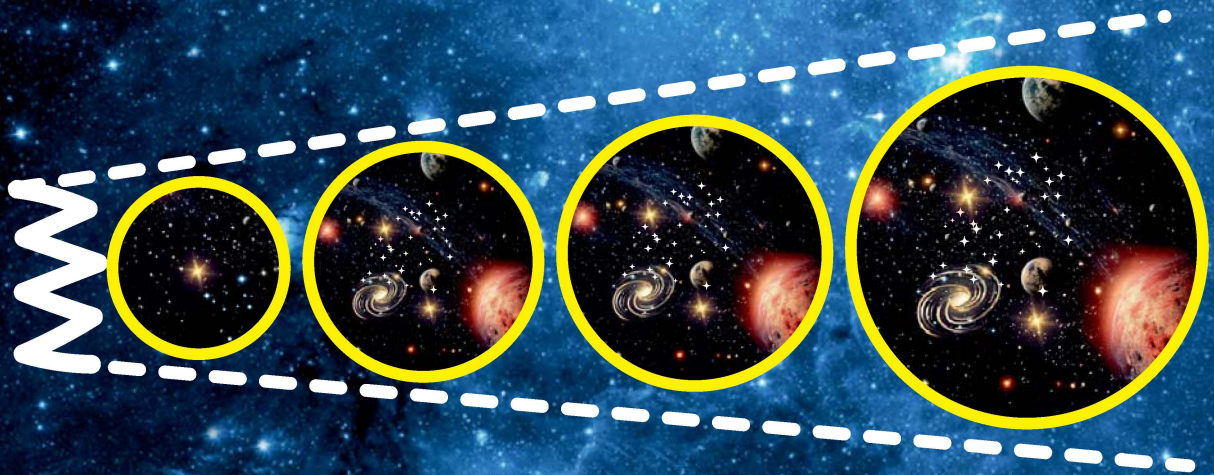# "NATURAL UNIVERSE EXPANSION" (NUE)

The Revolutionary Theory That Challenges Hubble's Law.

Presenting A New Model Of The "LIVING ORGANIC UNIVERSE" And Its Dynamics.

"NATURAL UNIVERSE EXPANSION" (NUE)

The Revolutionary Theory That Challenges Hubble's Law.

Presenting A New Model Of
The "LIVING ORGANIC UNIVERSE" And Its Dynamics.

An outcome of over
25 years of Research Study by the
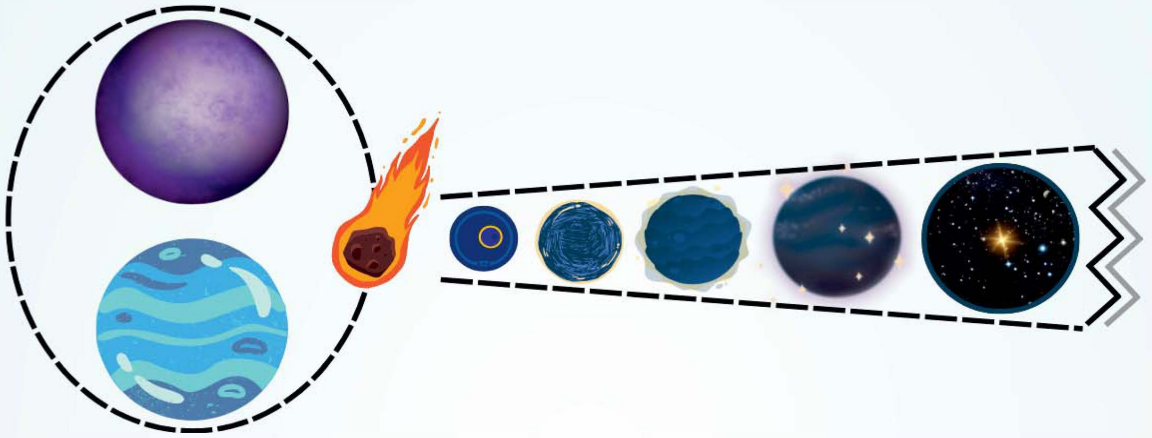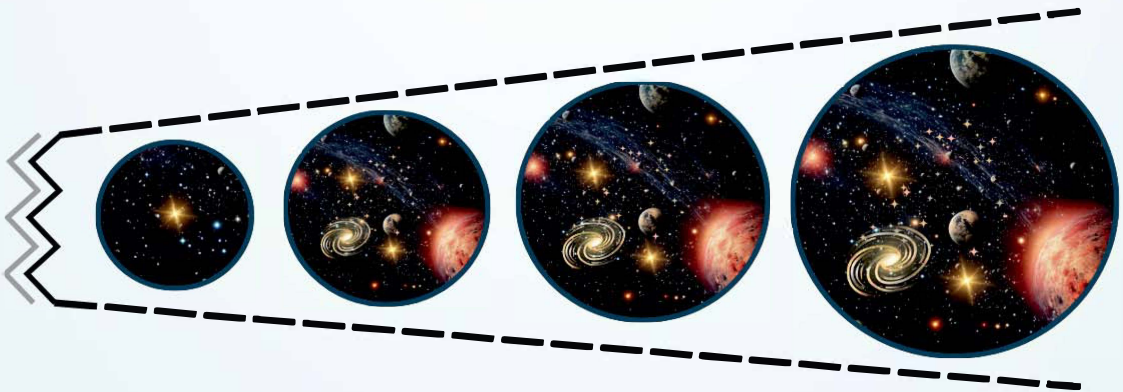Scientists at the **Astrogenesis Research Foundation**

Pre-natal embryo formation where no Laws are applicable

Post-natal birth of the Universe and its Organic growth

NB: The pre-natal, post-natal birth and growth of the Universe or new Celestial Bodies, is graphically explained in Chapter 8 para 8-d page 170.

The author's views and an advisory to the readers and intellectuals.

I present this new theory on the Natural Universe Expansion (NUE) with immense passion and a deep sense of responsibility. This work is the result of decades of inquiry, reflection, and a desire to push the boundaries of our understanding of the Cosmos.

Hubble's law presented in 1929 by Edwin Hubble and their team, helped establish that the Universe was expanding, with a graph showing the distance of viewing a Star or a Galaxy being directly proportional to their recession velocity. It also showed singularity at an epoch point in time. But it suffered a big flaw due to its finding a fixed age of the Universe not linked to the time factor.

The Theory of "Natural Universe Expansion" (NUE), overcomes the flaws and removes the need for a hypothesised dark matter and dark energy to explain the Universe's expansion. An updated Hubble constant incorporating the time factor is the Nu Constant, derived from the NUE Law.

The Theory challenges existing paradigms and inspires new research that brings us closer to unlocking the Universe's most profound mysteries. The NUE theory can be further explored by researchers, scientists, and scholars in space research, cosmology, and astronomy. Together, let us continue the journey toward evolving greater depths in knowledge, guided by curiosity and the infinite potential of the unknown.

Baldevkrishan Sharma
Author, Researcher & Scientist

I dedicate this research work to…

To the research institutions around the world that continue to inspire with their innovation and passion for uncovering the mysteries of the Cosmos, may this theory spark new avenues of inquiry and deepen our collective grasp with the presentation of the new Universe Model, viz the LIVING ORGANIC UNVERSE MODEL, inspired by the NUE Law.

I dedicate this work to the brilliant minds and tireless pioneers in space research, cosmology, and astronomy, whose relentless pursuit of knowledge has expanded the boundaries of human understanding.

I recommend Cosmo research Scientists from NASA, ISRO, ESA and other Astrophysics and Astronomy Institutions to take a note of the tremendous effort and time dedicated to present this groundbreaking NUE Theory, its applications and its impact.

Baldevkrishan Sharma
Author, Researcher & Scientist

Author's declaration :-

Acknowledgements :-

Edition 1st, 2025

Title : Natural Universe Expansion (NUE)

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Preface

"A Critical Examination of Hubble's Law and Its Limitations" provides a comprehensive analysis of Hubble's Law and introduces the Law of Natural Universal Expansion (NUE) as a solution to its flaws.

Hubble's Law, proposed in 1929, became a cornerstone for understanding the expanding Universe and measuring its age through the Hubble Constant (H_O). However, over time, measurements of H_O have varied significantly, ranging from 500 km/s/Mpc to the current NASA-accepted 70 km/s/Mpc, raising doubts about the reliability of distance and recession velocity measurements of targeted Celestial bodies (Star, Galaxies etc.).

The research analyses the limitations of various techniques for determining H_O values, including the Doppler effect, brightness methods, and the use of red giant stars and gravitational waves. Additionally, it highlights that Hubble's Law fails to account for the accelerated expansion observed in distant galaxies, suggesting the need for non-linear factors, which are currently unexplained by concepts like dark energy, dark matter, and dark radiation.

Another significant flaw is determining the Universe's fixed age, which is incorrect for the dynamic ageing Universe. The research introduces the NUE Law as a mathematical framework to resolve these inconsistencies.

The NUE Law offers a non-linear equation for cosmic expansion. It modifies the Hubble constant and introduces the Nu constant for more accurate measurements of Celestial distances and their recessional velocities.

Unlike Hubble's Law, which is limited to linear recession velocities, the NUE Law accounts for the continuous, exponential expansion of the Universe, maintaining stable ratios for fundamental Cosmic properties such as temperature and density.

The ARF research presents the NUE Law as a Universal model applicable to all scales of matter, from Galaxies to the Solar system to the Earth to atoms and wavelengths.

Furthermore, the NUE Law challenges the necessity of dark energy to explain Cosmic acceleration. Instead, it proposes that the Universe expands at a continuously compounding rate, which naturally explains the observed acceleration of the recessional velocities without invoking hypothetical forces

and such other assumptions. The NUE Law suggests that as the Universe expands, it maintains stable ratios, allowing Celestial bodies to expand in size and mass over time, maintaining their constant density and temperature.

A key distinction between Hubble's and NUE's laws is in their constants. While the Hubble constant (70 km/s/Mpc) is static, the Nu constant (98.2889 km/s/Mpc) is dynamic and changes over time, suggesting that the Universe is not static but continuously expanding at an accelerating rate. This difference offers a new approach to calculating the age of the Universe and predicting its future expansion.

The research also explains how the NUE Law applies to natural bodies like the Earth, Moon, and Sun. For instance, the Moon was once much closer to Earth but has since receded due to the expansion of space. Despite this expansion, the ratios of celestial body sizes and distances remain constant, ensuring that natural events like solar and lunar eclipses will continue in perpetuity. The law also explains the increase in mass and gravitational influence of Celestial bodies as they expand.

In summary, the research presents the NUE Law as a more comprehensive and accurate model for understanding the Universe's expansion. It addresses the shortcomings of Hubble's Law and challenges the reliance on dark energy concepts. It positions the NUE Law as a practical alternative to current Cosmological models, offering a more dynamic view of the Universe's continuous and intrinsic expansion.

The NUE Law for Universe expansion helps supersede the Tectonic Plate Theory, as in Chapter 9, and develop the Living Organic Universe Model, referring to its human connection. It provides a more practical approach to resolving the flaws and shortcomings of the Big Bang, Steady State, and other theories of the Universe.

About the author and his research work:

Baldevkrishan Sharma

Chairman, Lead Scientist & author,
Astrogenesis Research Foundation

He is a talented innovator, inventor, and entrepreneur with a nationally acclaimed, successful, reputed retail brand.

During his college days, he presented his inventions. He won the first Prize for his patented device, STD Control Device, for which he also won the Rashtrapati Science Award. His brief biography is covered in Section A of his maiden published book titled: "Who Are We? & What For?". (available for free reading on the website: www.arf-research.com)

Baldevkrishan Sharma has authored an intriguing and Thought-Provoking new research work titled "Natural Universe Expansion (NUE): A Revolutionary Theory, presenting a new Model of the Universe-dynamics and its Impact."

Here, the author deals with NUE Theory's Vision and a Radical Approach to Universal Expansion. The NUE Law incorporates the element of time, which is missing in Hubble's law and thus accounts for its basic flaw. The NUE Law overcomes the shortcomings of Hubble's Law and has its Nu constant.

The NUE Law not only deals with the Universe's expansion in deep space but also with the Solar System, including the Earth-Moon System. It also deals with all-natural matters connected to the Universe, from an atom to wavelengths, etc. The NUE Law also reviews the Tectonic Plate Theory and proves how the NUE Law supersedes it.

Hubble's Law and the Big Bang Theory influence the widely accepted Universe Model. It covers most of their flaws and ambiguities and presents an alternative theory, "The Living Organic Universe Model." The NUE Universe Model is mathematically and scientifically authenticated and explained in detail with examples, tables, graphs, and calculations.

The author's recent research publication, " Unmaking the Hidden Fate of

Carbon Emissions and the Great Discovery of its Recycling Process," would be an eye-opener and an out-of-the-box research that would be of great interest to the Scientists engaged in researching Earth Sciences, Global warming, causes for colossal forest fires and its solution. The research will also greatly help NGOs like Greenpeace, environmentalists, NGOs for environment protection, nature & ecology conservationists, COP-28 and others.

The author's study on the creation of 'Fortified Oxygen" and its power to deliver energy to sustain energy levels like that of humans, to undertake high energy consuming activities such as running, jogging, workouts in the gym., climbing, trekking, sports like athletics, sprinting, playing basketball, tennis, hockey, football, cricket, cycling, boxing, weight lifting, high jumps, long jumps, swimming, etc. Carnivorous animals need high energy to chase their prey and kill them for food. Cheeta runs at 120 kmph, and elephants support their vast body weight.

The author could also establish the causes of violent human deaths, fatal accidents, and grievous injuries. Since the reason or the cause is known, a possible solution to control and manage fatal human deaths and grievous injuries is suggested.

The author also could analyse the reasons for global warming, where carbon emissions such as GHG (Green House Gas) are understood to play an important role. In contrast, the research holds out other possible reasons hitherto ignored when evaluating global warming and climate change. All these are shared in this research paper presented in the book. *(available for free reading on the website: www.arf-research.com).*

Regarding his above-referred published book, Who Are We? What For?? The author has dealt with the laws of the Universe, i.e., the laws of gravitation, space, and science, which also apply to humans. Since humans are created from the Earth elements, it is also an integral part of the Earth System. The Earth is an essential and integral part of the Solar system and, consequently, an integral part of the Universe. The depth and size of the Universe are too huge and vast to comprehend with the present human-evolved knowledge.

Instead of searching into the vast unknown realms of infinite space and the Universe, it could also be understood via the study of humans, the tech deployed in their creation, the laws of nature influencing human activities and the hidden purpose of their activities. Section B of the above-referred book WHO ARE WE? explores the Universe via humans.

Natural Universe Expansion (*NUE*): A Revolutionary Theory, presenting a new Model of Universe-Dynamics and its Impact

Synopsis:

An intriguing and thought-provoking new research work is titled "Natural Universe Expansion (NUE): A Revolutionary Theory, presenting a new Model of Universe-Dynamics and its Impact."

The NUE Theory's Vision and a Radical Approach to Universe Expansion incorporates the element of time, which is missing in Hubble's law and accounts for its fundamental flaw. The NUE Law overcomes the shortcomings of Hubble's Law by adding the dimension of time and the continuous rate of Universe expansion to it. The Nu constant is derived from the NUE Law.

The NUE Law deals with the Universe's expansion in deep space including all celestial bodies in our neighbourhood, such as the solar system, planets, and the Sun-Earth-Moon System. It also deals with all-natural matters connected to the Universe, from an atom to wavelengths, etc. It also reviews the Tectonic Plate Theory in CHAPTER 9 and proves how the NUE Law supersedes it. (see CHAPTER-9)

Hubble's Law and the Big Bang Theory influence the widely accepted Universe Model. This research study covers its flaws and ambiguities and presents an alternative theory, **"The Living Organic Universe (LOU) Model."**

The LOU Model is inspired by the Human-Universe identity. It is mathematically and scientifically authenticated and explained in detail with examples, tables, graphs, and calculations. (see CHAPTER-2, 3, 4 & 5)

Objective of the research work:

"Natural Universe Expansion (NUE): A Revolutionary Theory, presenting a new Model of Universe-Dynamics and its Impact."

Hubble's Law, presenting the fixed age of the Universe as 13.86 bn years, is its fundamental flaw and has always been a concern. For a dynamic Universe, the age cannot be fixed; i.e., under Hubble's Law, the age of the Universe would reflect 13.86 bn years if calculated as two billion years in the past or also two billion years in the future.

To overcome this shortcoming, a new theory of Natural Universe Expansion (NUE) is introduced, which adds the dimension of a continuous compounding rate of expansion of the Universe with an element of timescale.

