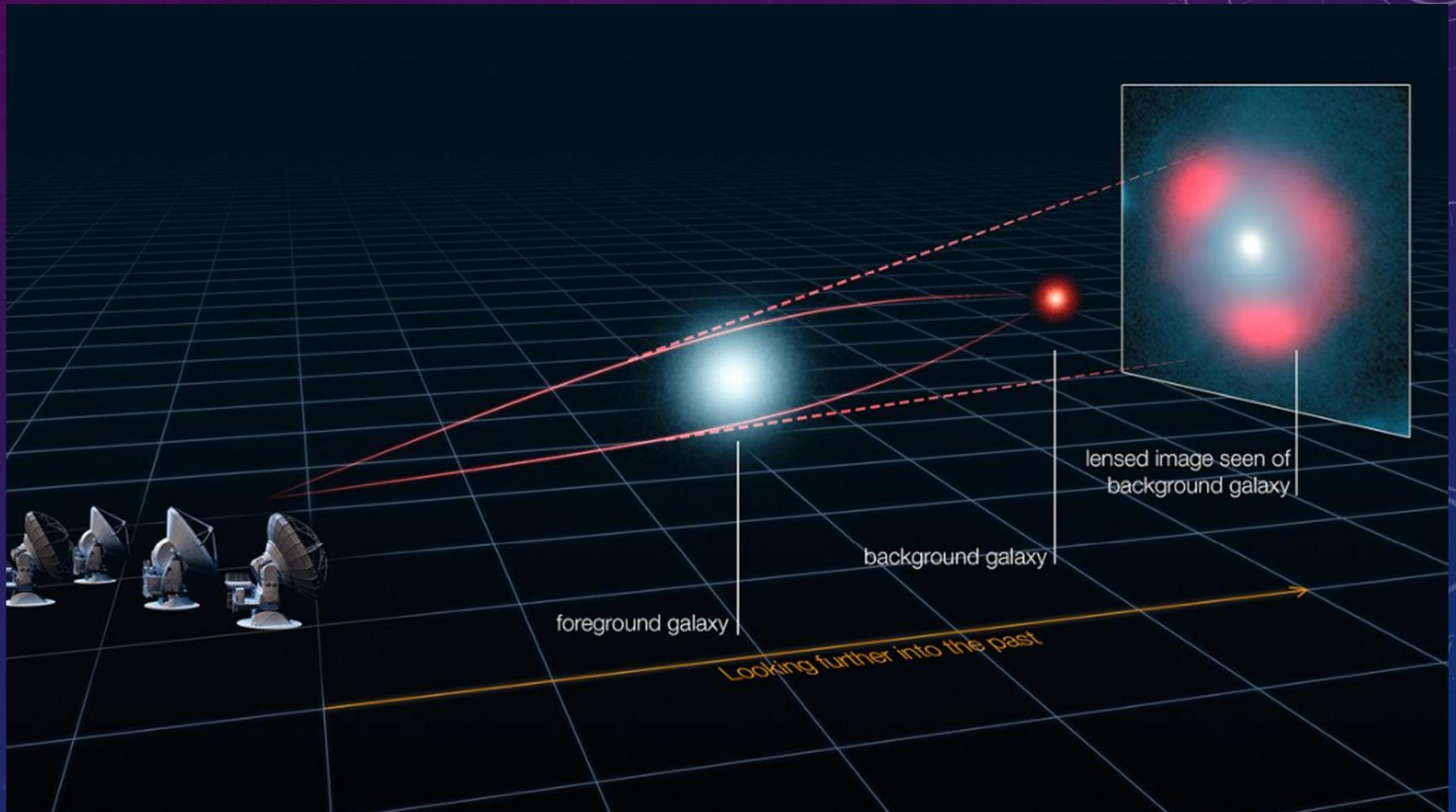
GR illustration

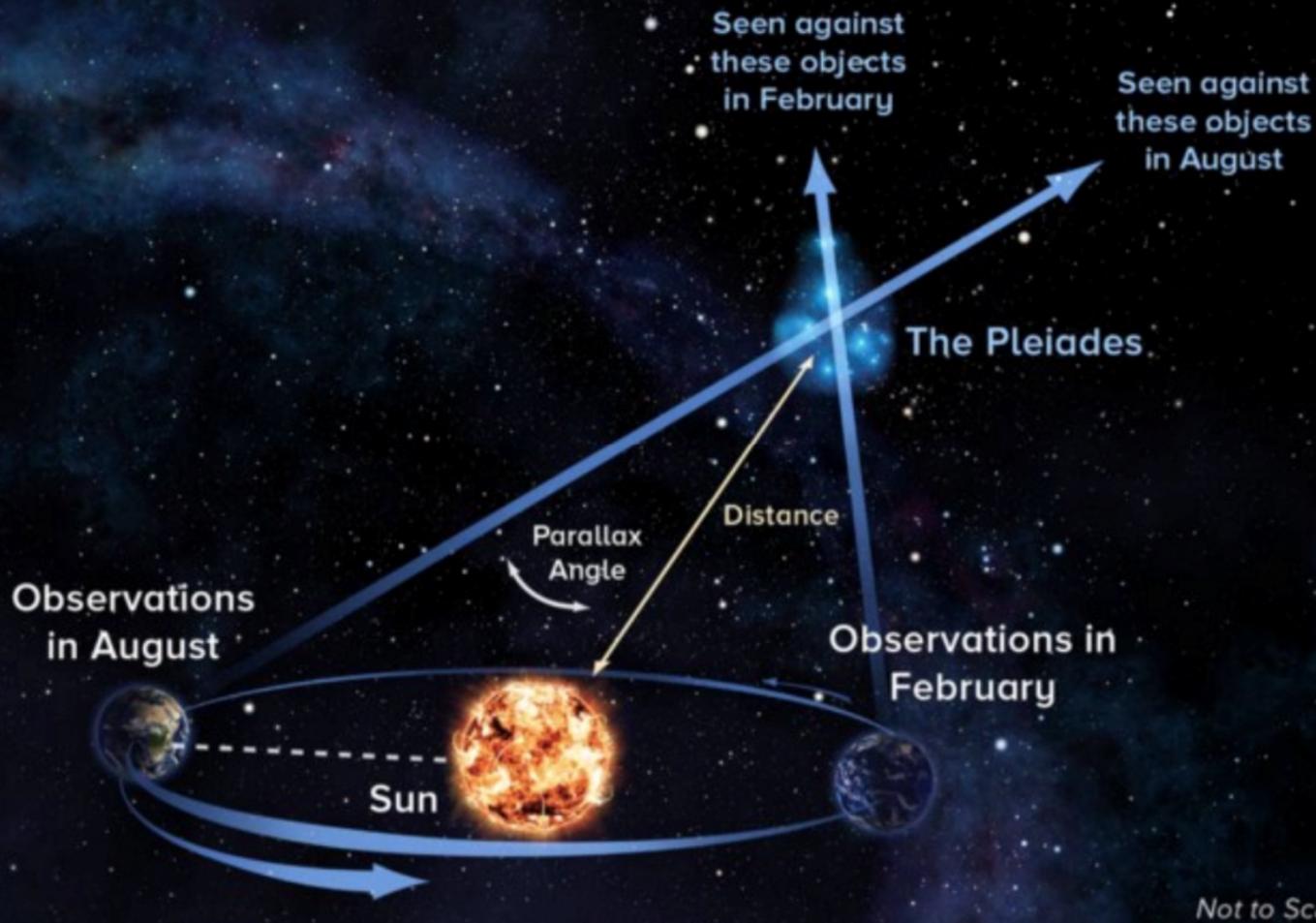


$$R_{\mu\nu} - \frac{1}{2}R g_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}$$

$$F = G \frac{m_1 m_2}{r^2}$$

Gravitational Lensing – GR prediction





CALCULATING DISTANCE IN SPACE-TIME: PARALLAX



CALCULATING DISTANCE IN SPACE-TIME: CEPHID VARIABLE STARS

$$d = 10^{(m-M+5)/5} \text{ parsecs}$$

m is the apparent magnitude of the object

M is the absolute magnitude of the object

d is the distance to the object in parsecs

https://svs.gsfc.nasa.gov/vis/a010000/a010100/a010145/Cepheidin_HD_LARGE_QT_Video_1.mp4