With this addition, we could redefine the age of the Universe theoretically and practically on a mathematical scale. It also presents the size of the Celestial bodies in the past and in the future. It resolves whether the Solar and Lunar eclipses will not occur in the distant future or are perpetual. The NUE Law also supersedes the Tectonic Plates Theory.

Hitherto, the Universe is inferred from the observations and interpretations of data and images collected from Earth-based telescopes, the James Webb Space Telescope (JWST), and spectrographic analyses for measuring blue shift, red shift, and other elements in the Universe. We also depend upon the Doppler effect, gravitational lensing techniques, Newton's law of gravitation, Einstein's general and special relativity, dark matter, and dark energy concepts. Distances are measured using parallax, standard candles, cepheid variables, etc.

All these findings are good enough for proximate measurements, and inferences are drawn from scientific, logical interpretations of probable and assumed reasons. For example, there is no finding of how the Universe got so populated over billions of years. However, there needs to be a reference point to compare and know what all the Celestial bodies and their motions are actively performing and achieving.

The NUE Model links Humans as an integral element of the Universe, and therefore, it develops a reference point for the behaviour and the activities of a

Living Organic Universe. Technical analyses of humans and their behaviour are a reference point for various activities happening in the Universe.

Thus, the research resolves most of the ambiguities and flaws of the Big Bang theory, Steady State Theory, dark matter, and dark energy by introducing the Living Organic Universe (LOU) Model and the NUE Law.

Baldevkrishan Sharma

Chairman, Lead Scientist & author,
Astrogenesis Research Foundation

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CHAPTER-9: The Earth's Expansion and the Tectonic Theory.		

"A Critical Examination of Hubble's Law and Its Limitations"
'Analysis of Its Flaws and Implications'.

CHAPTER-1; Abstract :

"A Critical Examination of Hubble's Law and its Limitations" provides a detailed analysis of Hubble's Law and the introduction of the NUE Law as a solution to its flaws. Hubble's Law, first proposed in 1929, showed the Universe is expanding, and the Hubble Constant (H_O) became the foundation for measuring the age and expansion rate of the Universe.

However, since its inception, numerous measurements of H_O have produced inconsistent values, ranging from 500 km/s/Mpc to the current NASA-accepted 70 km/s/Mpc, causing doubts about the accuracy of distance measurements and the recession velocity of the Celestial bodies.

Techniques and methods to determine distance and recession velocities such as the Doppler effect, brightness method, red giant stars, and gravitational waves are examined for their contributions and limitations in determining H_O. Additionally, the CHAPTER highlights that Hubble's Law does not account for the accelerated expansion observed in distant galaxies, suggesting that non-linear factors are missing.

Theories such as dark energy, dark radiation, and dark matter are explored as potential explanations for this accelerated expansion. The NUE Law is proposed as a more precise mathematical solution to address these inconsistencies and enhance our understanding of the Universe's expansion.

1. Introduction:

1-a-i. Why NUE LAW:

NUE LAW is a path-breaking presentation, a natural evolution that will complete the work left incomplete by Edwin Hubble, his colleagues, astronomers, cosmologists, and other scientists since 1929.

1-a-ii. Limitations and Shortcomings in Hubble's Constant:

Before we present this NUE Law, it's essential to explain the current shortcomings in evaluating Hubble's Constant and how the NUE Law provides a practical and algebraic mathematical solution.

1-a-iii. References from websites:

The following websites were visited for information and references: NASA website[1], Britannica[2], Uchicago[3], and others.

1-b.   The Hubble's Law:

The Hubble Law, presented in 1929, pioneered the following discoveries:
b-i. The Universe is expanding.
b-ii. Deriving the age of the Universe.
b-iii. The history of the Universe to a certain extent.

1-b-iv. The Hubble Constant (H_O):

It is a relationship between the distance D between the observer on Earth and the Galaxy in deep Space and the velocity of its recession. A significant application of this Law is that if the D of an astronomical targeted object is found (*like that of a Star or a Galaxy*), its recession velocity can be determined.

1-c.   The H_O needs to be consistently constant.

1-c-i.   Different values of Hubble Constant:

Initially, the H_O Constant was calculated at 500 km/s/Mpc. However, as more precision measurements were undertaken, the H_O had varying values such as 650 km/s/Mpc, 500, 180, 100, 80, 72 and 55 km/s/Mpc values. The latest NASA data provides $H_O = 70 \pm 2$ **km/s/Mpc**.

1-c-ii. Different values of the Hubble Constant?

One of the reasons for arriving at varying values of H_O could be the various assumptions made and the methods deployed to measure D and the velocity V of recession.

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[1] https://science.nasa.gov/missions/hubble/new-hubble-constant-measurement-adds-to-mystery-of-Universe s-expansion-rate/

[2] https://www.britannica.com/science/Hubble-constant

[3] (https://news.uchicago.edu/explainer/hubble-constant-explained#:~:text=,)

As we referred to the history of determining H_O, we find a wide and inconsistent variation as follows:(*data taken from the website*[4])

1. In 1929, H_O = 500km/s/Mpc

2. In 1956, H_O = 180km/s/Mpc

3. In 1958, H_O = 75km/s/Mpc

4. In 1970, H_O = 55km/s/Mpc

5. In 1979, H_O = 100km/s/Mpc

6. In 2019, H_O = 70 (± 2) km/s/Mpc by NASA[5]

1-d. The accepted value of H_O:

The presently accepted **H_O = 70 (± 2) km/s/Mpc**. But this H_O Constant must also adequately match astronomers' observations of Celestial bodies, such as the Stars and Galaxies around us.

However, the Universe is observed to be expanding much faster than predicted by Hubble's Law.

1-e. Something missing in Hubble's equation:

The different observations by Space telescopes and values determined by NASA, other Astronomers and Cosmologists have proven that something is pushing the Celestial bodies to move faster at more considerable viewing distances D. It could imply that **something non-linear is missing from Hubble's equation, causing the speeding up of the targeted Galaxies**.

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[4] https://lweb.cfa.harvard.edu/~dfabricant/huchra/hubble/#:~:text=Hubble's%20initial%
20value%20for%20the,per%20million%2Dlight%2Dyears.

[5] https://science.nasa.gov/missions/hubble/new-hubble-constant-measurement-adds-to-
mystery-of-Universe s-expansion-rate/

1-f.   What are the various shortcomings in measuring the distance D and velocity V?

1-f-i.   The Velocity of Recession:
One of the significant limitation in this H_O is that distant Galaxies' <u>speeds do not match Hubble's Constant.</u>

1-f-ii.   The present understanding of the cause of the Universe's expansion:
The present knowledge banks upon Relativity Equations and denser Universes are responsible for expansion.

1-f-iii.   Universe Expansion through Friedmann equations:
The current thinking is that the expansion of the Universe is driven by the Mass, Energy, and radiation contained within it. The Friedmann equation is derived from Einstein's General Relativity, which mathematically shows the Universe's expansion.

1-f-iv.   Limitation of Hubble's Constant:
At the time of the Big Bang, the denser Universe expanded faster, with its energy and radiation spreading. Because of this, Hubble's equation $V = H_O.D$ cannot mathematically show the Universe's expansion as per the Big Bang theory, which predicts faster expansion at the beginning of Universe formation.

1-f-v.   A flaw in calculating the distance D and the age of the Universe:
The H_O Constant is used as a tool to estimate the age of the Universe. But here, the serious flaw is that the H_O always provides the age of the Universe as a fixed constant. Example: Two billion years ago, the H_O would have given the same age as the Universe; three billion years from now, it will also provide the same age of 13.86 billion years.

1-f-vi.   The Doppler effect method:
The Doppler effect method allows astronomers to measure the recession velocity by measuring the redshift pattern of the light emitted

by Stars as absorption lines in the same position as its signature wavelength. When redshift changes the wavelength of light from a distant Star, Astronomers can measure the shift and derive the recession velocity.

1-f-vii. The Brightness method:

To measure distance D, astronomers must know the targeted Star's or Celestial body's inherent brightness (*known as standard candles*) and compare that to its brightness as viewed from Earth. (*ARF[6]-view: This method for deep space D = measurements is highly challenging regarding accuracy because the brightness could be dimmed for various reasons like dust, a brighter Celestial object behind it, or even the eyesight of the observer, etc.*)

1-f-viii. The Red Giant Star method:

Stars at the end of their lives increase the temperature to 100 mn degrees, accompanied by a sudden drop in brightness. The maximum brightness of the dying red Star can be measured and compared with the known distances of other neighbourhood red Stars to calculate the D of far-off Celestial Bodies. Using this method, H_O was determined to be 69.8 km/s/Mpc.

1-f-ix. The Gravitational waves method:

The Gravitational waves method offers a new way to calculate D distances in deep space. These can be detected on Earth using a Laser Interferometer Gravitational-wave Observatory (*LIGO*). The difference between the energy generated at the source, i.e. at the time of collision of two Neutron Stars, and the energy of the arriving Gravitational waves are determined t o find the distance D. (*With this method, the H_O is calculated at 70km/s/Mpc*).

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[6] ARF: This research study is undertaken by "ASTROGENESIS RESEARCH FOUNDATION".

1-f-x.   The Cosmic Microwave Background Radiation (*CMBR*) Method:

In the early Universe, after the enormous heating of the Big Bang, the CMBR was not homogeneous because the hotter and colder regions were not uniformly distributed across the Universe. From this data, Astronomers drew the model of the Universe's expansion from the Big Bang moment to the present, giving = **H_O = 67.8 km/s/Mpc**.

1-g.   Reasons for inconsistent Hubble Constant?

1-g-i.   Where readings of observations could blur:

The methods employed to calculate the H_O need to be re-examined and reviewed. For brightness, Redshift, and the Model of CMBR, the distance D between the observer on Earth and the Celestial Bodies in deep space is based on the observer's judgement, which could vary from observer to observer. If the observational data on the telescope screen is digitised, more accurate results can follow.

1-g-ii.   Inconsistent values of H_O causing doubts about the known fundamentals of the Universe:

The Astronomers and Cosmologists may have measured the distance D to the Celestial bodies quite elaborately, in detail and accurately by deploying the best available technology & techniques. However, different values of H_O could imply that the methods to measure D, and the recession velocity V, need to be worked upon with greater precision. Otherwise, it would probably be construed that something fundamental in understanding the Universe is missing.

1-g-iii.   Dark energy:

Scientists are considering introducing the concept of "dark energy," a mysterious but unobserved background energy that doesn't spread out even when the Universe is expanding, as one possible solution to the rapidly expanding Universe.

1-g-iv. Dark radiation:

The other propounded concept is "dark radiation," consisting of subatomic particles travelling across the Universe at nearly the speed of light, which could be driving its rapid expansion.

1-g-v: Dark matter:

Some Scientists believe the expansion may not be due to dark energy or dark radiation but could be due to "dark matter" interacting with the Universe differently to cause It to expand, move faster, and accelerate compared to the predictions through H_O.

Dark matter, as interpreted by ARF[7] is given in CHAPTER-8, para 8-a.

1-h. A gravitational lensing Technique:

1-h-i. Gravitational waves for accurate measurement of distant objects:

Gravitational waves are also being tried to find the correct and more precise distance measurements D. Using Gravitational wave methods, Astronomers could measure the Distance D and calculate H_O between 68 to 73 km/s/Mpc.

1-h-ii. Probable Graphical manoeuvring to present the desired value of H_O.

The three graphs shown below, taken from websites mentioned therein, appeared entirely arbitrary because graphs with several slopes could be drawn, as shown when comparing their respective graphs on their right-side figures-(b). A straight line 'slope' can be drawn connecting any two points. Hence, $\frac{V}{D}$ data can be manoeuvred and manipulated to match a pre-decided value unless neutral audit and certifying authorities authenticate its correctness.

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[7] ARF:-Astrogenesis Research Foundation, under which this research and study is undertaken.
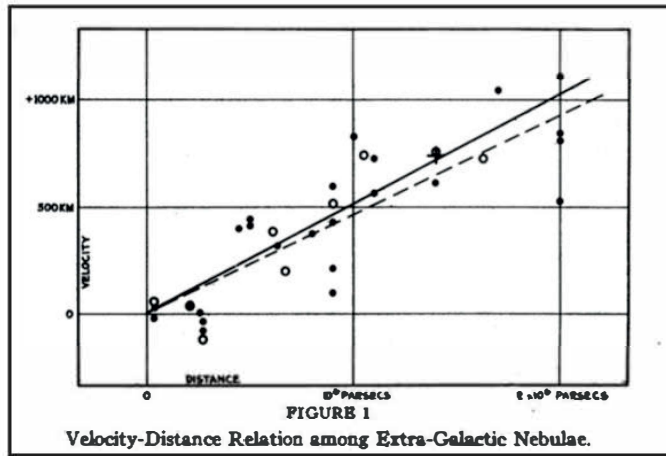
Fig:1.1-a
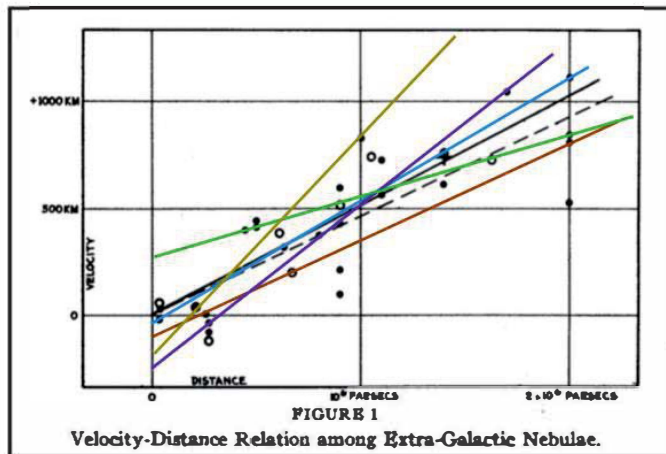
Fig:1.1-b: *If multiple points exist, multiple slopes can be drawn to interpret the results.*

Graph taken from website:
https://www.e-education.psu.edu/astro801/content/l10_p3.html
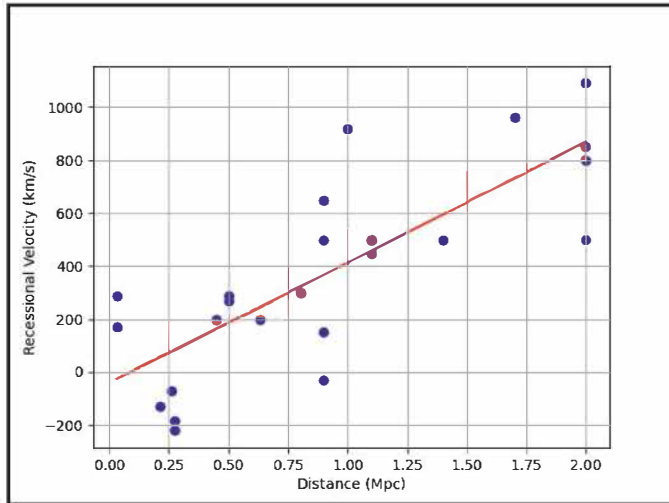
Fig: 1.2-a
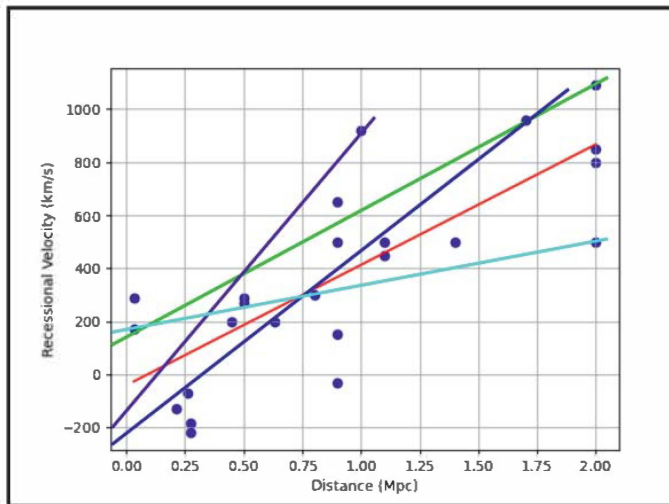
Fig: 1.2-b *If multiple points exist, multiple slopes can be drawn to interpret the results.*

Graph taken from website: *https://astrodatascience.net/hubbles-law/*
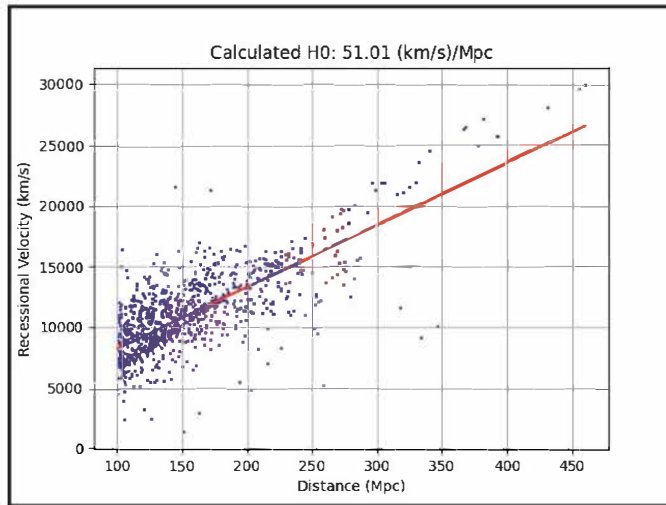
Fig: 1.3-a

Fig: 1.3-b: If multiple points exist, multiple slopes can be drawn to interpret the results.