<https://lco.global/spacebook/distance/what-is-distance-modulus/>

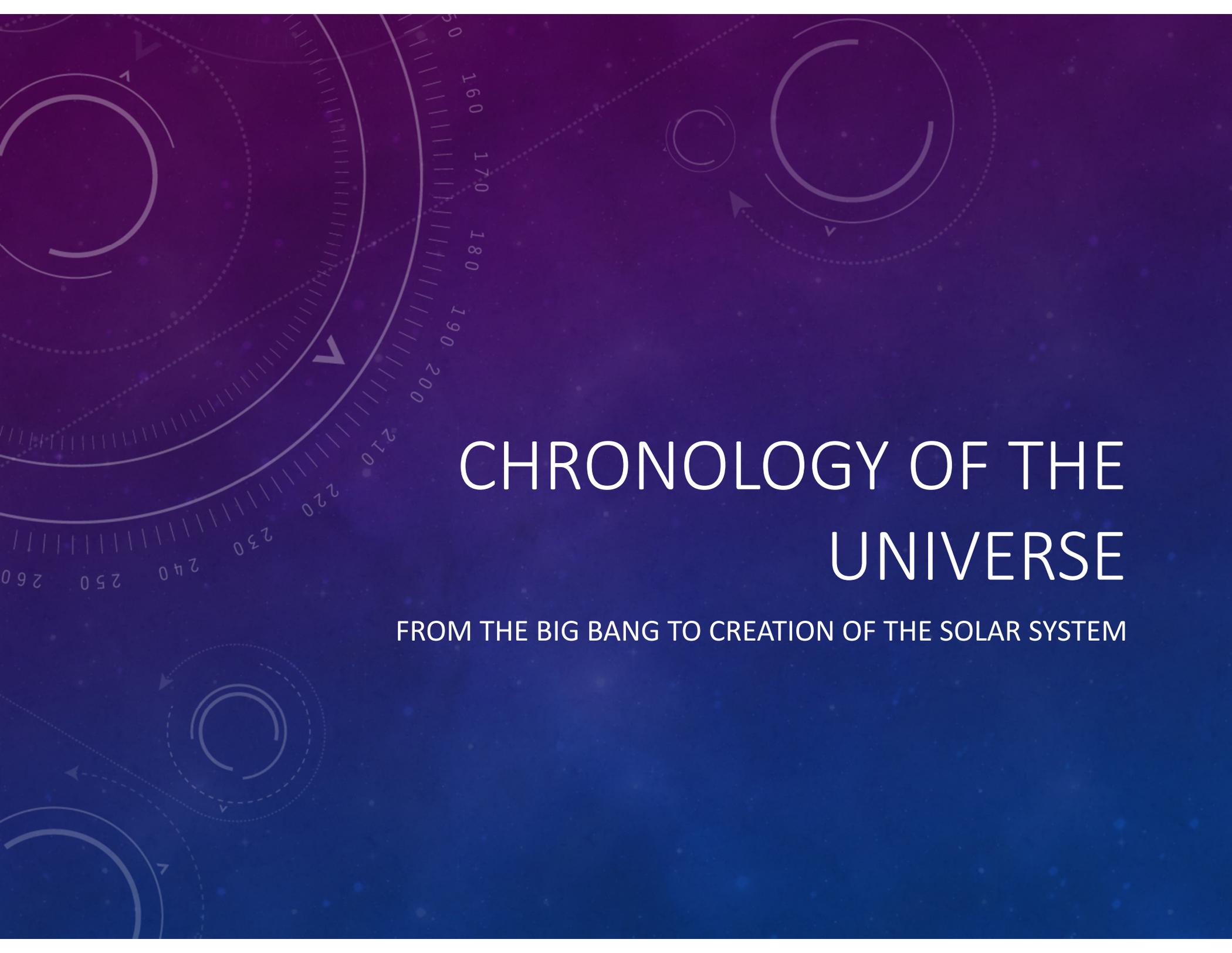
Periodic Table of the Elements

<p>State of matter (color of name) GAS LIQUID SOLID UNKNOWN</p> <p>Subcategory in the metal-metalloid-nonmetal trend (color of symbol) Alkali metals Lanthanides Metalloids Alkaline earth metals Actinides Reactive nonmetals Transition metals Post-transition metals Noble gases Unknown chemical properties</p> <p>Atomic Weight [] — Formal short value, rounded (no uncertainty) [] — Mass number of the most stable isotope</p>																		18 VIIIA	
1 IA H Hydrogen 1.008	2 IIA He Helium 4.0026																		
3 Li Lithium 6.94	4 Be Beryllium 9.0122																		
11 Na Sodium 22.990	12 Mg Magnesium 24.305																		
19 K Potassium 39.099	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 IVB Ti Titanium 47.867	23 VB V Vanadium 50.942	24 VIB Cr Chromium 51.996	25 VIIB Mn Manganese 54.938	26 VIIIB Fe Iron 55.845	27 VIIIB Co Cobalt 58.933	28 VIIIB Ni Nickel 58.693	29 IB Cu Copper 63.546	30 IIB Zn Zinc 65.39	31 IIIA Al Aluminum 26.982	32 IVA Si Silicon 28.085	33 VA Ga Gallium 69.723	34 VIA Ge Germanium 72.630	35 VIA As Arsenic 74.922	36 VIIA Se Selenium 78.971	37 VIIA Br Bromine 79.904	38 VIIA Kr Krypton 83.798
37 Rb Rubidium 85.468	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.94	43 Tc Technetium (97)	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.91	46 Pd Palladium 106.42	47 Ag Silver 107.87	48 Cd Cadmium 112.41	49 In Indium 114.82	50 Sn Tin 118.71	51 Sb Antimony 121.76	52 Te Tellurium 127.60	53 I Iodine 126.90	54 Xe Xenon 131.29		
55 Cs Cesium 132.91	56 Ba Barium 137.33	57-71 Lanthanides	72 Hf Hafnium 178.49	73 Ta Tantalum 180.95	74 W Tungsten 183.84	75 Re Rhenium 186.21	76 Os Osmium 190.23	77 Ir Iridium 192.22	78 Pt Platinum 195.08	79 Au Gold 196.97	80 Hg Mercury 200.59	81 Tl Thallium 204.38	82 Pb Lead 207.2	83 Bi Bismuth 208.98	84 Po Polonium (209)	85 At Astatine (210)	86 Rn Radon (222)		
87 Fr Francium (223)	88 Ra Radium (226)	89-103 Actinides	104 Rf Rutherfordium (261)	105 Db Dubnium (268)	106 Sg Seaborgium (266)	107 Bh Bohrium (270)	108 Hs Hassium (285)	109 Mt Meitnerium (276)	110 Ds Darmstadtium (281)	111 Rg Roentgenium (282)	112 Cn Copernicium (285)	113 Nh Nihonium (286)	114 Fl Flerovium (289)	115 Mc Moscovium (290)	116 Lv Livermorium (293)	117 Ts Tennessine (294)	118 Og Oganesson (294)		

57 La Lanthanum 138.91	58 Ce Cerium 140.12	59 Pr Praseodymium 140.91	60 Nd Neodymium 144.24	61 Pm Promethium (145)	62 Sm Samarium 150.35	63 Eu Europium 151.96	64 Gd Gadolinium 157.25	65 Tb Terbium 158.93	66 Dy Dysprosium 162.50	67 Ho Holmium 164.93	68 Er Erbium 167.26	69 Tm Thulium 173.05	70 Yb Ytterbium 173.05	71 Lu Lutetium 174.97
89 Ac Actinium (227)	90 Th Thorium 232.04	91 Pa Protactinium 231.04	92 U Uranium 238.03	93 Np Neptunium (237)	94 Pu Plutonium (244)	95 Am Americium (243)	96 Cm Curium (247)	97 Bk Berkelium (247)	98 Cf Californium (251)	99 Es Einsteinium (252)	100 Fm Fermium (257)	101 Md Mendelevium (258)	102 No Nobelium (259)	103 Lr Lawrencium (260)

22

Ti
Titanium
47.867
p: 22
n: 26



CHRONOLOGY OF THE UNIVERSE

FROM THE BIG BANG TO CREATION OF THE SOLAR SYSTEM

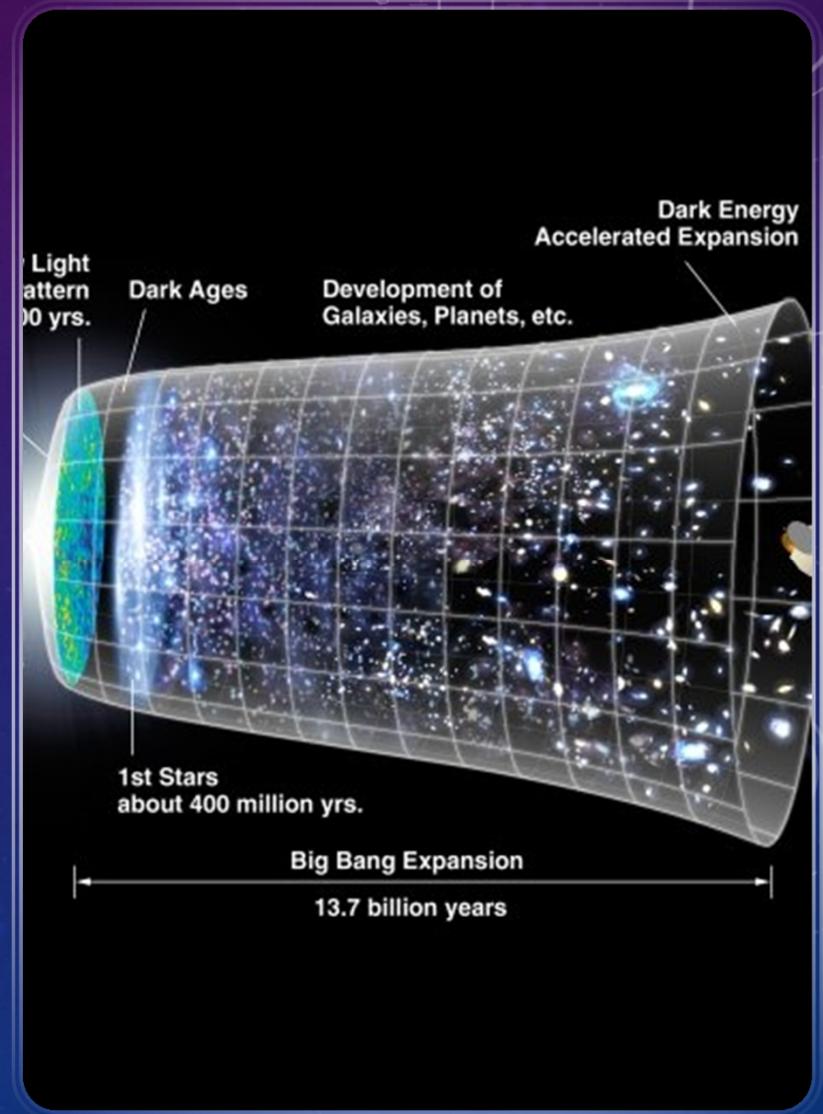
First let's review the evidence from cosmology today

- What follows is a physical description of creation...
- This description incorporates no theological implications or significance
 - It is our best estimation as to what physically occurred based on evidence from observations and experimentation
 - Theological implications will be discussed after.



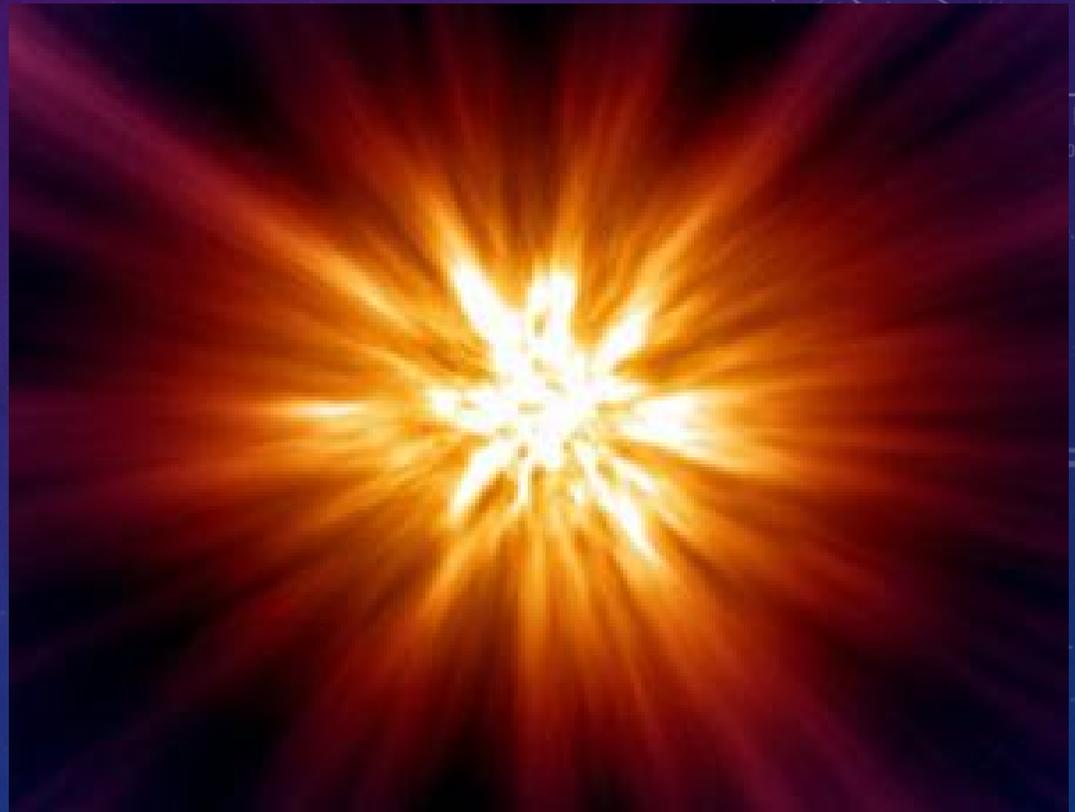
HOT INFLATIONARY BIG BANG COSMOLOGY & CREATION

- No one knows for sure what happened up until what is known as the Planck Epoch (next slide) or what occurred before the instant of the big bang
 - Science does not have the ability to probe these times
 - Predicted by General Relativity
- Creation of Space-Time itself
- It was not an explosion – rather a massive release of energy with a rapid expansion, thought to have been contained within a “quantum singularity”
 - A quantum singularity is a region of space time of near infinitely high temperature and density.



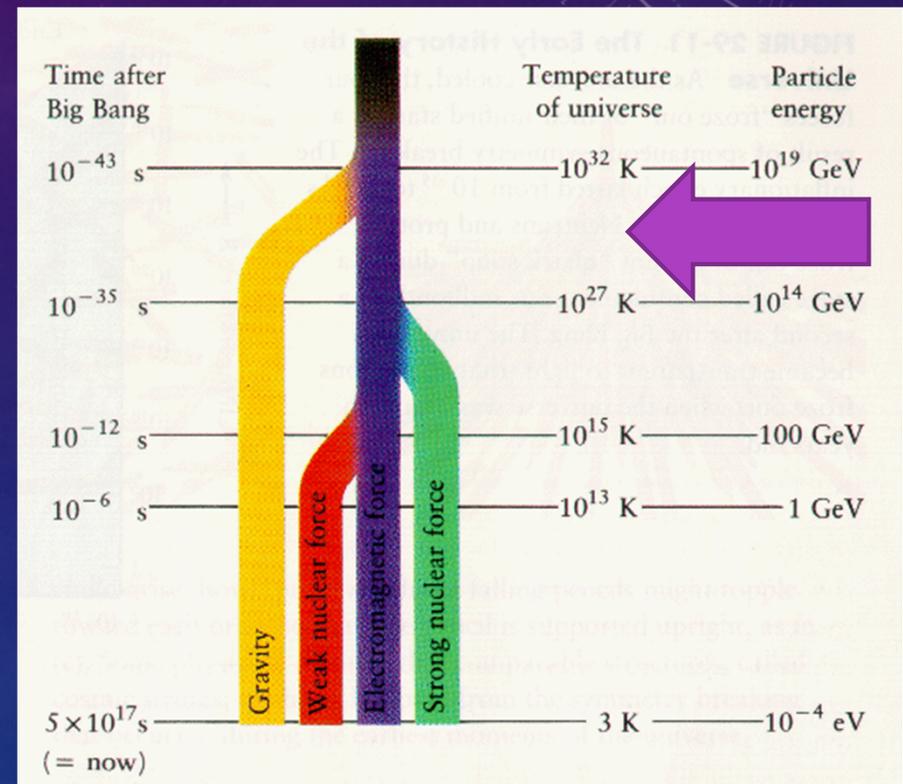
Plank Epoch: 0 to 10^{-43} seconds (1 plank time)

- Very little known about this time period
- GR suggests a gravitational singularity existed before this time
- Its possible all of the forces of the universe are combined into a single force having the same strength
- The diameter of the currently observable universe calculated to be approximately 10^{-33} cm

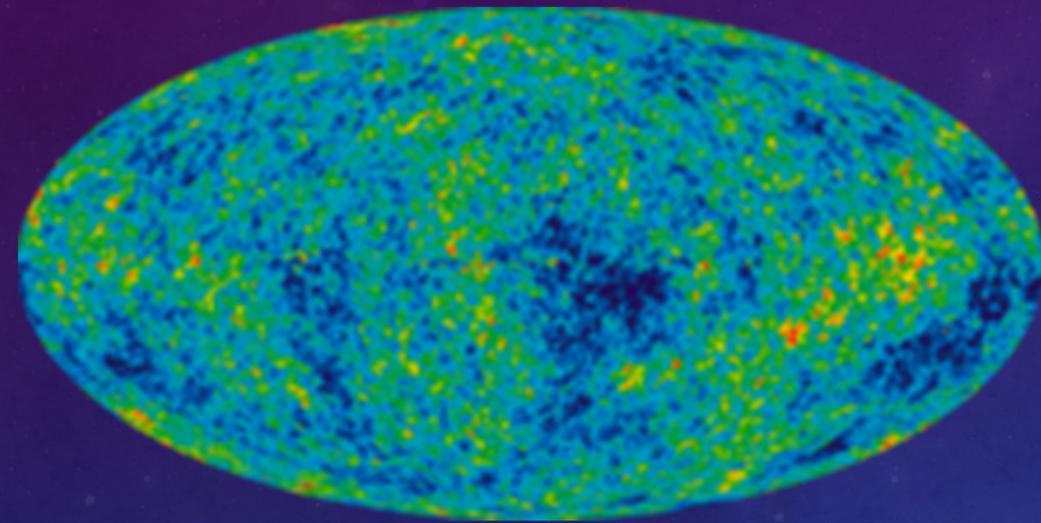


Grand Unification Epoch: 10^{-43} to 10^{-36} seconds

- As the universe expands it continues to cool now approximately 10^{28} °kelvin
- ~~Force of Gravity~~ separates from the other fundamental (gauge) forces
- The observable universe thought to increase from 10^{20} cm to 10^{30} cm.
- Fundamental particles & antiparticles first appear
 - Quarks, electrons, neutrinos, photons, etc
- Quarks appear in particle-antiparticle pairs in the ratio of $\frac{1 \times 10^{9+1} \text{ Quarks}}{1 \times 10^9 \text{ Anti Quarks}}$
- Particle – Antiparticle annihilation reactions occur to produce photons and 1 Quark per billion annihilation reactions



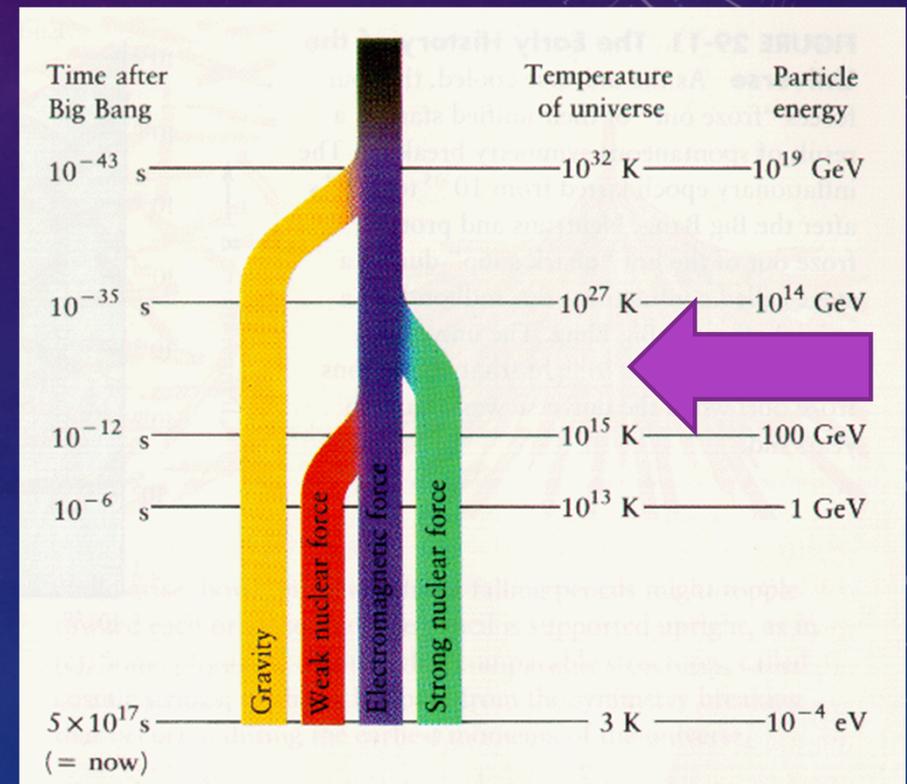
Inflationary Epoch: 10^{-36} to 10^{-32} seconds



- Extremely rapid, exponential expansion of space time – Universe expanded faster than the speed of light
- During this epoch,
 - As the universe expands it continues to cool now less than 10^{28} °kelvin (°F)
 - Volume of the universe increased by a factor of 10^{78} in less than 10^{-32} seconds
 - Accounts for the cosmological principle – premise that distribution of matter in the universe is both homogenous and isotropic
 - (similar in composition /structure and uniform in all orientations)
 - Thought to account for the “flatness” of the universe
 - Universe thought to exist now as a quark-gluon plasma (QGP)

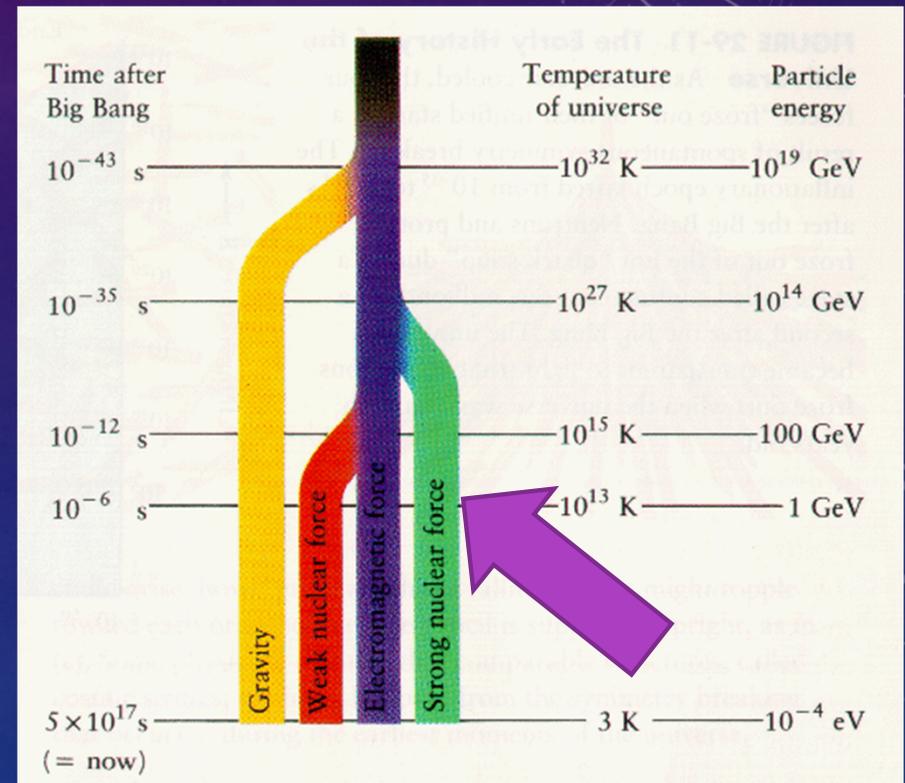
Electroweak Epoch: 10^{-32} to 10^{-12} seconds

- During this epoch,
 - The strong nuclear force separated from the remaining electroweak force
 - The electroweak force separates into the electromagnetic force and weak nuclear force
 - Creation of W and Z bosons – are particles that mediate the weak nuclear force.
 - WN Force responsible for radioactive decay and nuclear fusion of Hydrogen
 - Photons mediate the electromagnetic force
 - Good empirical evidence for this epoch from accelerator experiments
 - Observable universe increases to approximately 10^{13} meters in size.