Graph taken from website: *https://astrodatascience.net/hubbles-law/*
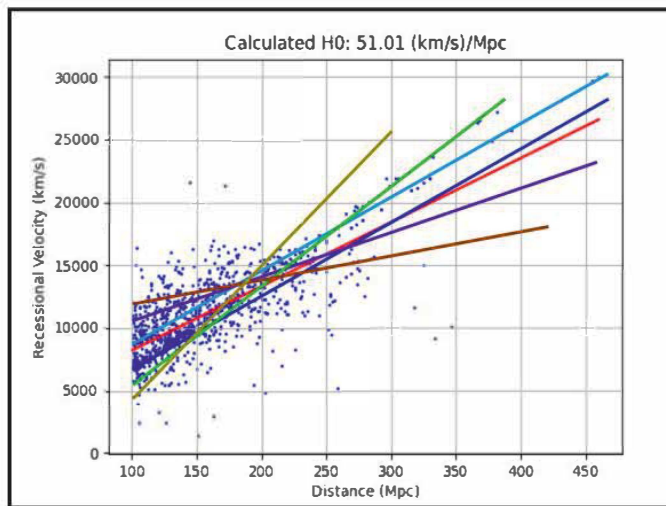
1-h-iii. The chase to improve the Hubble Constant continues:

Scientists are collecting more evidence to improve each method deployed for calculating D.

The Law of Natural Universal Expansion (NUE)

CHAPTER-2; Abstract :

"The Law of Natural Universal Expansion (NUE)," introduces a novel perspective on the expanding Universe, addressing the mystery of its accelerating expansion. Current hypotheses, such as dark energy, dark matter, and dark radiation, attempt to explain this acceleration, but the NUE Law offers a mathematical solution without relying on these concepts. It presents a non-linear equation that modifies the Hubble constant, deriving a more accurate Nu constant. This constant allows precise determination of distances and velocities of Celestial bodies.

The NUE Law suggests that the Universe expands in a straight line by accretion, maintaining constant ratios for temperature, density, and others. This law is universally applicable, affecting everything from Galaxies to atoms and wavelengths. It explains the consistent increase in mass and gravity as the Universe expands, implying a living, dynamic system.

Furthermore, the NUE Law challenges the need for dark energy by showing that the Universe's expansion can be explained by an intrinsic, continuous compounding rate of expansion w.r.t. time. The Chapter also explores the Law's implications for Celestial bodies' expansion, recession, and mass increase, by maintaining stable ratios and properties over time. By expanding uniformly, the NUE Law presents a new model of the Universe, offering a practical alternative to both the Big Bang and Steady State theories.

2-a.   Introduction:

2-a-i.   The purpose of presenting the NUE (*Natural Universe Expansion*) Law:

A great puzzle and mystery surrounds the cause of the acceleration of the Universe's expansion. To solve this puzzle, Astronomers are working on conceptualising dark energy, dark radiation, and dark matter as possible causes for resolving the acceleration mystery.

2-a-ii.   Hubble's Tension:

NASA's website[8] mentions that the current rate of the Universe's expansion is faster than what astronomers expect, based on the Universe's initial conditions and our present understanding of its evolution. NASA refers to this situation as the "Hubble Tension"[9].

2-b.   The objective of the NUE Law:

2-b-i.   To solve the Puzzle and raise the scope of Universe expansion:

The NUE Law seeks to solve the puzzle of why the Universe's expansion is accelerating, raise the scope of Universe expansion, derive a new model of the Universe and resolve various myths surrounding Big Bang Theory and Steady State Theory.

2-b-ii.   The Mathematical solution provided by NUE Law.

The NUE Law provides a mathematical solution that does not need to involve Dark energy, Dark radiation, or Dark matter as hypotheses for the speedy expansion of the Universe (*acceleration*).

2-b-iii.   The Non-linear equation:

The NUE Law also modifies the Hubble constant to a nonlinear equation, but Hubble's Law is a particular case viewed at a specific period in the past. A comparison of Hubble Law & NUE Law is also presented in CHAPTER 3, para 3-a-ii.

2-b-iv.   The NUE Law mathematically determines the Nu Constant[10]:

The NUE Law allows us to determine the Nu Constant from the distance D and velocity V of neighbourhood Celestial bodies, which provides more precise data from authentic and verified NASA websites. Hubble's

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[8] https://science.nasa.gov/missions/webb/nasas-webb-hubble-telescopes-affirm-Universe s-expansion-rate-puzzle-persists/

[9] Hubble Tension website: *https://science.nasa.gov/missions/webb/nasas-webb-hubble-telescopes- affirm-Universe s-expansion-rate-puzzle-persists/*

[10] Nu Constant = 98.2889 km/s/Mpc.D.e^{rt}. The details of its working is given in para 2-l.

constant H_O depends on approximations when measuring targeted Galaxies/Stars/Celestial bodies in far-off deep space. Therefore, the Nu Constant is the most accurate, precise and unambiguous.

2-b-v.   Nu Constant is a mathematical derivation:

Nu Constant is a mathematical derivation. Hence, there can be no variation in Constant's value at any time, but being a nonlinear equation, Nu could increase or decrease over a period, whereas H_O is always a fixed Constant. Similarly, in the past, the Nu Constant was less than that. These variable derivations of Nu Constant are also given in Table: T-3.2 and Table: T-3.2 Annexe.

2-b-vi.   The NUE Law and the applicable period:

From NUE Law, we can find the forward acceleration, $t = 25$ bn years in the future and beyond, w.r.t. from the present time. The NUE Law can also find the decay period in the past w.r.t to the present, that is 25 bn years ago, and also for periods t earlier than 25 bn years.

2-b-vii: NUE Law presents a New Model of the Universe:

NUE Law gives us a New Model of the Universe, which is also compared with the Big Bang and the Steady State Model in CHAPTER-8, para 8-s, Table: T-8.2.

2-b-viii.Deriving the Nu equation and the value of Nu Constant is given in para 2-p below.

2-c.   The Fundamental Law of 'Natural Universe Expansion' (*NUE*):

Before we present the statement for 'Natural Universe Expansion', it is important to understand the difference between Universe 'expansion' and 'recession' as considered in Hubble's Law.

In the context of Hubble's Law, expansion and recession refer to the movement of Galaxies away from each other due to the overall expansion of the Universe. According to Hubble's Law, the farther a

Galaxy is from us, the faster it appears to be moving away, indicating that the Universe is expanding uniformly in all directions.

Thus, expansion refers to the overall increase in the size of the Universe over time, while recession explicitly describes the motion of Galaxies/Stars/Celestial bodies moving away from each other due to the Universe's expansion.

The NUE Law Statement:

The Universe and all the natural bodies in the Universe are increasing in a straight line by accretion*, as a fundamental natural intrinsic property of matter and Universe expansion at a rate continuously compounding with respect to time, and behaving as a living Universe body, maintaining temperature, density and other ratios as a fixed constant.

*Accretion:

1. The act of increasing natural growth, significantly increasing organic bodies by internal accession of parts, is organic growth.
2. The process of growth or increase, typically by the gradual accumulation of additional matter or layers.

2-d.   Explanation of the NUE Law:

2-d-i.   What are the implications of the NUE Law?:

The NUE Law implies that everybody and every living matter integrated with the Natural Universe System is subjected to a straight line increase on a time scale in a regulated mode. This is possible only if the matter has a mass and is able to stretch in its entirety (*volume*). The mass increases proportionate to its stretched increase at a constant density. The rate of increase is regulated as its **"fundamental, natural and an intrinsic property of the matter"**.

2-d-ii.   NUE Law implies that the fundamental increase causes every matter to raise its mass, which also increases its gravity simultaneously to that extent. Increased gravity pushes the R of space in a straight line, causing

it to recess as follows: (m+Δm). G = (R+ΔR) V², where m is the original mass of the Celestial body, Δm is the increased mass in period t , G is the gravitational constant, R is the radial distance at which the satellite of the Celestial body is located, ΔR is the increase in the distance in time t (*recession or say expansion*). V is the velocity at which the Satellite revolves around the Principal Celestial body.

2-d-iii. The NUE Law is Universally applicable to all matters like Celestial bodies in Space, the Solar system, the Earth, etc., including the atoms, which are also a basic unit of matter. its nucleus and the space around which the electrons revolve. Atoms are sources of electromagnetic waves that have specific wavelengths (λ). Thus, NUE Law is also applicable to wavelegth (λ) of EM waves with its intrinsic property to increase (λ).

2-d-iv. The NUE Law's straight line increase cannot be selective for a particular region in space but ought to be uniformly applicable all over the Universe without any distinction, discrimination, or segregation.

2-e. What is the outreach of the NUE Law? Does NUE's straight line increase also include expansion of all matters?

2-e-i. The NUE Law states that the Universe is a living body System. The system is never random, but it always works on a designed programme that works in the backdrop and is never directly visible in the system's functioning. The designed software is a 'cause' whose 'effect' is seen in all activities happening in the Universe on a very precisely regulated, operational, and functional basis.

2-e-ii. The NUE Law is applied at the core software programming of the Universe's operating system, which keeps the Universe dynamic and functioning in perpetuity. The NUE Law causes a Uniform linear increase in every matter in the Universe subjected to Nu constant. Therefore, the velocity of expansion happens uniformly and Universally anywhere and everywhere. As observed in space, it occurs from an atom to molecule, from organic matter to Celestial bodies of all types and sizes.

2-e-iii. Why do we call the Universe a living body system?

Like all living bodies, the living Universe is organic and dynamic. It expands (*grows*), emits radiation, and has a counter-emitting radiation field. We call this the Cosmic Microwave Background (CMB) Radiation. Other details and features of the Living Organic Universe is shared in CHAPTER-7 & CHAPTER-8.

2-e-iv. A Living Organic Universe also has similar living organic matter within it. The living matter includes Celestial bodies, Stars, Galaxies, of all types, shapes, sizes and motions in Space, which also includes the Sun, the Earth, the Moon, all living bodies on an Earth, the mountains, the seas, the oceans, the lakes, the aquatic living bodies etc.

2-e-v. The reason for the NUE Law's integration into the Universe's functioning?

The creators of the Universe may have their reasons for integrating the NUE Law into the Universe activities. However, the one thought that comes to our mind is that the Universe is so vast and massive that to keep it instantly responsive, it needs to be kept active, stirred, and dynamic at all times. Without this intrinsic auto-increase mode, the Universe would have been static, lethargic, inactive and sleepy in the motionless domains[11] of interstellar Space. Thus, NUE Law keeps the Universe dynamic and active at all times.

2-e-vi.   It is similar to the large oceans, which are kept active internally through aquatic living bodies and externally through Earth-Moon-generated high tides, low tides, and waves. Thus, the huge mass of water in oceans and seas is always kept dynamic and active. Similarly, the massive Universe is kept active through the NUE Law.

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[11] The regions where the orbital motions are absent or where the space-time fabric is very weak

2-f. If NUE Law applies to an atom, will it not change with time, the physical characteristics or the properties of matter?

2-f-i. According to NUE Law, if an atom increases (*expands*) or decreases (*shrinks*) with time, its volume and its mass will also proportionally increase or decrease respectively to maintain its density as a fixed constant.

2-f-ii. Let's take a Carbon atom whose atomic number is 6, as an example to check whether the characteristics of an atom will change if it expands in the future or decays in the past period of time.

The atomic radius of the Carbon atom (*at present*) = 67 pm = ($67 \times 10^{-12}m$). The mass of the Carbon atom = $1.9944733 \times 10^{-23}$g.

2-f-iii. Let's take two examples of a Carbon atom: (1) at present, (2) 1 bn years ago. According to NUE Law, the Carbon atom has continuously expanded, but the density remains constant at all times i.e. 2.2 grams/cc. We can calculate the atomic radius of Carbon for the decay period using Table: T-3.2-Annex*.
https://arf-research.com/arf.pdf

From Table: T-3.2 Annex, we get that the shrinkage is as follows:-

2-f-iv. **At present t = 0, shrinkage = 0**
The radius of a Carbon atom = 67 pm = 67×10^{-12} m
NB: From the radius of the atom, we can calculate its volume ($\frac{4}{3}\pi r^3$), and from the volume, we can calculate mass with its density as a fixed constant at **2.2 grams/cc.**

2-f-v. **t = 1 bn years ago** (*see Table: T-3.2 Annexe*) = the shrinkage is 0.9043685764
Therefore, 67×10^{-12} m $\times$ 0.9043685764 = **60.5927 10^{-12} m**
= radius of Carbon atom 1 bn years ago was = 60.5927 $\times 10^{-12}$ m.

Note: From the shrunked radius of the atom, we can calculate its volume = $\frac{4}{3}\pi(r - \Delta r)^3$, and from the shrunked volume, we can calculate mass, with its density as a fixed constant.

2-f-vi.   Conclusion:
As long as the density of carbon atoms do not change, the physical characteristics and all the properties of carbon will remain unchanged at all times. Similarly, the characteristics and propertied of all other matters remains unchanged as long as their respective density do not change.

2-g.   The ratio-Constants:

2-g-i.   NUE Law states that ratios in a functional dynamic system have to be constant. Ratios such as density: $\frac{Mass}{Volume}$, Velocity: $\frac{Distance}{Time}$, Pressure: $\frac{Force}{Area}$, gravitational constant: $G = \frac{F.r^2}{m_1.m_2}$, Planck's Constant: $h = \frac{E}{v}$, ideal gas constant: $R = \frac{p.V}{n.T}$, π = 3.142 (*ratio of the circumference of a circle to its diameter*), Euler's number 'e' = 2.718, Golden ratio = 1.618 and others.

2-g-ii.   In all the above ratio constants, if the ratio changes, its characteristics also change. Below is an example of density as a constant ratio and what happens when it gets variable.

2-h.   Why does an expanding Universe need to have constant density?

2-h-i.   Cosmology texts present a model of an expanding Universe, with a famous example of a balloon on which we draw a few large dots with a felt pen. After the balloon is pumped with more gas, it expands, and the distance between the dots increases proportionately, so the size of the dots (*that is their radius*) also increases in the same proportion.

Fig-2.1-a, 2.1-b, & 2.1-c. *An analogy of an expanding Universe: As the balloon expands, the intermediate distance between the dots also increases proportionately, and so do the dots' diameters.*

2-h-ii. Regarding density, If we blow helium gas into the balloon, its volume increases, which is an excellent example of an expanding Universe. But when the balloon's volume increases, the mass of the gas pumped does not increase proportionately. Hence, the decreased density makes the balloon rise in the air and float randomly, making it unstable and drifting away along with the wind flow.

Fig 2.2. A helium-filled balloon is less dense; hence, it floats randomly and unmanageably on its own.

2-h-iii. The conditions for an expanding Universe to be stable and functional?

There are two primary conditions for a balloon to float and stay stable:

2-h-iv. The spinning (*rotation*) of the body:

Like a spinning top, it stays upright and stable because of its gyroscopic effect and angular momentum.