Quark Epoch: 10^{-12} to 10^{-6} second

- As the universe expands it continues to cool now approximately 10^{12} °kelvin (°F)
- During this epoch,
 - The universe is made up of a quark-gluon plasma
 - The four fundamental forces have all separated
 - Energies still too high for condensation into hadrons (protons and neutrons)
 - These energies are the highest attained in the LHC (large hadron collider)



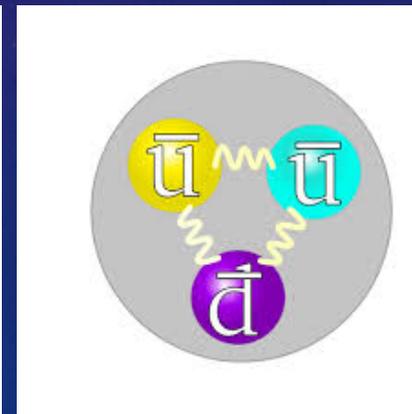
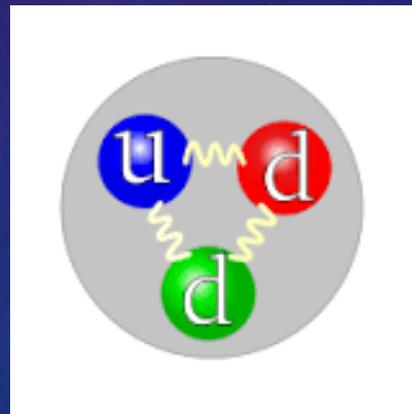
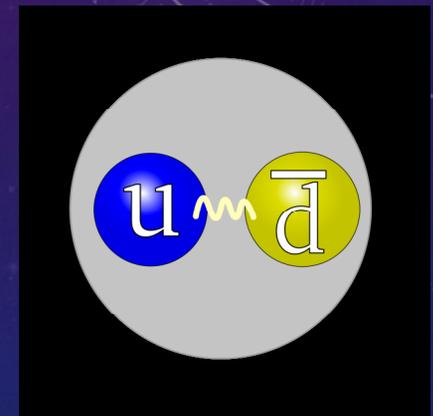
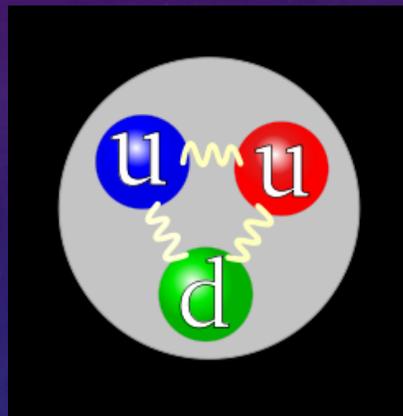
Hadron Epoch: 10^{-6} to 1 second

Hadrons

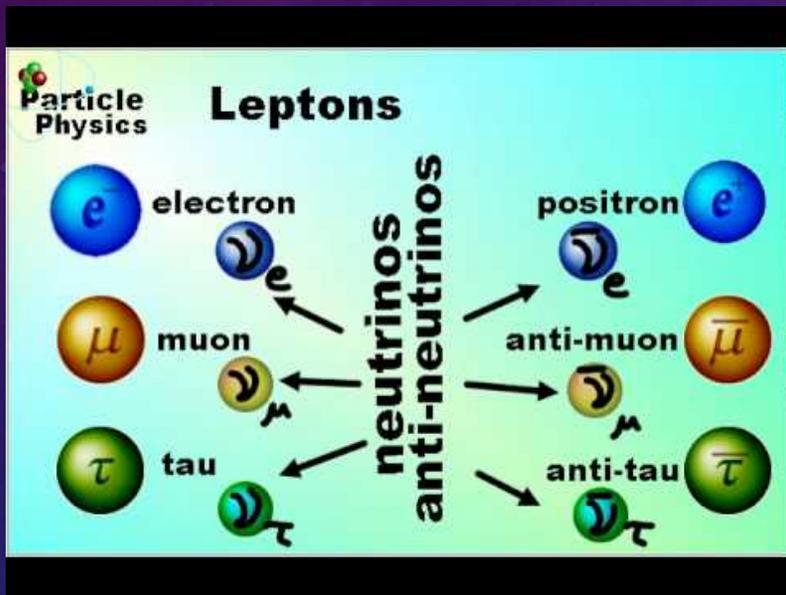
Baryons

Mesons

- As the universe expands it continues to cool now $>10^{12}$ ° kelvin (°F)
- Quarks form hadrons as the universe continues to expand and cool
 - (protons and neutrons among others)
- Mass of the universe at this time is dominated by hadrons
- Hadron / anti-hadron pairs annihilate leaving a small residue that makes up all of the normal mass in the universe today



Lepton Epoch: 1 second to 3 minutes

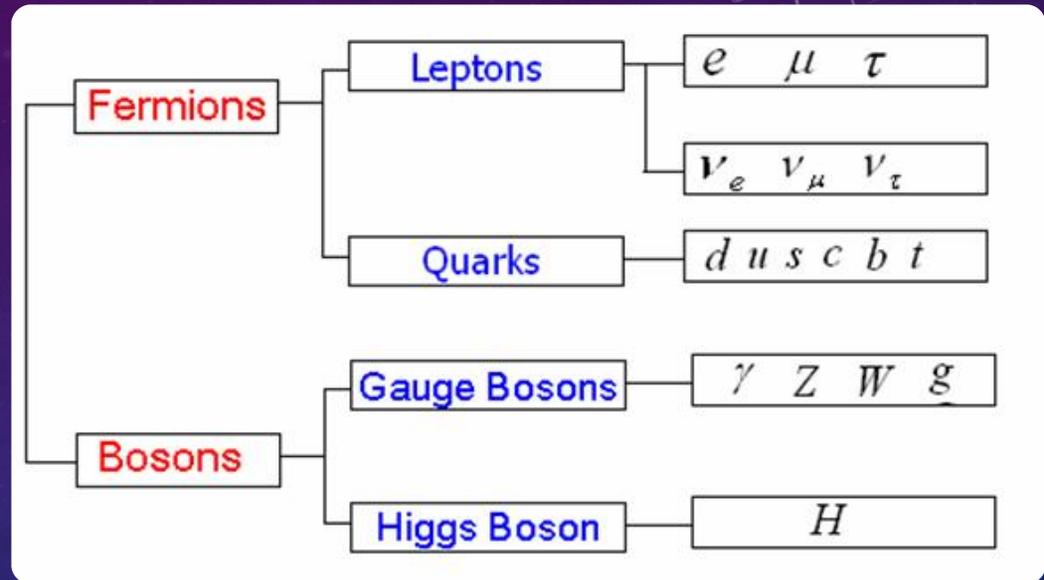


- As the universe expands it continues to cool now approximately 10^9 °kelvin (°F)
- Leptons have a half integer spin and does not interact with the strong nuclear force.
- During this epoch,
 - Charged leptons (electrons/positrons) and neutral leptons (neutrinos) dominate the mass of the universe.
 - Vast majority of lepton and anti-lepton pairs annihilate each other resulting in the production of photons
 - (Electrons, muon and tau particles and corresponding anti-particles and neutrinos)
 - Neutrinos exist on their own as a result of electron / anti-electron (positron) annihilations
 - The hydrogen nuclei (protons) combine to form helium. The universe comprised now of about 74% H^+ and 25% He with trace amounts of
 - Deuterium 2H / Tritium 3H
 - Lithium Li
 - Beryllium Be
- Observation of interstellar gas clouds confirm these elements and proportions
- No other elements of the periodic chart exist yet
- Electrons do not combine with atomic nuclei yet to form neutral atoms

Three Generations of Matter (Fermions)

	I	II	III	
mass	2.4 MeV/c ²	1.27 GeV/c ²	171.2 GeV/c ²	0
charge	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{2}{3}$	0
spin	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	1
name	u up	c charm	t top	γ photon
	4.8 MeV/c ²	104 MeV/c ²	4.2 GeV/c ²	0
	$-\frac{1}{3}$	$-\frac{1}{3}$	$-\frac{1}{3}$	0
	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	1
Quarks	d down	s strange	b bottom	g gluon
	<2.2 eV/c ²	<0.17 MeV/c ²	<15.5 MeV/c ²	91.2 GeV/c ²
	0	0	0	0
	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	1
Leptons	ν_e electron neutrino	ν_μ muon neutrino	ν_τ tau neutrino	Z⁰ Z boson
	0.511 MeV/c ²	105.7 MeV/c ²	1.777 GeV/c ²	80.4 GeV/c ²
	-1	-1	-1	±1
	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	1
	e electron	μ muon	τ tau	W[±] W boson

Gauge Bosons

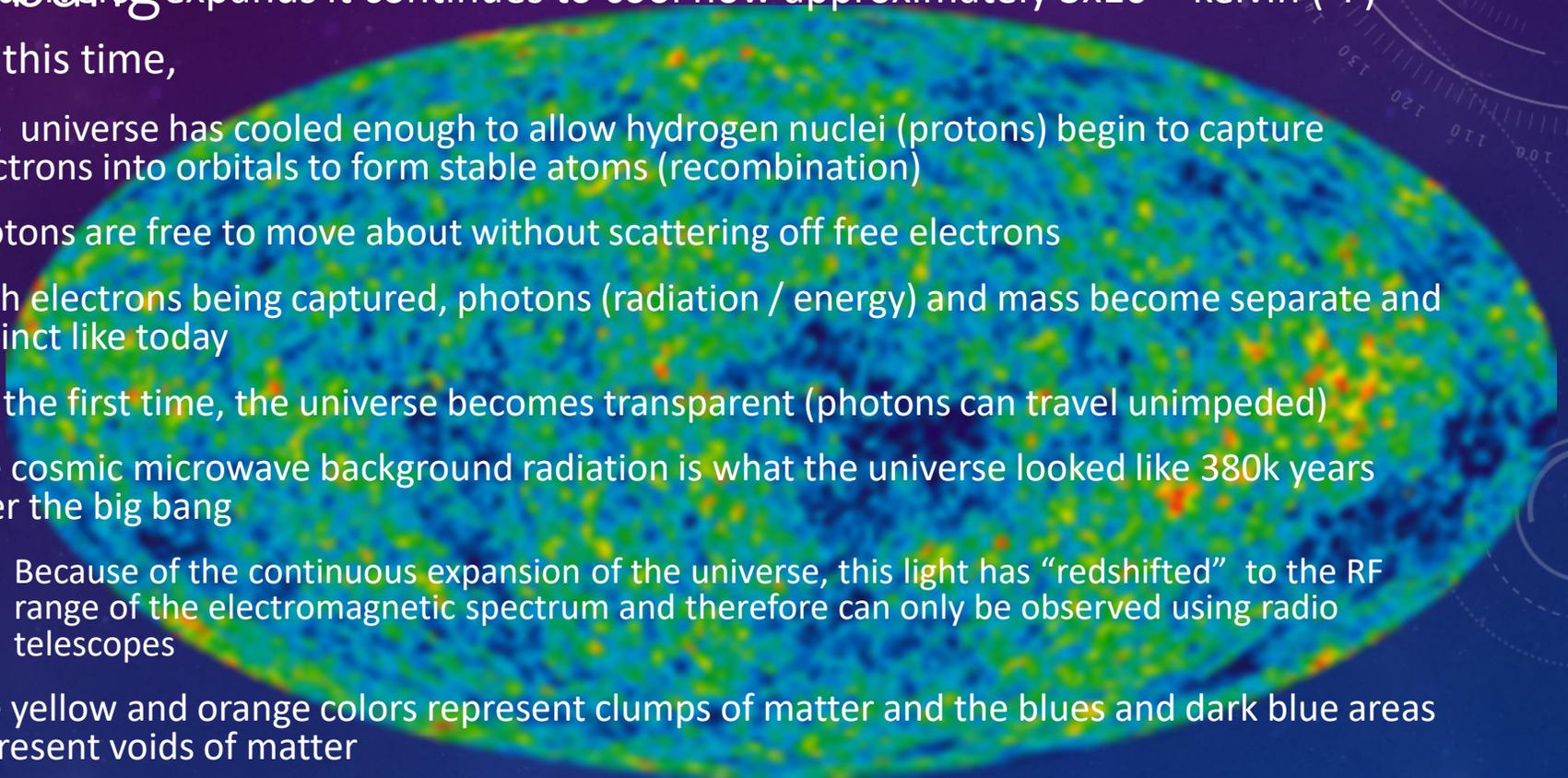


STANDARD MODEL OF PARTICLES

Nucleo-synthesis / Photon / Recombination Epoch: about 3 minutes to 380k years after the