Fig 2.3. A spinning top is upright and stable.
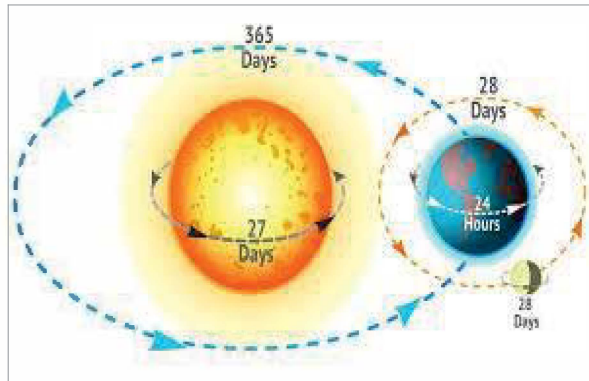
Fig- 2.4: *All Celestial bodies spin, Moon, Earth, Sun, Universe*

2-h-v.   A constant density and its benefits:

A constant density sustains a natural body's physical characteristics and all its properties. If the density of a natural body, whether a Celestial body or any other organic body, or an element or a metal or a solution, liquid, etc., has to be maintained as a fixed Constant. Examples are given in 2-h-vi below.

2-h-vi. Examples of constant density are as follows:

If a substance's density changes, it will change to another substance, that is, its properties will change.

Examples:-

1 - a.   If the density of fresh water is decreased by even 0.1%, all the aquatic life will sink to the bottom and die.

b.   A boat would dip more into the water and become unstable, and it is likely to sink after its density exceeds the new density of water.

c.   A lowered density of water will lose its character and become gasoline, ethyl alcohol, turpentine, olive oil, etc.

d.   If the density of seawater (= 1.035 grams/cc) increases, its character will change and become Ethylene Glycol (density = 1.1 grams/cc), etc. Also the aquatic life will rise to the surface, float and die out

because of the aquatic life is designed for a constant density 1.035 grams/cc.

2. Similarly, if the density of any element changes, it will not remain that element but become another element with different characteristics. For example, cobalt's density is 8.86 grams/cc, and copper's is 8.96 grams/cc. Here, we see drastic characteristics changes from Cobalt to Copper for the increase in density by just 0.1 grams/cc.

3. Even Isotopes of the same element have the same number of protons, but different neutrons have different physical properties, and there are stable and unstable isotopes. Hydrogen has three naturally occurring isotopes: protium, deuterium, and tritium. Due to different densities, all three isotopes exhibit different characteristics despite having the same atomic number.

2-h-vii. Conclusion:

A change in density changes the character and properties of a natural body.

Thus, to sustain the character and properties of any natural element or a natural body, including that of the living Universe, its mandatory and essential for its density to be maintained as a fixed constant.

2-j. Does the NUE Law and the Nu constant causes Universe expansion, increase in the size of the Celestial bodies and recession between the Celestial bodies?

2-j-i. Every Natural body connected to the Universe has its centre whether spherical or otherwise e.g. the Sun, Earth, Moon and other Planets are spherical but the Asteroid belt or the Milky-Way Galaxy are not spherical but have either their physical centre or their pseudo centre (*as in the case of local Galaxy group*).
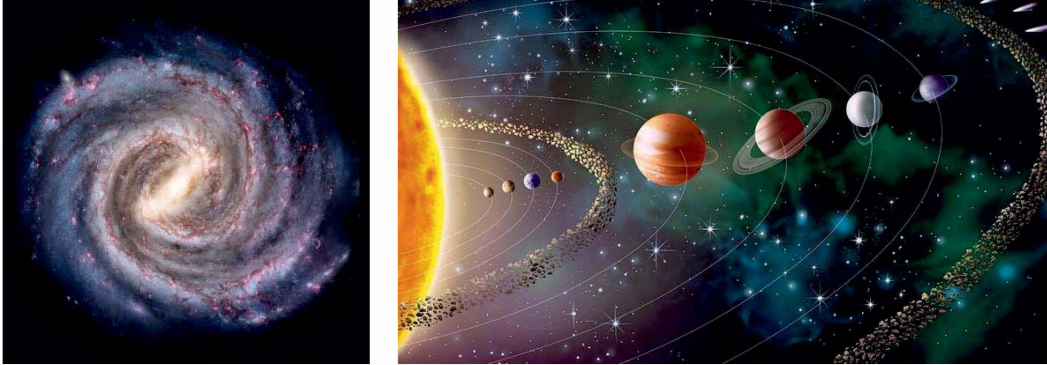
Fig 2.5*: Celestial bodies in Space are spherical and non-spherical, but all of them rotate around their centre.*

2-j-ii.　How do we prove that the straight-line increase in Sun-Earth distance simultaneously follows the NUE Law and the Laws of Gravitation?

2-j-ii-1. Let's take an example of the Sun-Earth linear increase. We have the present Sun-Earth distance = 149.6×10^6 km = R. This distance is from the Sun's centre to Earth's centre. The unit linear increase is regulated by the time factor and given by the Nu constant, i.e. 98.2889 km/s/Mpc.

2-j-ii-2. The 'R' is composed of $R_{C-C} = R_{S-S} + r_S + r_E$, where R_{C-C} is the Sun-Earth distance (*centre-to-centre*), R_{S-S} is the Sun-Earth distance (*surface-to-surface*), r_S is the radius of the Sun, and r_E is the radius of the Earth.

2-j-ii-3. When the time period t increases to $(t + \Delta t)$, then with the Nu constant, we will have $(R_{C-C} + \Delta R_{C-C}) = (R_{S-S} + \Delta R_{S-S}) + (r_S + \Delta r_S) + (r_E + \Delta r_E)$
Thus, by NUE Law, when the time period 't' increases to $(t + \Delta t)$, R_{C-C} increases to $(R_{C-C} + \Delta R_{C-C})$.
It simultaneously implies that r_S increases to $(r_S + \Delta r_S)$, r_E increases to $(r_E + \Delta r_E)$, and R_{S-S} increases to $(R_{S-S} + \Delta R_{S-S})$.

2-j-ii-4. Thus, the size of the Sun increases from r_S to $(r_S + \Delta r_S)$ —----------------- (A)
The radial increase in the Sun's spherical body causes an increase in the Sun's mass from m_S to $(m_S + \Delta m_S)$ —--- (B)

Therefore, at the constant density of the Sun. By cross multiplication of (A) with (B), we get $(\Delta m_S) = \frac{m_S . \Delta r_S}{r_S}$.

2-j-ii-5. Similarly, the size of the Earth increases from r_E to $(r_E + \Delta r_E)$.
The radial increase in Earth's spherical body causes an increase in the Earth's mass from m_E to $(m_E + \Delta m_E)$

Therefore, at the constant density of the Earth. By cross multiplication (same as 2-j-ii-4 above), we get, $(\Delta m_E) = \frac{m_E . \Delta r_E}{r_E}$.

Here, the Sun-Earth distance (*surface-to-surface*), i.e. $(\Delta R_{S\text{-}S})$, increases by the Nu constant = 98.2889 km/s/Mpc.

2-j-ii-6. If Δt = 1 year, to calculate the increased mass of the Sun in 1 year. r_S = 6,95,700 km. therefore, by cross multiplication (*same as 2-j-ii-4 above*) we have, = Δr_S = 6,95,700 km x 98.2889 km/s/Mpc gives,

Nu = 0.069938 m/ yr/6,95,700 km --(A)

Therefore, increase in the mass of the Sun (Δm) = (Δm_S) = $\frac{m_S . \Delta r_S}{r_S}$

Thus, (Δm_S) = $\frac{1.988400 \times 10^{30} \, kg \times 0.069938 \, m}{6,95,700000 \, m}$ **= 1.998917 $\times$ 10^{20} kg/yr ---(B)**

2-j-ii-7. To calculate the recession of the Earth from the Sun.

From the Laws of Gravitation, we have, m_S. G = $R_{C\text{-}C}.V^2$

G = $\Delta R_{C\text{-}C}. V_E^{\,2}$ or $\Delta R_{C\text{-}C} = \frac{\Delta m_S . G}{V_E^{\,2}}$

Therefore, $\Delta m_S . \Delta R_{C\text{-}C} =$ $\frac{1.998917 \times 10^{20} \, kg/yr \times [6.67430 \times 10^{-11}]}{(29780 \, m/s)^2}$

Thus, Earth's recession from the Sun

= $\Delta R_{C\text{-}C}$ = 15.04 m/yr for a distance of 149.6 $\times$ 10^6 km. -------------- (C)

2-k.   Using Earth-Moon recession to authenticate the Sun-Earth recession.

2-k-i.   Earth's recession from the Sun = $\Delta R_{E(C\text{-}C)}$ = 15.04 m/yr/149.6 mn km. --- **(D)**

2-k-ii.   Therefore, for the recession of the Moon from the Earth = _?_ m/yr/ 3,78,000 km. By cross multiplication (C) and (D) we have

= $\frac{3,78,000 \, km \times 15.04}{149.6 \, mn \, km}$ = 0.03800 m/yr = 3.8 cm/yr/3,78,000 km.

This rate of recession is as per NASA data fact sheet[12], measured Earth-Moon recession by laser ranging system, hence verified.

2-k-iii. Since the Earth-Moon recession, as in 2-j-ii is derived from the Sun-Earth recession as in 2-j-i, we have the rate of recession as follows

$$= \Delta R_{E(C^-C)} = 15.04 \text{ m/yr}/149.6 \times 10^6 \text{ km}$$

Thus, indirectly, the Sun-Earth rate of recession also stands verified. ---(E)

2-k-iv. Generalising that all Planets in the Solar System are receding from the Sun at the rate of Nu Constant.

Yes, the NUE Law provides all Celestial bodies are receding from the Sun. The recession table of all Planets, including the increase in their respective sizes (Δr) and increase in their masses (Δm). The Table T-2.1 is as follows:

Table T-2.1: The recession table of all Planets.

Sr.	Planet-Sun	Mean 'R' from the Sun	ΔR/yr increase in radial distance between the Sun and the Planet: i.e. Recession = (mtr/year)	Δr = increase in the Planet's radius (mm/year)	Δm = increase in the Planet's mass (kg/year)
1	Sun	-	-	69.938	1.9987×10^{20}
2	Mercury-Sun	57.9×10^6km	5.82	0.245	3.316×10^{13}
3	Venus-Sun	108.2×10^6km	10.88	0.608	4.889×10^{14}
4	Earth-Sun	149.6×10^6 km	15.04	0.64	6×10^{14}

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[12] https://nssdc.gsfc.nasa.gov/planetary/factsheet/moonfact.html

5	Earth-Moon	386108.4 km	0.3887	0.175	7.379×10^{12}
6	Mars-Sun	228×10^6 km	22.92	0.34	6.446×10^{13}
7	Jupiter-Sun	778.5×10^6 km	78.27	7.023	1.907×10^{17}
8	Saturn-Sun	1432×10^6 km	143.97	5.85	5.71×10^{16}
9	Uranus-Sun	2867×10^6 km	288.23	2.548	8.721×10^{15}
10	Neptune-Sun	4515×10^6 km	453.91	2.473	1.029×10^{16}
11	Pluto-Sun	5906.4×10^6 km	593.80	0.119	1.309×10^{12}

2-k-v. Table T-2.1 Conclusion:

From the NUE Law and the Table above we find that every year, each Planet is recessing away from its Principal Celestial Body, the Sun, while simultaneously their mass is also respectively increasing.

In the case of the Sun, its radius and its mass are also increasing as per the Nu constant.

2-l. Why is the constant ambient temperature of the Universe essential?

This is given in CHAPTER-8, para 8-g-iv.

2-m. The dual isotropic-anisotropic character of the Universe:

2-m-i. The Universe is filled with clusters of Galaxies, superclusters, and vast empty regions known as voids. These structures are not evenly distributed in all directions and have varying temperatures.

2-m-ii. The temperature variations around the visible matter make those portions anisotropic. However, non-visible matter, which is more than 90% of visible matter, is nowhere to be considered, but it must be addressed.

2-m-iii. The isotropy and anisotropy of the Universe depend heavily on the observation scale. The Universe is predominantly isotropic on the

largest scales (*hundreds of millions of light-years*). Anisotropic structures become more apparent on smaller scales (*tens of millions of light-years or less*).

2-m-iv. The Universe is a living organic Universe; we can say that, like the Biological materials, it exhibits anisotropic characteristics because of the anisometric nature of their constituents, and their preferred alignment within interfacial matrices provides sufficient clues for the Universe to exhibit anisotropic characteristics. Thus, when viewed on the larger scales, the anisotropic characteristics are miniscule, whereas the isotropic characteristics dominate the Universe.

2-m-v. Therefore, it would be wise and judicious to say that the Universe displays a dual isotropic-anisotropic model, where the percentage of isotropic over anisotropic may be a higher proportion, say 80-20, 85-15, 90-10 or even 95-05. These ratios are very empirical when observed in their entirety.

2-n. The dual Homogeneous-Heterogeneous characteristics of the Universe:-

2-n-i. The Universe appears heterogeneous in certain regions where structures, clusters, Galaxies, Stars and other Celestial bodies are located. We also need to consider the dark matter in the Universe, which is considered to be very large in proportion to the visible matter, occupying more than 90% of the visible matter.

2-n-ii. However, in the living Organic Universe (*described by the NUE Law*), the overall biochemical composition of the Universe is homogeneous because the gravitational laws, Physical laws, Einstein's Relativity, the E-M spectrum, Doppler's effect, wavelength stretching, temperature of Space = 2.725 K, laws of luminosity, thermodynamics, etc. are common features applicable on the Earth and to the Universe as a whole, which makes it homogeneous.

2-n-iii. Just like the Universe is not entirely isotropic but displays the dual isotropic-anisotropic characteristics. Similarly, the Universe is not entirely homogeneous but displays dual homogeneous-heterogeneous characteristics.

2-n-iv. The proportion of the ratios, that is, homogeneous to heterogeneous, could be empirically drawn as 80-20, 85-15, 90-10, 95-05 or other appropriate ratios is a matter of determination by observations and other theoretical calculations.

2-n-v. **Is Earth genetically and homogeneously integrated with the Universe?**
The Earth is genetically integrated with the Solar System, which is also genetically integrated with the Milky Way Galaxy, the Milky Way with the local group, and so on until we reach the oldest Galaxy, which is integrated with the Universe. Thus, Earth is genetically integrated with the Universe as a lineage of one big family.

2-p. Does the 'Living Organic Universe' (LOU) have genders?

2-p-i. We are aware that the Solar System, including the Earth, is about 4.5 billion years compared to the Universe, which is about 13.86 billion years old. Many other Stars and Galaxies are younger, and some are older.

2-p-ii. One would wonder what creates the newer Celestial bodies, Star systems, Galaxies etc. What could be the process by which new Celestial Bodies and their groups are created?

2-p-iii. The NUE Law describes the Universe model as the 'Living Organic Universe', which could be following a similar procreation pattern to all other living bodies, which is a fundamental criteria for all living bodies.

2-p-iv. All living bodies are gender specific, whether they are animals, birds, trees, plants, or aquatic life. The one thing common to all living bodies is that they all. procreate. On a time scale, they all grow from small to big.

Let's take living humans. beings as a micro example of the 'Living Organic Universe'. The newborn babies are born of either of the three genders: male, female, or transgender (*or also said to be 'non-binary'*).

2-p-v. On a calibrated time scale, the newborn grows in various stages, such as infancy, toddlerhood, childhood, adolescence, and adulthood. During the adult stage, males and females mature enough to choose their partners and copulate for reproduction, where the female conceives, and the parenting process begins with the responsibility of upbringing of the newborn.

2-p-vi. The living body's reproduction is the progressive cycle and the natural pattern of expanding families and population growth. A similar pattern is seen in the Universe. where the living Stars are gender specific, and when matured, they partner with another Star of the opposite gender to procreate a new baby Star, and the cyclic process continues with the parenting caring for the newborn until the newborn is an adult and capable of creating its own family. When we zoom in on the Universe pattern, we find a networked pattern that creates 88 constellations in the Universe.

Fig-2-6: *The Stars appear to be in a pattern networked of circles, semi-circles, squares, rectangles, etc.*

2-p-vii. Thus, we can say that all Celestial bodies have genders, which are either male, female or transgender (*that is, not capable of reproduction*). These genders have to be accepted by default because there is no other magical way of getting new Stars and Galaxies in Space and Populating Universe.

2-p-viii. How to know the gender of a Celestial body (*a Planet, Star, Galaxy, Constellation etc.*)?

It is quite natural that the gender of a living body is always private and

kept hidden, but it can be recognised only through its behaviour. Space scientists will have to focus on observing telescopes in Space, like the Webb Space Telescope and others, to understand the behavioural patterns of the various Stars, which could be the only way to investigate and discover their gender.

2-p-ix. Since there is no direct method of determining the gender of a Celestial body, we Could take help from the knowledge of the Vedas. The Vedic scriptures are 3,500 years old. They suggest a deep connection between humanity and the cosmos and provide eternal knowledge given by the creators of the Universe to humanity.