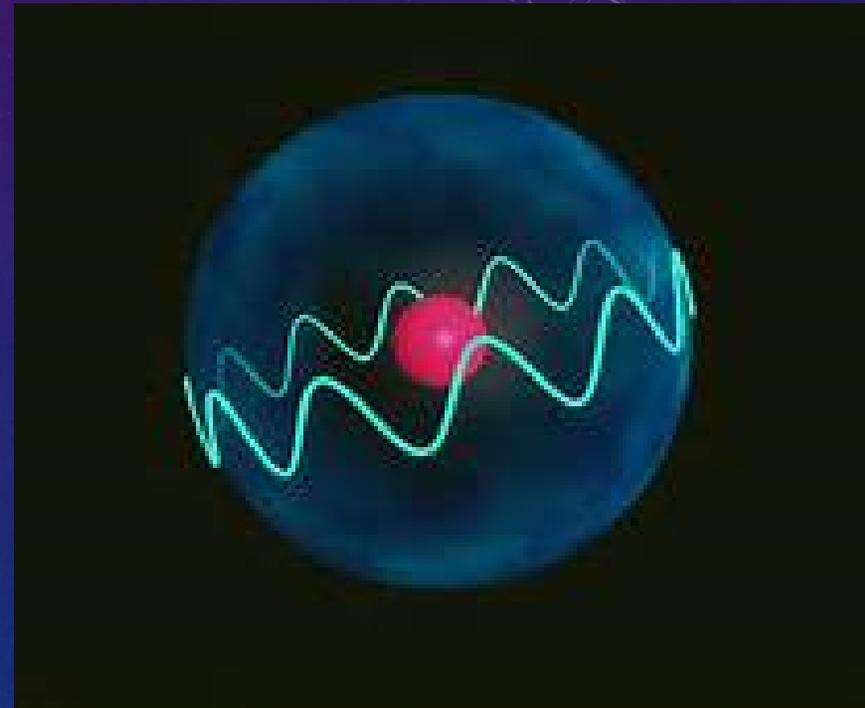
big bang

- As the universe expands it continues to cool now approximately 3×10^3 °kelvin (°F)
- During this time,
 - The universe has cooled enough to allow hydrogen nuclei (protons) begin to capture electrons into orbitals to form stable atoms (recombination)
 - Photons are free to move about without scattering off free electrons
 - With electrons being captured, photons (radiation / energy) and mass become separate and distinct like today
 - For the first time, the universe becomes transparent (photons can travel unimpeded)
 - The cosmic microwave background radiation is what the universe looked like 380k years after the big bang
 - Because of the continuous expansion of the universe, this light has “redshifted” to the RF range of the electromagnetic spectrum and therefore can only be observed using radio telescopes
 - The yellow and orange colors represent clumps of matter and the blues and dark blue areas represent voids of matter



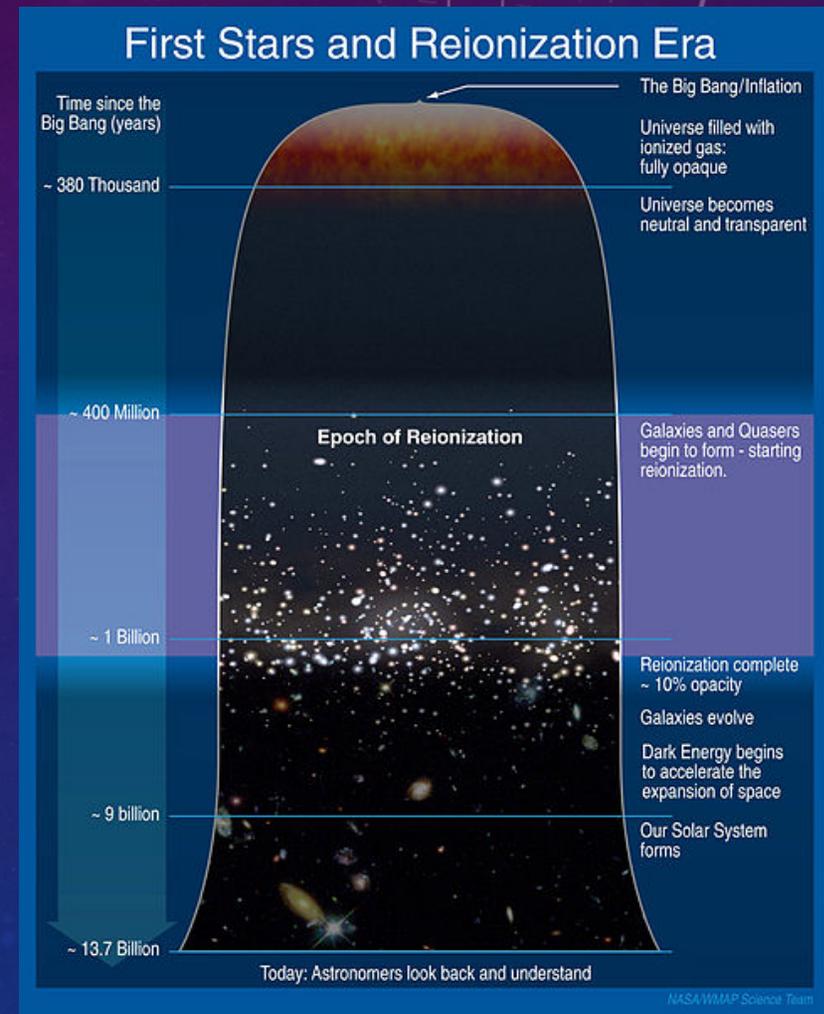
The Cosmic Dark Ages: 380k years to 800M (appx.) years

- This time occurs after the formation of neutral atoms and before the formation of the first luminous structures such as stars. Cosmic web structures thought to begin forming.
- The universe is literally dark across the EM spectrum
- During this epoch the main component of the universe was neutral hydrogen
- Dark matter and normal matter (ratio of 5.5/1) allows matter to come together and clump via gravity. This is necessary for the formation of stars and other stellar structures
- Glass-z13 shown in the Webb SMACS 0723 image would have been formed during this time.
 - Formed 300 MY after BB.
<https://earthsky.org/space/oldest-galaxy-yet-seen-by-webb-telescope/>



Re-ionization Epoch: 350M years to 1B (appx.) years

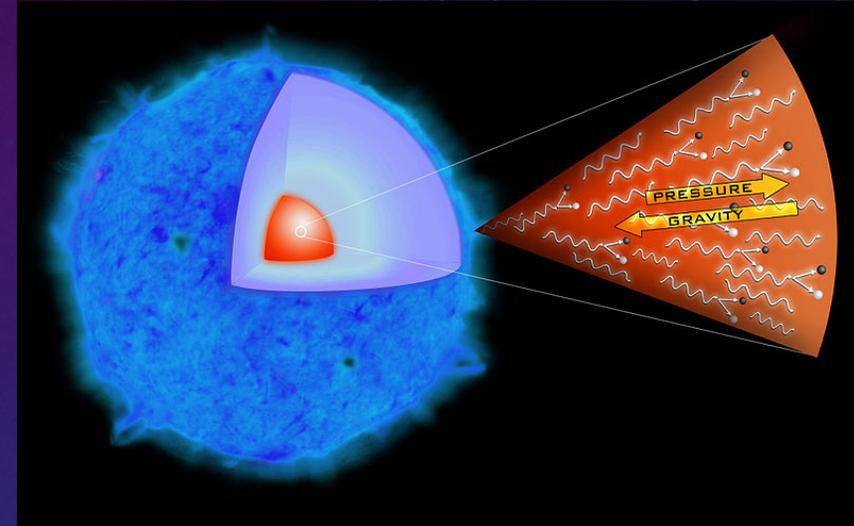
- First quasars formed from gravitational collapse and emitted high energy ultraviolet wavelength radiation, that effectively re-ionized all of the H in their vicinity ($H_2 + \lambda \rightarrow 2 p^+ + 2 e^-$)
- Gravity still dominates the universe and the expansion rate is slowing during this time
- The UV ionizing radiation travels freely (due to its high energy) throughout the neutral medium
- “Bubbles” of ionized plasma over time grew larger and eventually overlapped each other and subsequently allowed all EM wavelengths to travel the extents of the universe unimpeded; it allows us to see optical and infrared wavelengths (universe can now be observed)
- Interestingly, at the end of this epoch, dark energy begins to dominate the universe and the expansion starts to accelerate as we observe today