2-p-x. One branch of the Vedas is the Jyotish-Shastra (*Astrology*). From here, we can get some clues, which mention the zodiac[13] to be divided into 12 equal parts, each of 30° occupying a Constellation called '*Rashis*'. The Rashis and the Planets are shown here as gender-specific.

2-p-xi. How do we say that the Planets and the Rashis are gender specific?
The Planets and the Rashis have genders, which is fundamental to the '*Jyotish-Shastra*'. Astrological predictions based on the genders of the Planets and the Rashis can genuinely predict the birth of a male or female newborn much before the mother conceives the child. It is indirect and inferential proof of the correctness of the genders given to the Planets and the Constellations (*Rashis*) of the Universe.

2-p-xii. Examples of gender-specific planets and Constellations (*Rashis*):-
The Sun, Mars and Jupiter are male genders; Moon (*representing the Earth*) and Venus are female genders, whereas Mercury and Saturn are transgender.

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[13] a belt of the heavens within about 8° either side of the ecliptic, including all apparent positions of the sun, moon, and most familiar planets. It is divided into twelve equal divisions or signs (Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricorn, Aquarius, Pisces).

2-p-xiii. Among the '*Rashis*' in the zodiac, one planet is connected to two '*Rashis*', one male, the other female, and some transgender. e.g. Planet Mars is connected to Aries (*male gender*) and Scorpio (*female gender*). Venus is connected with Taurus (*male gender*) and Libra (*female gender*). Similarly, other planets are connected to the male and female '*Rashis*'.

2-p-xiv. How can the two Stars do the Celestial mating?

Let's take the example of trees and plants. Trees are also male and female, and since they are fixed to the ground, they cannot physically mate. Therefore, pests are created that cross-pollinate between the male trees and the female trees, where the female trees bear fruit. We get the seeds from the fruit, which can be procreated again.

2-p-xv. Similarly, the Stars do not physically mate. Still, intermediaries like Comets, Solar winds, etc., can connect the opposite-gender Stars by way of cross-mating. Female stars get conceived and Start the pre-natal process, which consequently gives reason for making a newborn Celestial baby or a baby Star.

2-q. If Earth is a female gender, can the Earth procreate?

2-q-i. Just like a growing child of 9 to 10 years starts getting the feeling of a pre-puberty period where some inkling starts creeping into the child, moving towards sexual inclination.

2-q-ii. Now, let's take Earth as an example. In the last 70 years, we have ventured into Space, landing on the Moon and Mars and preparing to colonise them.

2-q-iii. The technologies are also being developed to make spaceships faster and study other solar planets.

2-q-iv. In 1000 years, humans can create mega Satellites, wherein tens of thousands of micro Satellites like the one we have in our Space close to the Earth and scattered around several orbits could be clubbed into a single massive Satellite and launched.

2-q-v.   The progression will continue, and possibly, by the next 5,000 years, the Earth will be able to launch Satellites the size of the Moon. In the following 10,000 to 25,000 years, technologies will be developed to launch Star-like Celestial bodies.

2-r.   The NUE Law states that the Universe's expansion, including all Celestial bodies, Stars, and Galaxies are, continuously compounding with respect to time:

2-r-i.   The NUE Law implies that the radial distances of all Celestial bodies and the space between them are increasing, such that the velocity of expansion is directly proportional to the product of distance and the compounded rate of continuous expansion w.r.t. time.

2-r-ii.   If **D** is the distance between the observer and the targeted Celestial body (*like a Star, Galaxy, etc.*) or the radius of a Celestial body or a matter, **e** is Euler's number (= *2.718…*), **r** is the rate of expansion and **t** is the period for which expansion is being calculated. Thus, we have **V**, the expansion/recession velocity is directly proportional to $D.e^{r.t}.$, **or** V'[14] $\propto D.e^{r.t}$ **or** $V' = Nu.D.e^{r.t}$**,** where **Nu** is a constant.

2-r-iii.   The Nu constant is derived as follows:

The distance between the Earth and Moon, drawn from NASA website[15] as measured by NASA's laser ranging system, is 3,78,000 km, and the recession velocity is measured as 3.8 cm/year.

NB: When calculating the Nu constant for the present period, we take t = 0.

Therefore $e^{r.t} = e^0 = 1$**. Thus, the present Nu constant =** $\frac{V'}{D'} = \frac{V'}{D.e^{r.t}}$**. (here,**

$D' = D.e^{r.t}$**)** [16]

Thus, Nu = $\frac{V'}{D'}$ **= 3.8 cm/year/3,78,000 km (=** *98.2889 km/s/Mpc*)**.**

---

[14]   V' is a modified velocity given by Nu Constant and not a derivative of velocity.

[15]   https://nssdc.gsfc.nasa.gov/planetary/factsheet/moonfact.html

[16]   D' = D.e^{r.t} and not a derivative of distance D.

2-r-iv. How do we calculate the rate of continuous compounded expansion in decimals that is r?

As per NUE Law, the expansion rate is continuously compounding w.r.t. time **t** here **t** is in seconds.

The continuous compounding formula for recession / expansion is **V′ = Nu.D′,** where **= D′ = $D.e^{r.t}$.** Here, **r** is the continuous compounding percentage in decimals of 1 Mpc. We have, **t** for the past period (*i.e. the decay period*) is negative.

Thus, the formula **D′ = $D.e^{r.-t}$ or $D.e^{-r.t}$** ----------------------------------- **(A)**
Similarly for future period 't' is (+)ve. Thus, we have **$D.e^{r.+t}$** or **$D.e^{+r.t}$** --- **(B)**
For the present period 't' = 0, therefore $e^{r.t} = e^0 = 1.$
Therefore **D′ = D** --- **(C)**
To calculate the rate of expansion 'r' percentage in decimals, we have as follows:- For 1 Mpc distance we have 98.2889 km recession/expansion.
1 Mpc = 3.086×10^{19} km.
Thus, if 3.086×10^{19} km = 100% then 98.2889 km = %?

Therefore, percentage = $\dfrac{98.2889 \; x \; 100}{3.086 \times 10^{19}}$ = 3.18499×10^{-16} %.

Thus, In decimals = percentage / 100 = $\dfrac{3.18499 \times 10^{-16}}{100}$ = 3.18499×10^{-18}

or **r = 31.8499×10^{-19}** -- **(D)**
Note: Percentage rates have no units.

2-r-v. Why have we calculated the Nu constant from the Earth-Moon recession?

The Universe is expanding uniformly all over, so whether we measure the distance D and the expansion velocity V from the Celestial bodies in deep space or the Celestial bodies closer to us should be the same.

However, measuring closer Celestial bodies like the Earth-Moon is more precise with high accuracy measuring instruments than measuring Celestial bodies in deep space with several assumptions and approximations, as seen in CHAPTER-1, para 1-f.

Thus, the Earth-Moon distance and its expansion rate, measured with NASA's laser ranging systems, provide precise and accurate Nu constant = 3.8cm/year/3,78,000 km, **equivalent to Nu = 98.2889 km/s/Mpc.**

2-r-vi. Why and what's the difference between Nu constant and Hubble's constant?

The accepted value of **H_O = 70±2 km/s/Mpc,** as drawn from NASA website[17] and the calculated value of **Nu = 98.2889 km/s/Mpc.**

We have seen that the value of Hubble's constant is calculated by measuring Celestial bodies in deep space using methods like the Doppler effect, brightness, red giant Stars, gravitational waves, etc., with several assumptions and approximations, as seen in CHAPTER-1, para 1-f.

Whereas, the value of the Nu constant is calculated from the precise measurement of Earth-Moon distance = 3,78,000 km and the Moon's recession rate from Earth at the rate 3.8 cm/year. **Then how can the Nu constant not be correct?**

2-r-vii. When is Nu constant = Hubble's constant?

The difference in the recession rate, H_O = 70 km/s/Mpc and Nu = 98.2889 km/s/Mpc, is in the **"period"** for which they are calculated. The rate of recession in both cases is calculated for different periods.

The Hubble constant value is calculated for 3.3756 bn years ago* as seen in CHAPTER-3, para 3-h, Table T-3.2 and Table T-3.2 Annexe.

Meanwhile, the Nu constant value is calculated using the present (*t = 0*) Earth-Moon recession velocity.

*We get the value of Nu = 70 km/s/Mpc for a period that could have been about 3 to 4 billion years ago. At that moment, Nu = H_O, = 70 km/s/Mpc.

Thus, H_O is measured in deep space about 3 to 4 bn years ago; therefore, it is a special case when Nu = H_O.

2-r-viii. Nu constant is a non-linear equation. Is it non-linear at all times?

Nu = $\frac{V'}{De^{r.t}}$, we take the present time as t = 0, the past as **−t** and the future as **+t.** Therefore, for the present time t = 0, the equation Nu = $\frac{V'}{D.e^0} = \frac{V'}{D \times 1} = \frac{V}{D}$ = a linear equation for the present times.

---

[17] https://science.nasa.gov/missions/hubble/new-hubble-constant-measurement-adds-to-mystery-of-Universe s-expansion-rate/

For calculating the expansion in the past (*the decay period*), that is, the contraction from the present period to the past, we have the **Nu equation** $\Rightarrow$ **V′ = Nu.*D*.*e*$^{-r.t}$** For calculating the expansion in the **future,** we have V′ = Nu.***D*.*e*$^{+r.t}$ = Nu.*D*.*e*$^{r.t}$**

Thus, we can say that the Nu equation is non-linear all the time except during the 'present-time' when t = 0.

The interval period of t = 0 for the Nu equation is given in para 2-s below.

2-s.   How much 'time interval' can we take for which the Nu constant is a linear equation (*D′ = D*), that is, when the present period (*t ≈ 0*) ?

2-s-i.   Example-1 for period of 100,000 years or less

Let's take examples Starting 100,000 years.

Example-1: for **t = 100,000 years (*0.1 mn years*) x 3.156 x 10^{7}s = 10^{5}x 3.156 x10^7= 3.156 x10^{12}s.**

Thus **r.t = 31.8499x10^{-19} x 3.156 x 10^{12} = 10.05 x 10^{-6}:**

Since **r.t** is of the order of a **10^{-6}, that is, it's a millionth part.**

Therefore, **r.t = 0 $\Rightarrow$ e^0 ≈ 1.**

Thus, V′ = Nu.D′ = Nu.D $\Rightarrow$ Nu ≈ linear equation.

Hence, all periods below 1,00,000 years give the Nu equation: V′ = Nu.D, which is a linear equation.

2-s-ii.   Example-2: for t = 1 million years

t = 10^6 x 3.156 x 10^{7}s = 3.156 x10^{13} s,

Thus **r.t = 31.8499 x10^{-19} x 3.156 x 10^{13}= 10.05 x 10^{-5} = 0.0001005**

Therefore **e$^{0.0001005}$= 1.000100523.**

Thus, V′ = Nu.D x 1.000100523 Mpc,

Thus **V′ ≈ Nu.D**

The Nu equation is linear for t = 1 million years, except for the far-off located Galaxies in Deep Space.

2-s-iii. **At what distances the Nu equation will be linear for one mn years?**

Example of various distances D: A targeted Galaxy is observed at distances varying from 0.5 to 500 Mpc. (*see Graph G-2.1, below*).

Thus, if we take D = 0.5 Mpc, D′ = **1.000100523 x 0.5 = is negligible.**

if we take D = 250 Mpc, then D′ = **1.000100523 x 250 = 250.025 Mpc.**

if we take D = 500 Mpc then D′ = **1.000100523 x 500 = 500.0502 Mpc.**

However, for lesser distances of 100 Mpc, $e^{(r.t \approx 0)} = e^0 \approx 1$.

Thus, **for distances less than 100 Mpc and t = 1 mn years, the Nu equation is linear.**

NB: Here, after one million years, for galactic distances beyond 250 Mpc, Nu is a threshold limit from which the_ acceleration of Galactic velocity becomes evident.

It also implies that for less than 1 million years, a Galaxy located at a distance D = 250 Mpc will also appear to move linearly, where the Nu equation is also linear.

2-s-iv. **Example-3**: for **t = 10 million years**

For t = 10 mn years = 10^7 x 3.156 x 10^7 s = 3.156 x10^{14} s,

Thus **r.t = 31.8499 x10^{-19}x 3.156 x 10^{14} = 10.05 x 10^{-4}:**

Since **r.t** = 0.001005 = Therefore $e^{0.001005}$ = 1.0010056.

Thus D′ = 1.0010056 x D, where D exceeds 50 Mpc for t = 10 mn yrs.

For Nu Constant, It also implies that for 10 million years, a Galaxy located at a distance up to 50 Mpc will appear to move at a linear velocity, where Nu is linear (*like the H_O*)

NB: For accelerated recession velocity, the Nu constant gets non-linear when t is 10 million years and D exceeds 50 Mpc.

2-s-v. **Example-4: for t = 100 million years**

For t = 100 mn years, we have = 10^8 x 3.156 x 10^7s =3.156 x10^{15} s,

Thus, r.t = **31.8499 x 10^{-19} x 3.156 x 10^{15} = 10. 05 x 10^{-3} = 0.01050**,

Therefore D′ = $e^{0.01050}$ x D = 1.0101025.D

Thus, D′ = 1.0101025 x D, where D is in Mpc.

Here, the Nu law gets active, triggering an accelerated velocity when compounded for 100 million years and beyond, for observable distances 2.5 Mpc and beyond. Graph 2.1 below shall be linear for shorter periods that is, less than 100 million years or lesser than 2.5 Mpc distances.

2-s-vi. Example-5: for t = 250 million years

For t = 2.5×10^8 x 3.156 x 10^7s = **7.89 $\times 10^{15}$ s,**

Thus **r.t = 31.8499 x10^{-19} x 7.89 x 10^{15} = 0.0251295711**

r.t = 0.0251295711 Therefore, $e^{0.0251295711}$ = 1.02544798

Thus when t = 250 mn years, the Nu equation v = Nu. D x 1.02544798 = 1.02544798.D where D is in Mpc.

Here, the Nu law gets active, triggering an accelerated velocity when compounded for 250 million years and beyond, for observable distances 1 Mpc and beyond.

2-s-vii. Graph G-2.1 below, shows a nearly linear graph for shorter periods less than 250 million years for distances less than 1 Mpc.
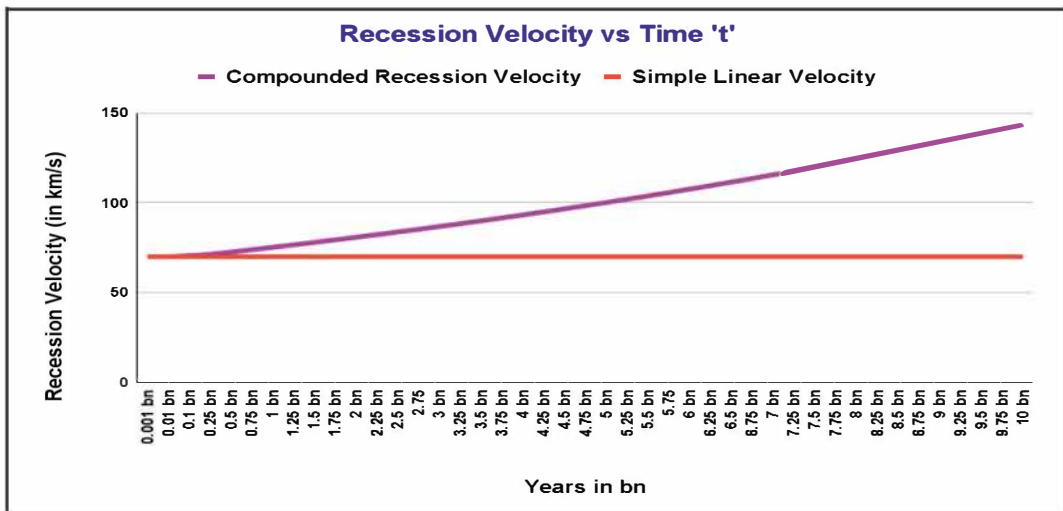
Graph G-2.1 shows Nu & H_O at an initial period; both are linear, but with the advancing period, the exponential function $e^{r.t}$ takes the curve path (pink line) and the red line as Hubble constant, which is not a function of time t. Where D = 1 Mpc at all times. Since H_O is a linear equation, for v = 70 km/s, D will always remain constant at D = 1 Mpc.
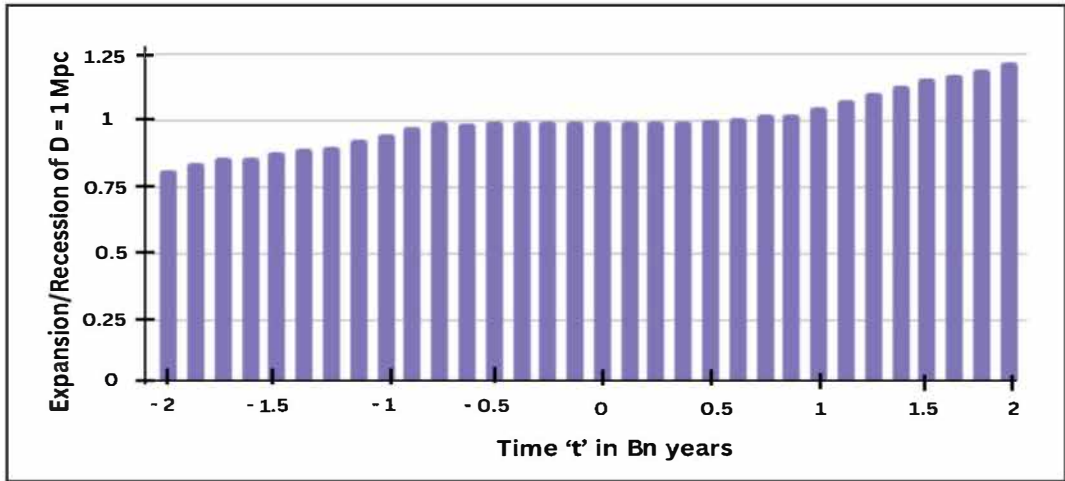
Graph G-2.2: *The above graph is plotted between* ***t*** *= - 2 bn years to* ***t*** *= + 2 bn years. It shows that the graph is linear while the Nu curve is exponential between* ***t*** *= - 0.125 bn years to* ***t*** *= + 0.125 bn years.*
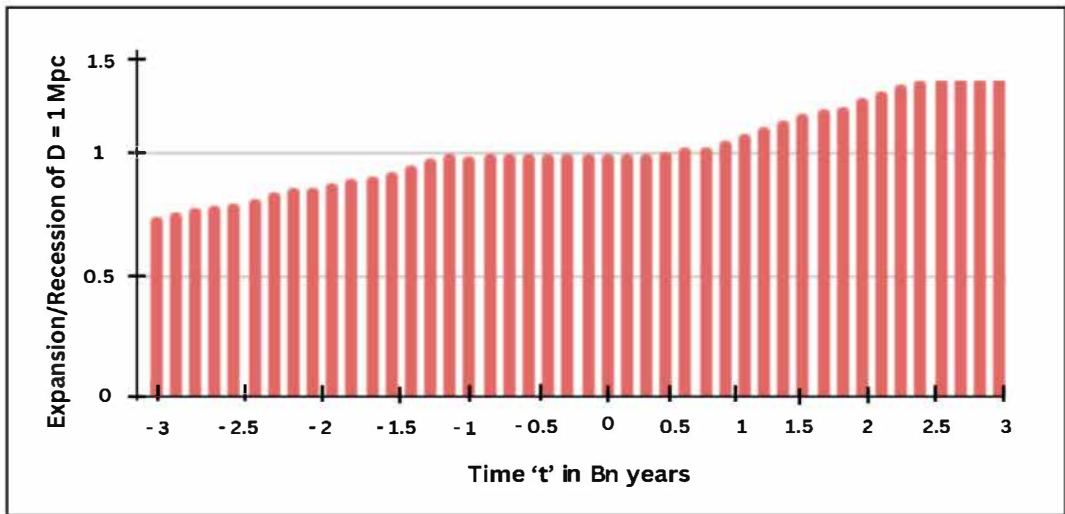
Graph G-2.3: *The above graph is plotted between* ***t*** *= - 3 bn years to* ***t*** *= + 3 bn years. It shows that while the Nu curve is exponential character between* ***t*** *= - 0.125 bn years to* ***t*** *= + 0.125 bn years, the graph is linear.*
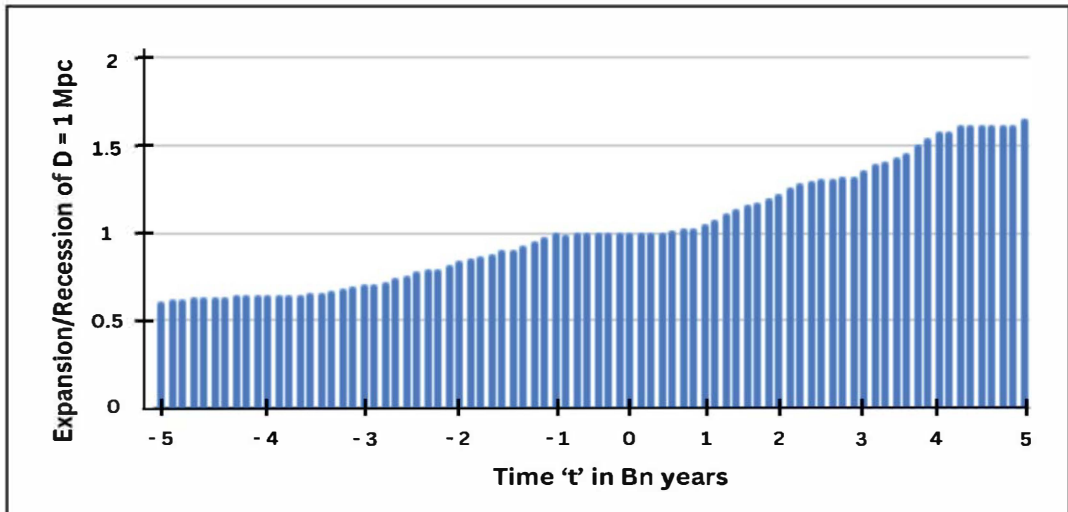
Graph G-2.4: *The above graph is plotted between* **t** *= -5 bn years to* **t** *= + 5 bn years. It shows that the graph is linear while the Nu curve is exponential between* **t** *= - 0.125 bn years to* **t** *=+0.125 bn years.*

2-s-viii. Table T-2.2:- The Table summarises the period t versus the linearity of the Nu equation.

Time 't' years	Distance 'D'	Linearity
1,00,000 years and less	1 Mpc	Linear
	250 Mpc	Linear
	500 Mpc or more	Linear
1 mn years	1 Mpc	Linear up to D = 250 Mpc
	250 Mpc or more	Non-linear
10 mn years	1 Mpc	Linear up to D = 50 Mpc
	50 Mpc or more	Non-linear
100 mn years	1 Mpc	Linear up to 2.5 Mpc

Time 't' years	Distance 'D'	Linearity
	2.5 Mpc or more	Non-linear
250 mn years	1 Mpc	Non-Linear
	250 Mpc	Non-linear
	500 Mpc	Non-linear

2-s-ix. What are the applications of the Nu constant?

Nu constant is applicable to determine the expansion (*of the future*) or shrinkage (*of the past, that is, the decay period*) of all bodies from macro to micro size of all linear distances for a given period.

The distances could be as large as that of interstellar spaces, the radius of Celestial bodies, like Galaxies, Stars, Planets, their Satellites (*like the Sun, Earth, Moon, etc.*) or all other natural matters and bodies, including that of an atom, wavelength (λ), etc.

2-s-x. When period t increases, what happens to the space distance R and the mass of the Principal Celestial body?

According to the NUE Law, when R stretches, as per Nu Constant,[18] the mass of the Principal Celestial body also increases proportionately, as follows: **= by the Law of Gravitation = RV² = mG at the time t ---------- (A)**
= When there is an increase in time = Δt (*say one year, 100 years, 1mn years or more*), = by **NUE Law = (t + Δt).**

= the increase in the Spacetime distance R = **(R+ΔR) and the proportionate increase in the mass of the principal Celestial body is = (m+Δm).** where Δ (*delta*) is proportionate change w.r.t. Increase in time Δt respectively.

Thus, with time Δt, the equation (A) evolves to =
(R+ΔR)V² = (m+Δm) G -- **(B)**

Dividing (B) with (A) we get = $\frac{(R+\Delta R)}{R} = \frac{(m+\Delta m)}{m}$

---

[18] Nu Constant = 98.2889 km/s/Mpc.D.e^{rt}. The details of its working is given in para 2-l.

$$= \frac{(R+\Delta R)}{R} = \frac{(m+\Delta m)}{m} = \frac{m.(R+\Delta R)}{R} = (m+\Delta m) =$$

Therefore, $\Delta m = \left[\frac{m.(R+\Delta R)}{R}\right]$ - m (*equation derived from Laws of Gravitation*)--- **(C)**

When the gravitational space time R increases from R to (R + R), that is, R increases or recesses, the mass of the Celestial body m also increases proportionately to (m+m), maintaining its density as constant.

In equation (C), R is known, ΔR is found from the Nu-Constant, and m of the Celestial body is known; thus, Δm can be determined.

2-t. What will be the increase in the mass of Earth in 1 year?

2-t-i. Data drawn from NASA website factsheet[19], we have the following:
Present radius of Earth = **6371 km** --- **(D)**
Mass of Earth = **5.9722×10^{24} kg** (*from NASA fact sheet*) ---------------- **(E)**
Radial Earth-Moon (*S-to-S*) distance = **3,78,000 km** ---------------------------- **(F)**
Recession of Moon from Earth = ΔR = **38 mm/year** (*given by NASA*) ---- **(G)**

2-t-ii. To find the increase in Earth's radius Δr in 1 year by the Nu constant.
The radius of the Earth is 6371 km. For the Earth-Moon distance of 3,78,000 km, the increase in recession is 38 mm/year.

Therefore, the increase in the radius of Earth = $\frac{6371 \, km \times 38 \, mm}{3,78,000 \, km}$ = **0.64 mm/year**

The Nu constant gives the increase in the Earth's radial distance, Δr = **0.64 mm/yr** --**(H)**
Increase in radius of Earth = 6371 km + 0.64 mm = **6371000.00064 m** ---**(J)**

2-t-iii. To calculate Earth's increase in mass (Δm) from the Laws of Gravitation as follows:-

$\Delta m = \left[\frac{m.(R+\Delta R)}{R}\right]$ - m $= \left[\frac{5.9722 \times 10^{24} \, kg.(3,78,000 \, km + 38 \, mm)}{3,78,000 \, km}\right]$ - $5.9722 \times$

10^{24} **kg** $= 6 \times 10^{14}$ **kg/yr**-- **(K)**

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[19] https://nssdc.gsfc.nasa.gov/planetary/factsheet/earthfact.html

2-t-iv. Calculations to find Earth's Δm/year from the NUE Law:

By applying the NUE Law directly for an increase in straight line recession to calculate the increase in mass (Δm) can be done by cross multiplication from the Nu constant as follows:

For 6371 km, the linear increase in radius is 0.64 mm/yr;

Therefore, for the mass m of the Earth 5.9722×10^{24} kg, Δm = ?

We have $\dfrac{5.9722 \times 10^{24}\, kg \times 0.64\, mm}{6371000000\, mm}$ = 6×10^{14} kg = Δm

2-u. By Laws of Gravitation to calculate the increase in Earth-Moon recession (ΔR) (*centre-to-centre*) per year from increase in mass (Δm) per year of the Earth.

2-u-i. From the law of gravitation, we have F = $\dfrac{G.m.M}{R^2}$, where m is the mass of the Earth, M is the mass of the Moon, R is the Earth-Moon distance (*centre-to-centre*), and G is the gravitational constant.

F = $\dfrac{G.m.M}{R^2}$ can be repositioned as, = G.m = $\dfrac{F.R^2}{M}$ = RV^2

Therefore, **mG** = RV^2 where V is the velocity of the Moon ----------------(L)

Here,

R = 386108.4 km [*radius of Earth + radius of Moon + E-M s-to-s distance*] -- **(M)**

After one year, we have from (C) above (R+ ΔR) = $\dfrac{(m + \Delta m).G}{V^2}$ (*holding V constant temporarily*). where **ΔR is the increase in Earth-Moon distance R in one year.**

2-u-ii. From (K) above, we have: $\Delta m = 6 \times 10^{14}$ kg/year

$$\Delta R = \frac{386108.4\, km\, [(5.9722 \times 10^{24}\, kg) + (6 \times 10^{14}\, kg)]}{5.9722 \times 10^{24}\, kg} - 386108.4\ km =$$

0.000038789 km = 38.789 mm/year. --- **(N)**

38.789 mm is the recession for Earth-Moon distance (*centre-to-centre*) = **3,86,108.4 km**

2-u-iii. **To find Earth-Moon recession (*surface-to-surface*) ΔR:**
By cross multiplication to calculate Earth-Moon distance (surface-to-surface) = 3,78,000 km, we have: $\dfrac{3,78,000\ km \times 38.789\ mm}{3,86,108.4\ km}$
= 37.974 mm = 38 mm **Therefore, ΔR = 38 mm/year**----------------(P)
ΔR = 38 mm/year tallies with the finding by NASA's laser ranging system.

2-u-iv. **Is the Moon's rate of recession from Earth constant when measured from any coordinates of the Earth?**
When measuring for close distances like Earth-Moon, Earth-Venus, and Earth-Mars, we have V′ = Nu.$D.e^{rt}$.Cos (θ). Distance D is measured from equator to equator where $\theta = 0$, hence D.Cos (0) = D. But when measured in any of the coordinates of the Moon or from the Earth, then θ becomes relevant. For example, if the measurement of the Moon is taken from Mumbai located at 19.076º N then the distance D is 3,78,000 x Cos (19.076º) = 357242.5 km, hence, V′ will be less than 3.8 cm/year that is 3.59 cm/year. If it is taken from Colombo in Sri Lanka then the recession will be 378000 x Cos (6.927º) = 375240.8 km thus recession velocity V′ = 3.772 cm/year.

2-u-v. For measuring Celestial bodies in deep space, the Celestial bodies, however large, are observed as point size w.r.t. D measured from Earth, hence $\theta = 0$.

2-u-vi. Also, when measured from Earth, Celestial bodies of small size w.r.t. D, e.g., Mercury, Pluto, Neptune, Uranus, or Satellites of Saturn, can all be taken as $\theta = 0$ because they all act as a point size w.r.t. their position.

2-u-vii. Therefore, for distances measured in Pc or Mpc or the ratio of the size of the Celestial body w.r.t. to the distance D is negligible; hence θ can be taken as zero.

2-u-viii. **Conclusion:**

2-u-viii-1. **From para 2-r and 2-s we find that from the recession ΔR we can find Δm of Earth and vice-versa, i.e. from Δm we can find ΔR.**

2-u-viii-2. It also implies that when the mass of Earth or any Celestial body increases by Δm, the gravitational field outside the Celestial body also expands / recesses by ΔR.

2-u-viii-3. The cause for recessing Moon from Earth (*ΔR/year*) is the increase in mass of the Earth (*Δm/year*).

Therefore, there is no need to hypothesise dark energy to be the cause for expansion and acceleration.

2-u-viii-4. For measuring rate of recession for closer Celestial bodies like Earth-Moon distances, the coordinates from where the measurement is done influences the recession velocity by Cos (θ) (*V = V'.Cos θ*) , where θ is the latitudinal coordinate as seen in para 2-u-v, vi and vii. Where, the ratio of the distances D w.r.t. Size of the Celestial body is negligible θ can be taken as zero.

2-v. How do we say Earth is a Principal Body for all Galaxies, Stars and other Celestial bodies in deep Space situated at multiple distances in (Mpc)?

2-v-i. The Moon is the Satellite of its Principal Celestial Body, that is, the Earth. The increase in the radius of the Earth, as per NUE Law, causes the Earth's mass to increase simultaneously. The increase in mass of the Earth causes its Satellite Moon to recess from the Earth simultaneously in compliance with the Laws of Gravitation mG = Rv². The mathematical calculations are presented in para 2-r and 2-s above.

2-v-ii. Earth is an integral part of the Solar system, and therefore, the Solar system is the Principal Celestial body, w.r.t. the Celestial bodies in deep space. Here, the Solar system's mass is also increasing, complying with the NUE Law and Nu constant.

2-v-iii. The Solar System is an integral part of the Milky Way Galaxy, and therefore, the Milky Way Galaxy is the Principal Celestial Body w.r.t.

the Celestial bodies in deep Space. The mass of the Milky Way Galaxy also increases proportionally, complying with the NUE Law and Nu constant.

2-v-iv. The Milky Way Galaxy is an integral part of the Virgo Supercluster, part of the Laniakea Supercluster. Thus, the Laniakea Supercluster is the Principal Celestial Body for the Galaxies and Stars in the deep Space. The mass of the Virgo Supercluster and the Laniakea Supercluster also increases proportionally, complying with the NUE Law and Nu constant.