Source: <http://www.haystack.mit.edu/ast/science/epoch/>

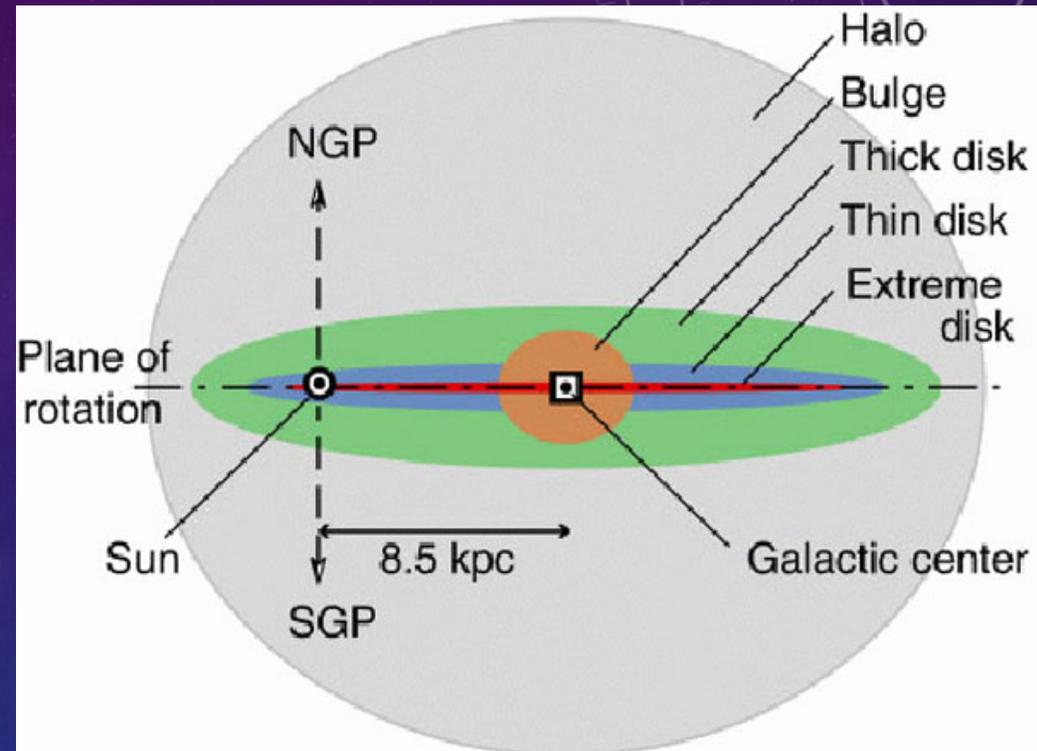
Population III Stars

- Population III Stars formed resulting from increased matter density due to gravitational force. As mass increases, it increases in temperature and pressure.
 - When the matter becomes hot enough, (around 10 million degrees F) hydrogen nuclear fusion reactions can begin and be sustained
- P III stars have no metals, are thought to be very large (100 to 400 times a solar mass)
 - As a consequence they burned through their fuel in only a few million years (very quickly by comparison to main sequence)
 - collapsed into supermassive black holes and forming (not the first) quasars; created elements heavier than Fe in supernovae
- Quasi stellar radio sources have the highest redshifts of any objects in the observable universe (among oldest objects)
- Stars are not observed today but the distant quasars are seen
 - Light travels at a fixed velocity (appx 3×10^8 m/sec),
 - Therefore objects farther away are older
 - Cosmologists/Astronomers can “see” back as far as 380,000 years after the BB



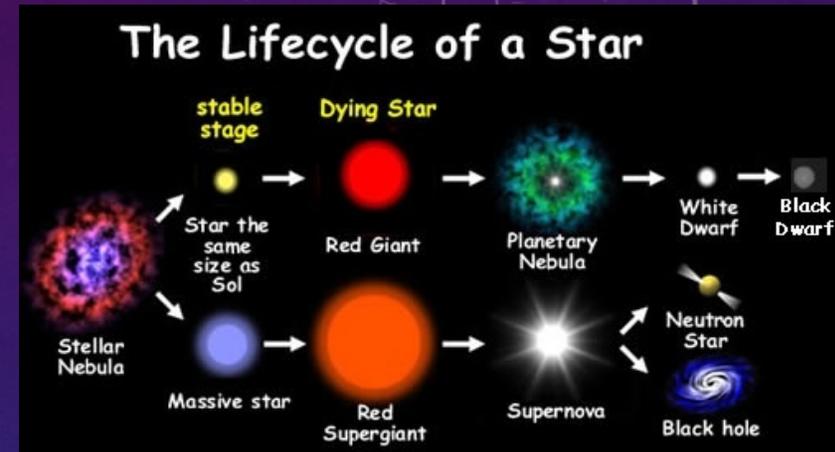
Population I and II Stars

- Population II Stars have lower metal content as compared to P I stars.
 - They are generally found around the outer rim of galaxies today (older stars); nebulae (stellar nurseries) are near the center
 - Unlike P III, they can be observed today
 - Theory and spectroscopic observations hold that all remaining elements in the periodic chart would be created by P II stars as they supernova.
 - In general, much longer lifespans than P III
- Population I Stars (youngest of all stars)
 - When formed in nebulae, pick up many metals (>Fe) created by previous generations of stars, hence metal rich
 - Our solar system begins to form about 9 BYA BB; more on this shortly...
 - In the meantime, generations of stars are creating heavy metals that are completely necessary for sustaining complex life and seeding nebulae with them.

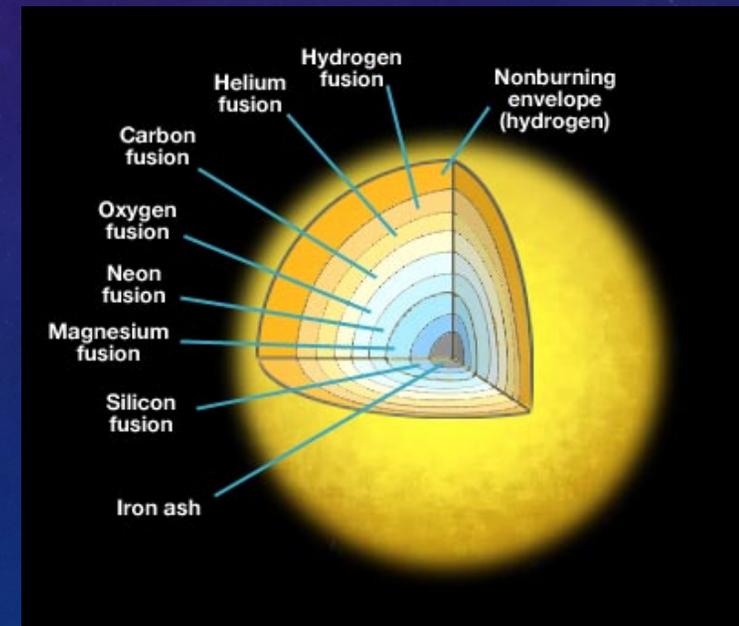


Life Cycle of Stars

- These supermassive stars produced the first metals (elements heavier than He) in the universe
 - during their fusion (up to iron, element 26) AND
 - subsequent supernovae (possibly up to uranium, element 92)
- As we shall see later, these heavy elements, especially thorium and uranium are absolutely necessary for sustaining complex life on earth.

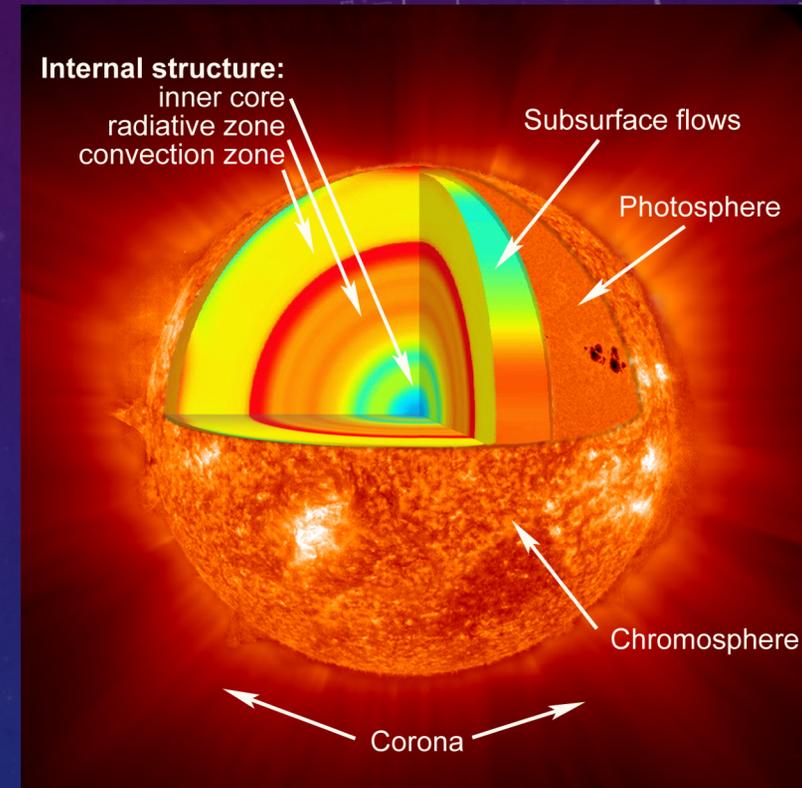


H B		<table border="1"> <tr> <td>B B</td> <td>L Large stars</td> <td>S Supernovae</td> </tr> <tr> <td>C C</td> <td>S Small stars</td> <td>M Man-made</td> </tr> </table>										B B	L Large stars	S Supernovae	C C	S Small stars	M Man-made	He B	
B B	L Large stars	S Supernovae																	
C C	S Small stars	M Man-made																	
Li C	Be C	B C	C S	N S	O S	F L	Ne S	Al S	Si S	P L	S S	Cl L	Ar L						
Na L	Mg L	Sc L	Ti S	V S	Cr L	Mn L	Fe S	Co S	Ni S	Cu L	Zn L	Ga S	Ge S	As L	Se S	Br S	Kr S		
Rb S	Sr L	Y L	Zr L	Nb L	Mo S	Tc L	Ru S	Rh S	Pd S	Ag S	Cd S	In S	Sn S	Sb S	Te S	I S	Xe S		
Cs S	Ba L	Hf S	Ta S	W S	Re S	Os S	Ir S	Pt S	Au S	Hg S	Tl S	Pb S	Bi S	Po S	At S	Rn S			
Fr S	Ra S	La L	Ce L	Pr S	Nd S	Pm S	Sm S	Eu S	Gd S	Tb S	Dy S	Ho S	Er S	Tm S	Yb S	Lu S			
		Ac S	Th S	Pa S	U S	Np S	Pu S	Am M	Cm M	Bk M	Cf M	Es M	Fm M	Md M	No M	Lr M			