2-v-v. Thus, the Earth is a Principal Celestial Body located within all the Principal Celestial Bodies networked and encompassed in the Laniakea Supercluster w.r.t. the Celestial bodies in deep Space.

2-v-vi. Therefore, the increase in the mass of Principal Bodies pushes the Gravitational field. Thus, Galaxies, Stars, and other Celestial bodies located at massive distances in deep Space observed from Earth are showing a recession of Galaxies and Stars in deep Space **at the rate 98.2889km/s/Mpc,** which is equivalent to **38 mm/year/ 3,78,000 km for the Earth-Moon distance.**

2-w. How do we say that the mass of each Celestial body in the Universe is increasing simultaneously in whichever System they belong to?

2-w-i. When we say the Solar System is radially expanding as per NUE Law, it implies that every Celestial body in the Solar System is also expanding simultaneously, e.g. the Earth, Venus, Mercury, Mars, Jupiter, Saturn, Uranus, Neptune or the Asteroid belt, Kuiper belt or the respective rings of Jupiter, Saturn, Neptune, Uranus in the Solar System, including that of the Sun.

2-w-ii. Thus, the Earth-Moon recession is not a special case but one among the other co-planets, where the recession happens between the Planets and their respective Satellites.

2-w-iii. We have already explained that the NUE Law causes the expansion of the Principal Celestial Body, which in turn causes its Satellites to recess, as per the Nu-Constant. In the Solar System, we take the Sun as a Principal Celestial Body. The expansion of the Sun's sphere is causing an increase in its mass, which causes all its Satellites to recess away from it. Therefore, all the satellites of the Sun, that is the planets, recess from the Sun simultaneously at the rate Nu constant.

2-w-iv. Similarly, all the Planets are Principal Celestial Bodies of their Satellites and rings, respectively (*for Jupiter, Saturn, Uranus and Neptune*). This implies that not only the Satellites of the Planets but also the rings of the Planets are recessing. The Asteroid and Kuiper belts are also recessed from the Sun at the rate Nu constant.

2-w-v. Thus, from paras **2-r and 2-s** above, we can say that the Sun and the entire Solar System are simultaneously expanding radially and volumetrically, causing an increase in their mass while maintaining their constant density.

2-w-vi. Similarly, the Solar System is an integral part of the Milky Way Galaxy, which is not a special case of expansion but is in conformity with the overall expansion of the Milky Way Galaxy. Here, all the Celestial bodies expand and recess simultaneously, radially, volumetrically, and with their respective increased masses at all times, at the rate Nu constant.
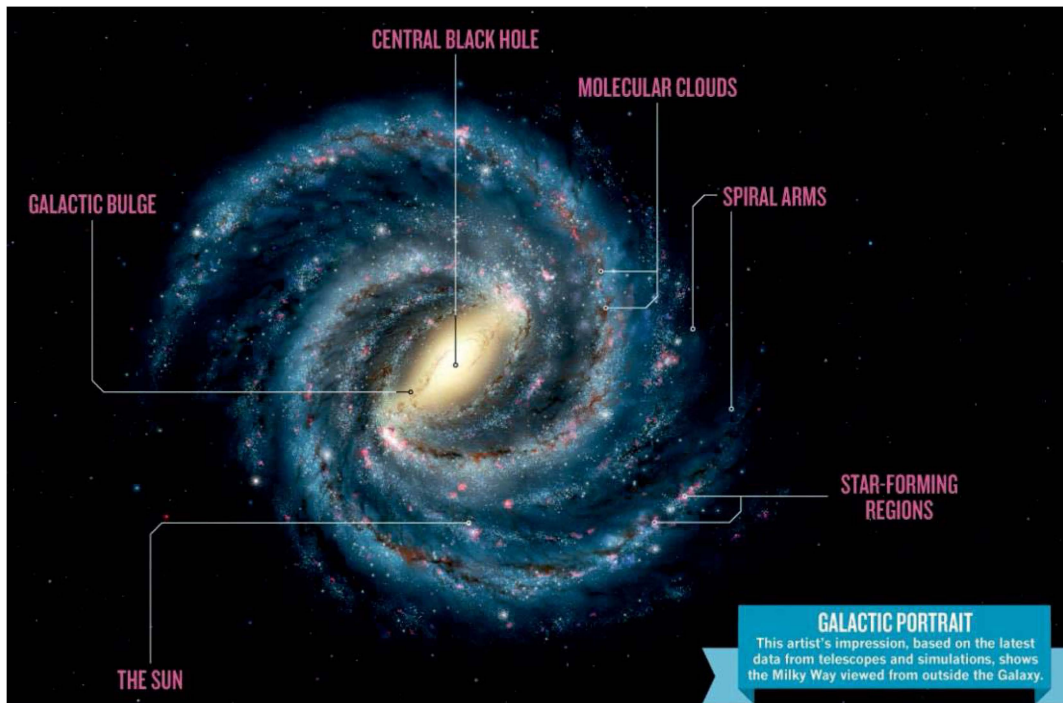
Fig:2.7- The Milky Way Galaxy as presented in website[20].

[20] https://physics.stackexchange.com/questions/217363/what-part-of-the-milky-way-do-we-see
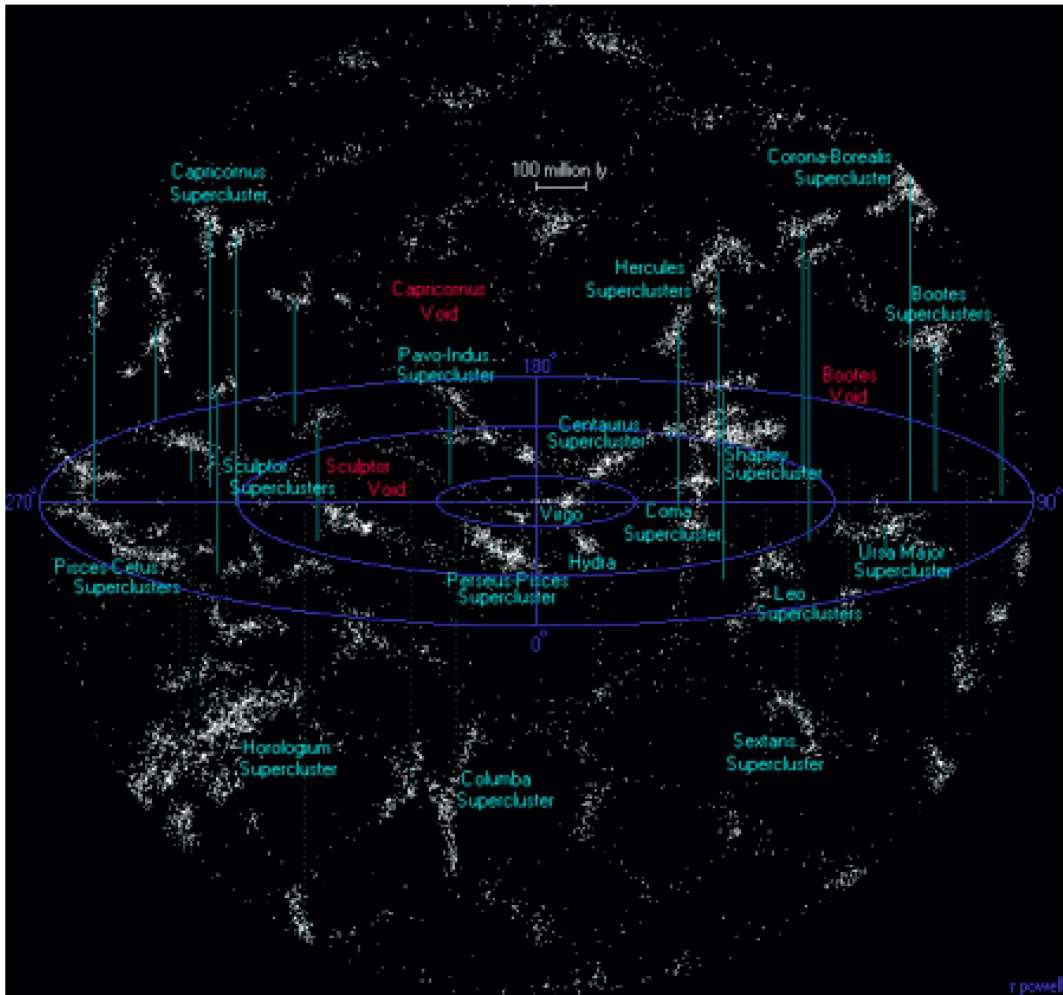
Fig:2.8-The Virgo Supercluster (Virgo SC) or the Local Supercluster (LSC or LS), which itself contains the Milky Way and Andromeda Galaxies, as well as other Galaxies, as per website[21]

2-w-vii. Since the Milky Way is an integral part and a component of the Virgo Supercluster or the Local group thus, the expansion of the Milky Way Galaxy is a normal situation where all the Celestial Bodies in the

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supercluster are expanding, recessing with respective Mass increasing uniformly all over the Supercluster and the Local group. The Local Group, thus, acts as a collective Principal Celestial Body where the Satellites of this Local group, that is, the Galaxies, Stars and other Celestial bodies in deep Space, are expanding and recessing simultaneously, as per the NUE Law and Nu constant.

2-w-viii. Why are Cosmologists unable to discover the increased mass in the Universe?

1. Since the increase in mass is not in any particular location in the Universe but in every Celestial body itself w.r.t. time t. Therefore, no mass creation is happening in isolation, which can be specifically observed in any part of the Universe.

2. The increase in mass of Celestial bodies, Stars, Galaxies, etc., simultaneously increases their size, but this is so minuscule that it can't be observed.

3. When the balloon expands, the distance between the dots expands, which is obvious, but the size of the dots increases, which is not easily observed. (*see Fig 2.9 below*)

Fig 2.9: *When the balloon expands, the increase in distance between the dots is easily observable, but the increase in the size of the dots is not easily observable, but we know the size of the dots is also increasing.*

4. Therefore, we cannot find the **'cause'** of expansion/recession. Still, we see the **'effect'** of the increased cumulative mass of all Celestial bodies in the Universe per unit of time acting at the centre, triggering the increase in the Universe's radius, pushing the expansion/recession of Stars and Galaxies moving away from each other. However, this expansion/recession is observed by Hubble, his team and consequently by other Cosmologists.

2-w-ix. The NUE Law eliminates the hitherto hypothecation of 'dark energy'.

The NUE Law and the discovery of the creation of mass in every Celestial body and acting at the centre of the Universe, causing the circumference of the Universe to expand / recess, eliminates the hypothecation of dark energy.

2-x. Is the Sun – Earth - Moon eclipse perpetual or transitional?

2-x-i.
As per the NUE Law, the expansion of the Universe w.r.t. time does not alter the ratios of respective size and distances between the Sun, Earth and Moon.

Thus, the constant ratios of the sizes and the space between the Sun, Earth and Moon cause the perpetual eclipse. The details, the graphical presentation and the calculations are given in CHAPTER-4, para 4-a, 4-b, 4-c.

2-x-ii. Comparison between Hubble's Law and NUE Law:
This is a very important differentiation between Hubble's Law and the NUE Law, which are similar. The detailed comparison is given in CHAPTER-3, para 3-a, Table-**T-3.1**.

The comparison between NUE Law with Hubble's Law and its Applications

CHAPTER-3; Abstract :

The comparison between NUE Law and Hubble's Law is centered on their respective constants—Nu constant and Hubble constant—and how they describe the expansion of Space and Celestial bodies.

Hubble's Law observes the recession of Galaxies at speeds proportional to their distances, primarily addressing large distances in deep space. In contrast, the NUE Law applies to a wider range of natural bodies, from micro to macro scales, covering all matter, including celestial bodies, atoms, and wavelengths etc. NUE Law asserts that everything in Space expands intrinsically at a continuously compounding rate, w.r.t. time, increasing mass and size of the Celestial bodies, ensuring constant density and temperature, which is not addressed by Hubble's Law.

One critical difference lies in the constants themselves. While Hubble's constant (70 km/s/Mpc) is static and associated with linear recession velocity, the Nu constant (98.2889 km/s/Mpc) is dynamic and varies over time, factoring in an exponential growth rate of velocity. This implies that the Universe is not static in age, as Hubble's Law suggests, but continuously expanding, and its age can be calculated more dynamically.

The application of the NUE Law extends to all matter including that on the Earth, such as determining the age of excavated artifacts, Satellites measurement of Earth's radial increase or calculating Earth's rotation slowdown.

3-a. NUE Law, Nu constant comparison with Hubble's Law and Hubble constant.

3-a-i. The comparison between the Nu Constant and Hubble's Constant is very important for gaining clarity and proper understanding. Table T-3.1 below provides the much-needed clarity.

3-a-ii. The following is Table T-3.1 provides a Comparison between Hubble's Law and the NUE Law

Table-T-3.1: Comparison between Hubble's Law and the NUE Law

Sr. No.	Particulars	Hubble's Law	NUE Law
1	The Law	Hubble's law, also known as the Hubble–Lemaître law, is the observation in physical cosmology that Galaxies are moving away from Earth at speeds proportional to their distance.	The Interstellar Space and everything in Space, including the Celestial bodies and other natural matters linearly stretch and expand intrinsically at a rate, continuously compounding at all times, maintaining constant ratios such as density, etc.
2	Where applicable and for whom?	Viewed for Galaxies in the deep Space for large distances (*measured in Mpc*). The Law helps quickly find the recession velocity of a targeted Celestial body when its distance is determined. It also helps in finding an indicative age of the Universe.	The NUE Law is more generic and covers not only the recession of Celestial bodies in deep space but also the expansion of all matters, including Celestial bodies following the Nu-Constant. Thus, NUE Law and the Nu-Constant apply to all natural bodies from micro to macro in size, such as Celestial bodies like Galaxies and Stars, including Earth, Moon, Sun, Planets, etc., and also atoms and wavelengths (*EM spectrum*), and distances measured in nanometers to meters to km, ly, pc to Mpc.

Sr. No.	Particulars	Hubble's Law	NUE Law
3	**Radial increase of Celestial Bodies**	It is not applied to the radial increase of the Celestial bodies; that is, Hubble's Law only applies to the velocity of Galaxies located in deep space.	NUE Law applies @Nu constant to all Celestial bodies, near and far in space, that is, from micro to macro sizes.
4	**Density**	Hubble's Law is silent on density.	NUE Law maintains density as a fixed constant, that is, while Space or Celestial bodies expand as per Nu Constant, their respective densities remain constant.
5	**Temperature**	Hubble's Law is silent on temperature, but indirectly, it refers to cooling w.r.t.. expansion of the Universe.	According to the NUE Law, the temperature must be constant if the density has to be steady and to remain constant.
6	**Measurement methods of distances in Space.**	This is measured for Galaxies in deep space placed at large Mpc distances. The methods used are the redshift, the candles, the Doppler effect, etc. Depending upon the mode of measurement, these methods could	Measurements can be made of closer distances between the Celestial bodies that can be very accurately measured. For example, the Earth-Moon distance and the velocity of the Moon can be most accurately measured by the laser ranging system to evaluate Nu Constant, which

Sr. No.	Particulars	Hubble's Law	NUE Law
		provide approximate distances. In the beginning, H_O was 500km/s/Mpc, which, over some time and with more accurate measurement methods, is now given by NASA, $H_O = 70 \pm 2$ km/s/Mpc.	works out to Nu = 98.2889 km/s/Mpc (*for calculations, see CHAPTER-2, para 2-p-iii*). Here, there is no ambiguity of the **value of Nu constant = 98.2889 (± 0) km/s/Mpc or 3.8cm/year/3,78,000 km. Hence, the value of the Nu constant is the most accurate and precise.**
7	**Observing the distance 'D'**	Hubble's law is for the observation that Galaxies move away from <u>Earth</u> at speeds proportional to their distance D.	NUE Law applies to measurements not only from Earth to Stars and Galaxies in deep Space but from anywhere in the Universe, in any direction, to anywhere in the Universe at speeds proportionate to $D.\,e^{r.t.}$, which shows an accelerated velocity over longer periods. Here, D is for Galactic distances, including the closer Earth-Moon distances. D is also for the radius of Celestial bodies, including the radius of matter to that of an atom.
8	**The solar and lunar eclipses:**	Since the Moon is recessing from the Earth, the time will come, say, in a million years, when the solar eclipse and the lunar eclipse may not occur.	According to NUE Law, the Solar and the Lunar eclipses are a perpetual phenomenon because the expansion ratios of all bodies are constant. (*see CHAPTER-4, para 4-a, 4-b & 4-c*).