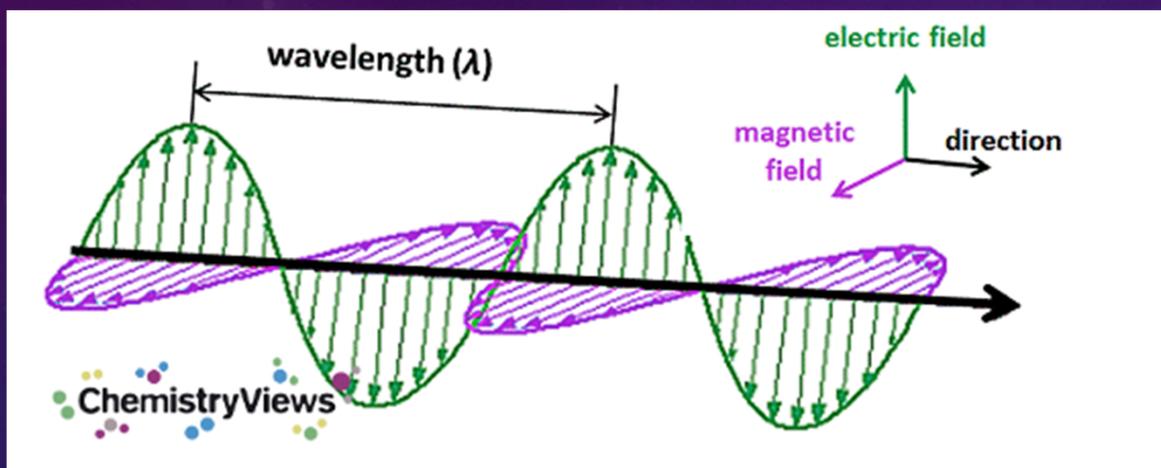


Our Sun

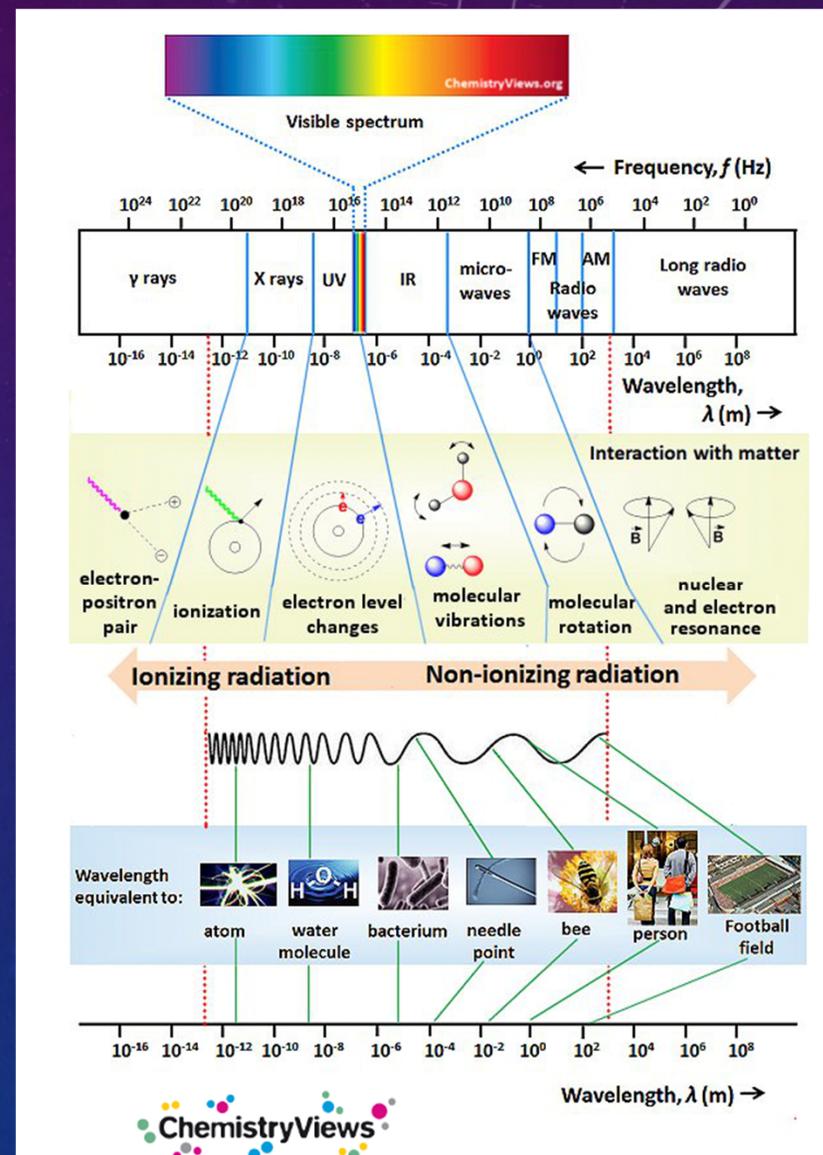
- The size of our star is crucial for supporting complex life
- Larger stars undergo rapid and unstable fusion with large surface temperature variations and significantly more CME's than our sun
- All stars increase in luminosity over their life span. Larger stars increase solar energy on the surface of a planet and must be compensated for by the atmosphere
 - More solar energy, then fewer greenhouse gases must be present to trap heat
- Smaller stars burn in a more stable manner but
 - Planets must be closer to the star to support life
 - This causes stronger gravitational effects on the planets



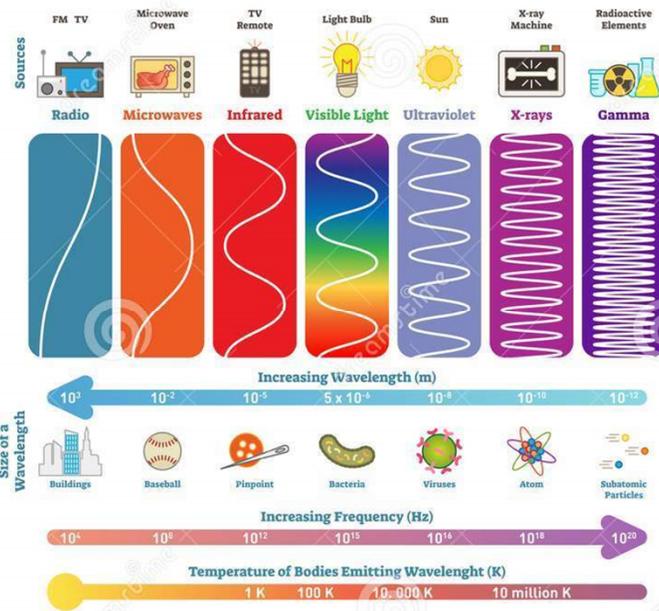
EM Spectrum



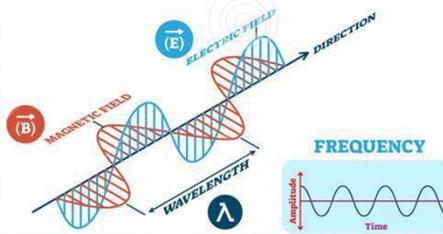
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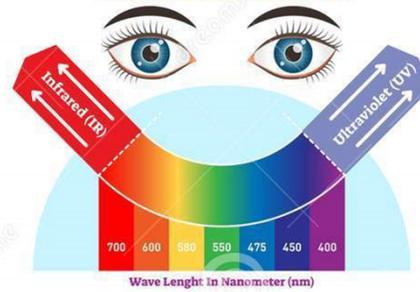
ELECTROMAGNETIC SPECTRUM



ELECTROMAGNETIC WAVES



VISIBLE SPECTRUM



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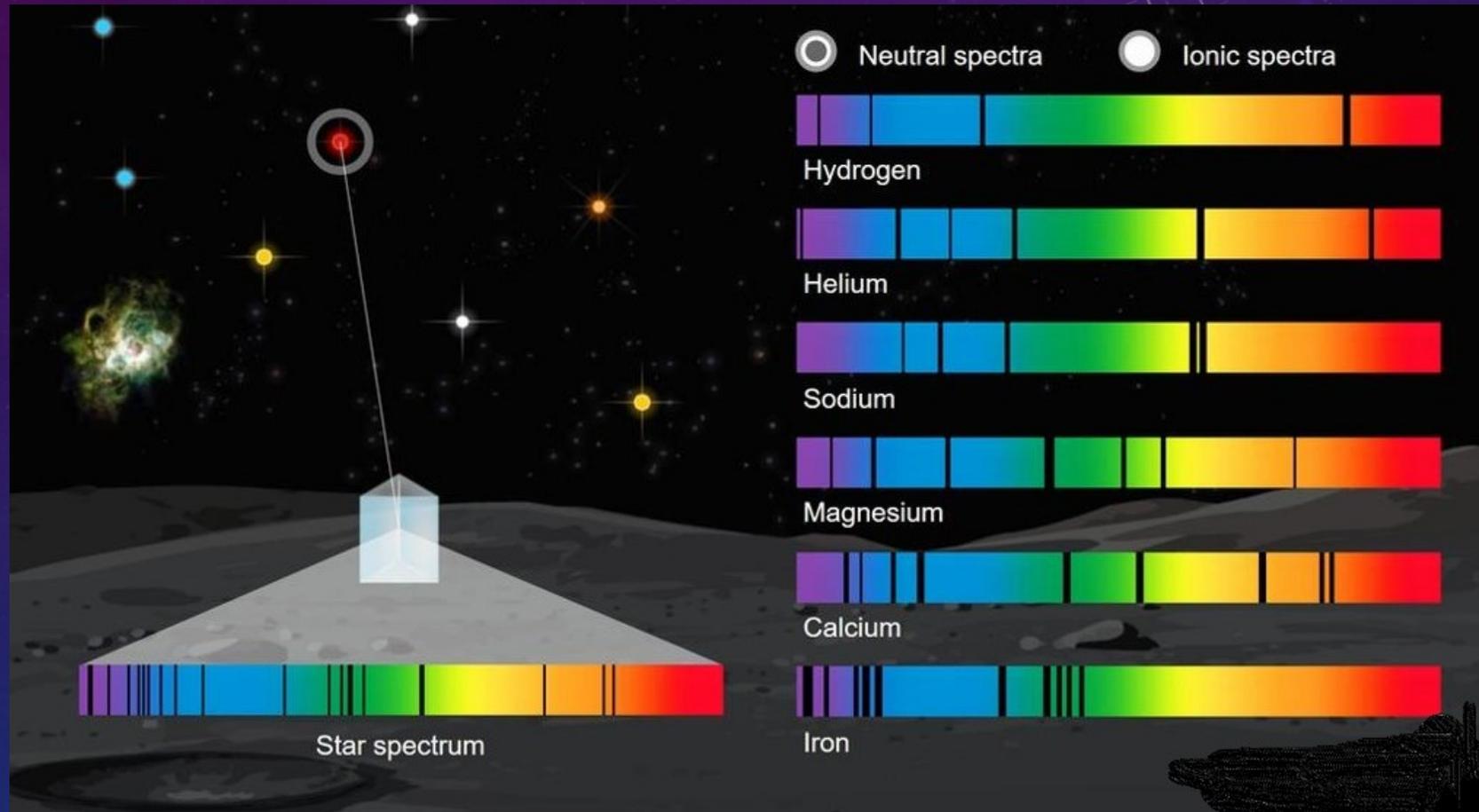
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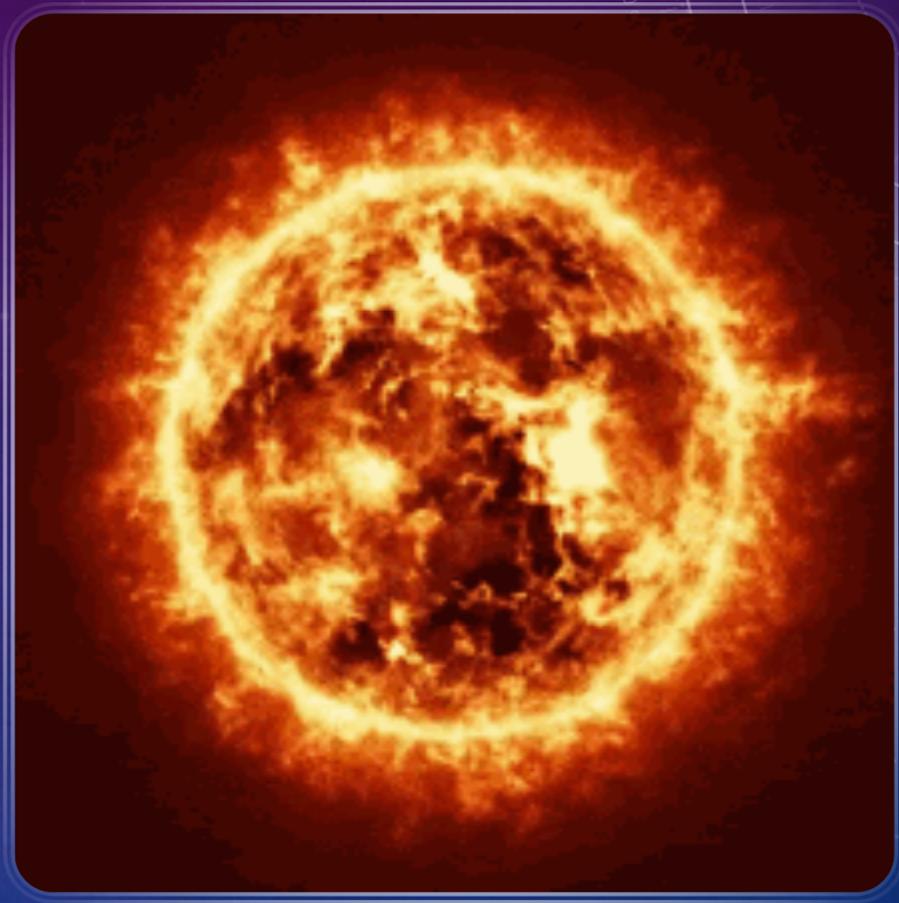
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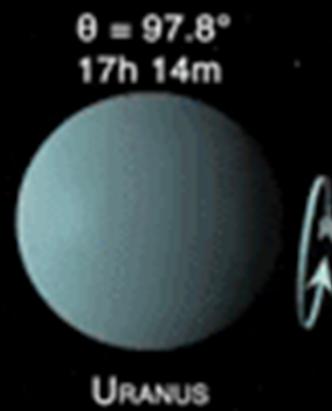
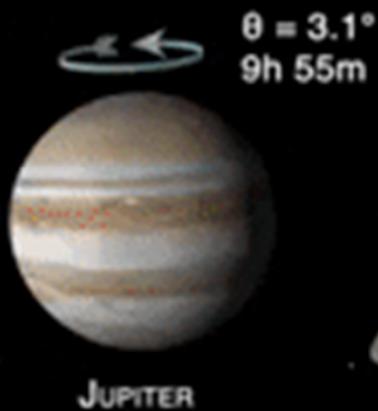
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Stellar Spectral Analysis

The elements contained within stars can be determined by observation and measurement of its spectral absorption.







James O'Donoghue / NASA -- T: @physicsJ IG: jameslikesspace

Big Bang Final thoughts

- Sources:
http://www.physicsoftheuniverse.com/topics_bigbang_timeline.html;
https://en.wikipedia.org/wiki/Chronology_of_the_universe
- At this point, we have reached about 9 BYA after the BB and about 4.6 BYA from the present
- Next we will look at some theological implications of this evidence
- Later we will examine the cosmological evidence about how the solar system was created
- We will also examine some of the features required of earth to sustain complex life over the long term

Big bang and the Bible – How do they relate?

How does the theory of big bang cosmology fit with biblical scripture?

The more I study science, the more I believe in God.

- Albert Einstein

THEOLOGICAL CLAIMS OF THE BIBLE 1. Space-Time has a beginning...

Genesis 1:1 - In the beginning God created the heavens and the earth.

Genesis 2:4 - This is the account of the heavens and the earth when they were created, when the LORD God made the earth and the heavens.

Psalms 148:5 - Let them praise the name of the LORD, for at his command they were created... Also see **Isaiah 45:18** and **Isaiah 40:26**

Isaiah 42:5 - This is what God the LORD says— the Creator of the heavens, who stretches them out, who spreads out the earth with all that springs from it, who gives breath to its people, and life to those who walk on it:

John 1:3 - Through Him all things were made; without Him nothing was made that has been made

Colossians 1:15-17 - ¹⁵ The Son is the image of the invisible God, the firstborn over all creation. ¹⁶ For in Him all things were created: things in heaven and on earth, visible and invisible, whether thrones or powers or rulers or authorities; all things have been created through Him and for Him. ¹⁷ He is before all things, and in Him all things hold together.

Hebrews 11:3 - By faith we understand that the universe was formed at God's command, so that what is seen was not made out of what was visible.

THEOLOGICAL CLAIMS OF THE BIBLE

2. The universe is expanding
from a beginning...

Job 9:8 - He alone stretches out the heavens and treads on the waves of the sea

Isaiah 40:22 - ...He stretches out the heavens like a canopy, and spreads them out like a tent to live in.

Isaiah 42:5 - This is what God the LORD says—the Creator of the heavens, who stretches them out, who spreads out the earth with all that springs from it, who gives breath to its people, and life to those who walk on it

Isaiah 44:24 - “This is what the LORD says—
your Redeemer, who formed you in the womb:

I am the LORD, the Maker of all things, who stretches out the heavens, who spreads out the earth by myself...

Psalms 104:2 - The LORD wraps himself in light as with a garment; He stretches out the heavens like a tent

Isaiah 45:12 - It is I who made the earth and created mankind on it. My own hands stretched out the heavens;
I marshaled their starry hosts

Isaiah 48:13 -My own hand laid the foundations of the earth,
and My right hand spread out the heavens;
when I summon them, they all stand up together.

Isaiah 51:13 – ...that you forget the LORD your Maker, who stretches out the heavens and who lays the foundations of the earth...

THEOLOGICAL CLAIMS OF THE BIBLE

Jeremiah 10:12 - But God made the earth by his power; He founded the world by his wisdom and stretched out the heavens by His understanding

Jeremiah 51:15 - He made the earth by his power; he founded the world by his wisdom and stretched out the heavens by His understanding

Zechariah 12:1 - The LORD, who stretches out the heavens, who lays the foundation of the earth, and who forms the human spirit within a person, declares:

2. The universe is expanding from a beginning... continued

THEOLOGICAL CLAIMS OF THE BIBLE 3. The physical laws are constant...

Jeremiah 33:25 - This is what the LORD says: 'If I have not made My covenant with day and night **and established the laws of heaven and earth...**

From Physics, Biology and Chemistry, the universe the universe is described by finely tuned, fixed laws

THEOLOGICAL CLAIMS OF THE BIBLE 4. The universe is undergoing pervasive decay...

Romans 8:20-22 - ²⁰For the creation was subjected to frustration, not by its own choice, but by the will of the one who subjected it, in hope ²¹that the creation itself will be liberated from its bondage to decay and brought into the freedom and glory of the children of God.

²²We know that the whole creation has been groaning as in the pains of childbirth right up to the present time.

FINAL THOUGHTS

Do these biblical claims, written by numerous authors over many centuries, of

1. Having a beginning to the universe
2. Stretching out the heavens like a tent
3. Having natural laws that are constant repeatable
4. The universe undergoing loss and decay

Sound familiar to the story about big bang cosmology?

No other religious text ever conceived has the accurate science the bible has...

While science is not the intent of the bible, if it is written there, it should be accurate... and it is...

Terminology Review

- Science – Is man's interpretation and attempts to understand of the metaphorical book of nature (General Revelation)
- Theology – Is man's interpretation and attempts to understand the literal book of scripture (Special Revelation)
- Question – If we perceive a conflict between special and general revelation where do you think the problem lies?
 - We always need to remember that our knowledge of both science and theology is inadequate and incomplete.
 - We all have biases that cause our understanding to be imperfect and we lack complete information.
 - These allow for *apparent* conflicts between science and theology to occur.
- I Thessalonians 5:21 – But examine everything carefully; hold fast to that which is good.
- Acts 17... be like the Bereans

EIGHT RULES OF INTERPRETATION-

Creation

DEFINING TERMS– Are the terms consistent with the authors intent?

USEAGE – Who was the intended audience?

CONTEXT – places boundaries on the interpretation

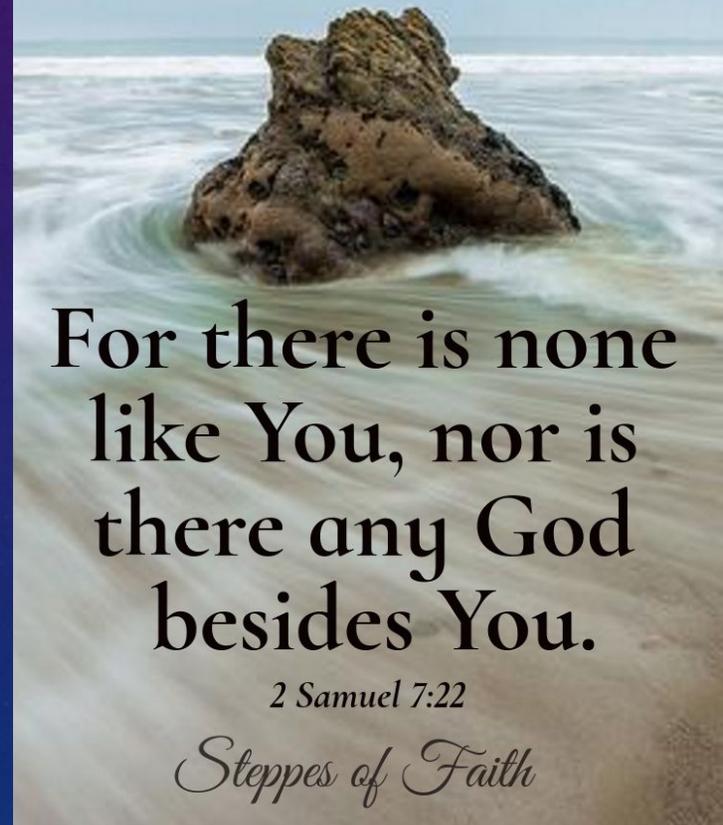
HISTORICAL & CULTURAL BACKGROUND – significance of and influences on the writing

LOGIC – Is the interpretation reasonable and consistent?

PRESCEDENT – Is the interpretation consistent with previous interpretations or does it significantly depart from them?

CONSISTENCY – Is the interpretation

**You are great,
O Lord God.**



**For there is none
like You, nor is
there any God
besides You.**

2 Samuel 7:22

Steppes of Faith

Select Scriptures on Creation

Of old You laid the foundation of the earth, and the heavens are the work of your hands (Psalms 102:25).

On the glorious splendor of your majesty, and on your wondrous works, I will meditate (Psalm 145:5).

You are the LORD, You alone. You have made heaven, the heaven of heavens, with all their host, the earth and all that is on it, the seas and all that is in them; and you preserve all of them; and the host of heaven worships you (Nehemiah 9:6).

But ask the beasts, and they will teach you; the birds of the heavens, and they will tell you; or the bushes of the earth, and they will teach you; and the fish of the sea will declare to you. Who among all these does not know that the hand of the LORD has done this? In his hand is the life of every living thing and the breath of all mankind (Job 12:7-10).

When I look at your heavens, the work of your fingers, the moon and the stars, which you have set in place, what is man that you are mindful of him, and the son of man that you care for him (Psalms 8:3-4)?

The heavens declare the glory of God, and the sky above proclaims his handiwork. Day to day pours out speech, and night to night reveals knowledge (Psalms 19:1-2).

In the beginning, God created the heavens and the earth (Genesis 1:1).

The background is a dark blue gradient with a starry texture. On the left side, there are several overlapping circular patterns. One prominent circle has a scale around its perimeter with numbers ranging from 160 to 260 in increments of 10. Other circles are partially visible, some with arrows indicating a clockwise direction. The overall aesthetic is technical and scientific.

CHRISTIAN APOLOGETICS

END OF SECTION

(FROM BIG BANG TO THE SOLAR SYSTEM)