Sr. No.	Particulars	Hubble's Law	NUE Law
9	The accuracy and true value of the graph's slope $(\frac{V}{D})$ w.r.t. Time 't'	We see graph G-3.1 below. There are several Stars in the Space as shown in the graph. A straight line can be drawn connecting any two Stars with varying slopes, which can be challenged. Also see graphs in CHAPTER-1, para 1-h-ii G-1.1-a,b, 1.2-a,b, 1.3-a,b. It is for this reason that different values of Hubble's constant was calculated from H_O = 500 km/s/Mpc to the latest 70 ($\pm$2) km/s/Mpc	The Nu constant is derived mathematically, therefore, there is no need for any graph and slope to calculate the Nu constant.
10	The nature of equation H_O and Nu and its interpretation w.r.t. Time 't'	$H_O = \frac{V}{D}$ is a linear equation; hence H_O is Constant, and independent of the time **t** at all times, as seen in para 3-a-iii, Fig-3.1-a.	Nu $= \frac{V\prime}{D.e^{r.t}}$ is a non-linear curve, which shows an accelerated growth of velocity w.r.t. the period t as seen in para 3-a-iii, Fig-3.1-b.
11	The age of the Universe	According to Hubble's Constant, the age of the Universe is fixed at 13.86 bn years. This is not possible for a live, existing, active, and dynamic Universe whose age cannot be	The NUE Law is dynamic because of the $e^{r.t}$ factor in the equation, therefore, the Universe's age can be more accurately predicted rather than the static and fixed age given by Hubble's Constant (*the age of the Universe is given*

Sr. No.	Particulars	Hubble's Law	NUE Law
		limited to a specific period but should increase with time. The fixed age of the Universe provided by the H_O Constant is its greatest flaw.	*in para 3-s below).*
12	**Are Hubble's Constant and Nu Constant are a fixed constants?**	Hubble's Constant is derived from the slope as a fixed constant H_O = 70 km/s/Mpc. However, H_O cannot be a fixed constant since the Universe continues to expand and accelerates its expansion.**This is also one of the major flaws of Hubble's law.**	The Nu constant is not a constant because of the $e^{r.t}$ factor. $V = Nu.D.\,e^{r.t.}$ or $Nu.e^{r.t.} = \frac{V}{D}$. Therefore, the Nu constant is variable, but at t = 0 (*present time*) Nu is constant for 100 to 200 mn years, for its linearity, see CHAPTER-2, para 2-q.
13	**The limitations of Hubble Law and its shortcomings**	Hubble's law shows Galaxies racing away with velocities proportionate to the distance D. Such a model will fail to apply the Gravitational Laws, which bind the Stars with the galactic centre. At 4285 Mpc, the velocity will exceed the speed of light. Therefore, Einstein's General Relativity and	In the NUE Law's Graph at $e^{r.t.}$, when t = 79.82 bn years, in the future from the present (*see Table T-3.2 annexe)*, the expansion of space shall exceed the speed of light, and that could be the end of the Universe's life. because when **t** = ∞, the equation $e^{r.t.} = e^{t.∞}$ = an undefined period. Hence, the end of life is undefined. Except at 79.82 bn years. For looking into the past, $D.e^{r.t.}$ when t is −∞ we

Sr. No.	Particulars	Hubble's Law	NUE Law
		Special Relativity will also fail because, according to relativity, the length contracts as per the formula $$L' = L\left(1 - \sqrt{\frac{1 - V^2}{C^2}}\right).$$ Therefore at the speed of light V = c, L' = 0, that means the length of the Galaxies is reduced to 0 or the Galaxy disappears or is destroyed. However, the Galaxy is not getting destroyed because there is no Supernova or any effects of Galactic destruction of Galaxies exceeding 3050.11 Mpc. There are Galaxies at 14,000 Mpc also. What about them?	have $e^{-\infty} = 0$. Therefore, the beginning of the Universe is defined as the infinite period in the past. However, as per Table T-3.2-Annexe, 91.75 bn years ago, the expansion percentage w.r.t. the present size of the Universe was 0.00%, which could be the birth time of the baby Universe.

3-a-iii. Graphs presenting the nature of Hubble's constant and Nu constant.
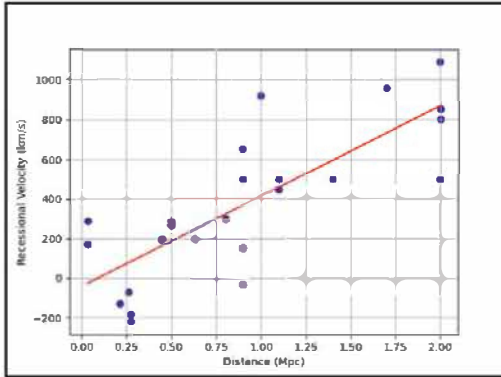
Fig-3.1-a Hubble's graph, which is a straight line showing the linearity in Hubble's constant.
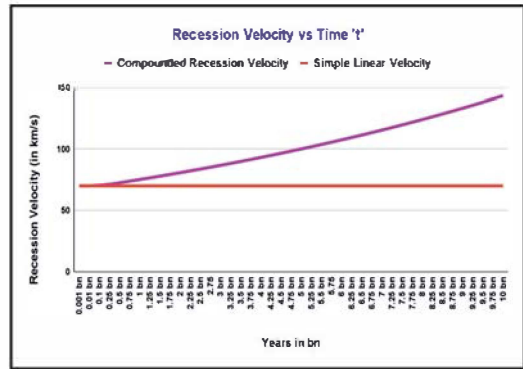
Fig-3.1-b NUE's law shows non-linear acceleration (not to scale; this is only a demo model) Here the red line is Hubble's constant, and the pink curve curve is NUE's accelerated galactic velocity.

3-b. Applications of NUE Law and Nu-Constant:

3-b-i. Can we find the age of excavated artefacts calculated from the Nu constant?

If a pot and some other artefacts are found buried at a depth of 10 feet from the open field below, during excavation, to which period of history could those artefacts belong?

3-b-ii. As per the Nu constant (= *98.2889 km/s/Mpc*), the Earth's surface recedes from its centre at the rate 0.64 mm/year.

10 ft deep excavation = $\frac{10ft}{3.28}$ = 3.04878 mtrs = $\frac{3048.78\ mm}{0.64\ mm}$ = 4763.72 years.

Thus, an artefact/pot excavated from 10 feet deep would belong to a period of 4763.72 years ago.

NB: We could also approximate the calculated period by saying that the artefact could be between 4700 and 4800 years old.

3-b-iii. If a human skull is found 16 ft below the surface of the Earth, what could be the skull's age?

We need to assume that people in that period of history buried their corpses in graves dug 6 feet below. Thus, if a corpse's skull and bones are found at a depth of 16 feet below the present Earth's surface, it amounts to an excavated depth of only 10 feet, not 16 feet (16 ft – *6 ft deep grave =10ft*).

For a 10ft excavated depth, we have seen in 3-b-ii above the skull and bones belong to a period of 4700 to 4800 years ago.

3-b-iv. Important Note: The age of excavated artefacts can be verified by radiocarbon dating, absolute, relative, or other scientific methods.

Once the Nu constant method of Earth's expansion is calibrated and standardised, the age of that material can be determined easily depending upon the depth of the excavation, that is, the depth at which the artefacts, mined cores, or other organic and inorganic minerals are found.

Fig-3.2: An archaeological research team clears a mud-brick wall at a dig site in Elba, Syria. PHOTOGRAPH BY JAMES L. STANFIELD, NAT GEO IMAGE COLLECTION

3-c.   Some more examples:-

3-c-i. If coal is found at a depth of 180 to 300 ft. below the Earth's surface. What could be the age/period when coal was formed?

= 180 ft. in mm = 180 ft. x 304.8 mm = $\frac{54864\ mm}{0.64mm}$ = **85,725 yrs.**

= 300 ft in mm = 300 ft. x 304.8 mm = $\frac{91440\ mm}{0.64mm}$ = **1,42,875 yrs.**

Therefore, the coal found 180 to 300 ft. below the Earth's surface could have formed between 85,725 and 1,42,875 years ago.

3-c-ii.   Oil wells are 5,000 ft and 20,000 ft below Earth's surface. What could be the age of their fossil fuel formation?

= 5,000 ft in mm = 5,000 ft. x 304.8 mm = $\frac{15,24,000\ mm}{0.64mm}$ = **2.38 mn yrs.**

= 20,000 ft in mm = 20,000 ft. x 304.8 mm = $\frac{6096000\ mm}{0.64mm}$ = **9.53 mn yrs.**

Therefore, the crude oil found 5,000 to 20,000 ft. below the Earth's surface could have formed between 2.38 mn years and 9.53 mn years ago.

3-d.   Can we find the rate at which the Earth is slowing per year?

3-d-i   The Earth is expanding at the rate 0.64 mm /year = 0.00064m/year or 6.4×10^{-4} m/yr

3-d-ii.   The velocity of Earth's rotation $V = \frac{2\pi r}{T}$ Where V is the velocity of rotation of the Earth, **r** is the radius of the Earth and **T** is the period of 1 rotation (= *1 day*).

3-d-iii. After one year, $V = \frac{2\pi\ (r+\varDelta r)}{(T+\varDelta T)}$, where Δr is the radius increase in one year as per Nu Constant, and Δt is the increase in time for one rotation in a year.

$V = \frac{2\pi\ (r+\varDelta r)}{(T+\varDelta T)}$ = V (T+ΔT) = 2π (r+Δr)

Therefore, VT + VΔT = 2πr + 2πΔr = VΔT = 2πΔr

Thus, $\Delta T = \frac{2\pi\Delta r}{V}$, where, V = velocity of rotation (*data taken from NASA*[22] *factsheet*) = 465 m/s

Therefore, $\Delta T = \frac{2\pi\Delta r}{V}$

Thus, $\Delta T = \frac{2\pi \times 6.4 \times 10^{-4}\ m}{465\ m/s} = 8.65 \times 10^{-6}$ s/year = the rate of slowing down of the Earth = 8.65 seconds per million years or 0.865 ms/century **that is..Earth is slowing down at the rate 0.865 milliseconds per century or 8.656 μ.s/yr**

3-d-iv.   Conclusion:

3-d-iv-1. The calculation of Earth's rotation, from Nu-Constant, is mathematically derived as in 3-d-iii above, to be slowing down at the rate 0.865 ms/century---**(A)** The quantum of slowing down as in (A) above, is most accurate because the Nu constant is drawn from the precise measurement of Earth-Moon recession by NASA's laser ranging system.

3-d-iv-2. From the NASA website[23], Dr Kevin Pang of NASA's Jet Propulsion Laboratory said in a paper presented before the American Geophysical Union at an AGU meeting in San Francisco the Earth's rotation has slowed down by 47-thousandth of a second per day in the past 3,200 years.

Mathematically 47 thousandth $= \frac{47}{1000} = 0.047$s in 3200 years

Therefore, in 1 year the rate of slowing down $= \Delta T = \frac{0.047}{3200} =$ 1.469×10^{-5} or 1.469×10^{-5} s/year = 1.469 ms/century--------------**(B)**

3-d-iv-3. **Comparing (A) and (B)**, we find that the Earth's slowing down as determined by Nu-Constant at the rate **0.865 ms/century,** whereas the Earth's slowing down as presented by Prof. Dr Kevin Pang shows the Earth's slowing down at the rate **1.469 ms/century.**

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[22] https://eclipse2017.nasa.gov/shadow-speed-and-earths-rotation

[23] https://www.jpl.nasa.gov/news/earths-rotation-slows-down

3-d-iv-4. why is there a difference in (A) w.r.t. (B) for Earth's slowing down?

The methodology used by Dr Kevin Pang to determine Earth's slowing is as follows:-

Dr Pang, an astronomer, and his colleagues analysed the Earth's rotation rate three millennia ago by using records of five solar eclipses scratched on oxen shoulder blades in the city of Anyang, China, in the years 1226 B.C., 1198 B.C., 1172 B.C., 1163 B.C. and 1161 B.C.

The ancient scribes noted important daily events by inscribing on bones and tortoise shells, called "oracle bones". Paper was not invented until a thousand years later.

They described a solar eclipse as "the sun has been eaten," presumably by an imaginary Celestial monster.

Determining exactly when the eclipse was seen and where the moon's shadow fell on Earth would help calculate the rate of Earth's spin.

3-d-v. Comments by ARF[24] Scientists:-

3-d-v-1. The methodology is astonishingly very approximate and relies on primitive data on Solar eclipses inscribed on bulls (*oxen*), shoulder blades and tortoise shells (*inscribed in what language, when written languages were not developed 3 millennia ago?*). Dr Kevin and the team take the data engraved on bones and shells as authentic and accurate on an assumption basis without any verification.

3-d-v-2. Data (A) above is drawn from Nu-Constant, which is very authentic and precise. It was also drawn from NASA's laser-ranging measurement of Earth-Moon distance. Thus, we can say that the Earth is slowing down at the rate 0.865 ms/century.

3-d-v-3. The derived rate of Earth's slowing down at the rate 0.865 ms/century is more accurate and authentic than the rate provided at the rate

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[24] ARF = Astrogenesis Research Foundation under which the research study is undertaken.

1.469 ms/century by Dr Kevin and his team and another NASA website[25] gives the slowing down at the rate 1.7 ms/century. Thus, there is no consistency of data by NASA, for slowing down of the Earth.

3-e. What is the interpretation of the slowing of Earth's rotation?

3-e-i. The slowing of the Earth implies that in the past, the Earth's rotation period was less than 24 hours, and in the future, it would be more than 24 hours.

How do we calculate for 500 million years in the past and future?

3-e-ii. To calculate the number of hours per Earth day 500 mn years ago?

The current rotation period of Earth is 23 h 56 min 34 sec (*given by NASA website[26]*).

500 mn years ago the Earth would be rotating at the rate 0.865 ms/century x 500 mn years = $(0.865 \times 10^{-5}) \times (5 \times 10^8) = 4.325 \times 10^3$ seconds. Therefore, in hours, we have 4.325×10^3 s ÷ 60 s = 72.08 min. Thus, we can say that 500 mn years ago, the Earth was rotating at the Current period of rotation - $\frac{72.08}{60}$ = 1.201 = (23 h 56 min 34 sec) - (1 h 12 min 4 sec) (*since 1.201 hours = 1 h 12 min 3.6 sec*) = 22 hours 44 min 30 s/day.

That is, the Earth's day 500 mn years ago was 22 hours 44 min 30 s/day.

3-e-iii. To calculate the number of hours per day 500 mn years in future from the present period?

500 mn, in the future, it will be 1 h 12 min 4 sec more than 23 h 56 min 34 sec.

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[25] https://climate.nasa.gov/news/2469/10-interesting-things-about-earth

[26] https://eclipse2017.nasa.gov/shadow-speed-and-earths-rotation

Thus, (23 h 56 min 34 sec) + (1 h 12 min 4 sec) **= 25 hours 8 min 38 sec. that is, The Earth's day after 500 mn years will be of = 25 hours 8 min 38 sec.**

NB: 1. The slowing down of the Earth also proves that the Earth was smaller in the past, with a radius at 6058.712 km [_data taken from Table T-3.2-Annexe for 500 mn years ago = 6371 × 0.9509529528_**], and it expanded over a period of time to the present size where r, the radius of the Earth = 6371 km.**

2. **For the period 500 mn years in future, the day will get longer, and the Earth's radius will also increase to 6699.384 km [**_data taken from Table T-3.2-Annexe for 500 mn years in future = 6371 × 1.05154356_**].**

3. **As seen in 1 and 2 above, the impact of the rotation of the Earth's slowing down is that the Earth was smaller in the past (**_with a shrunked radius_**) and would be larger than the present, as shown by the increased radius of the Earth.**
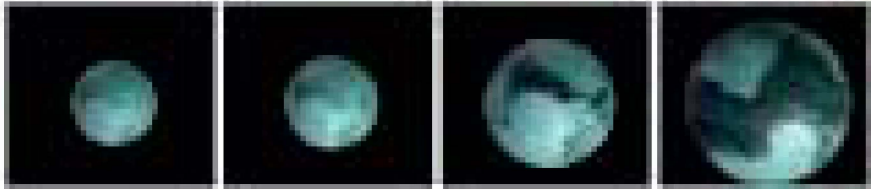
**Fig: 3.3** With time, the Earth increases its size at the rate Nu constant.

3-f. Does the NUE Law provide the mechanism of Universe expansion, including the expansion of all Celestial bodies and their intervening space?

3-f-i. The Universe Expansion:

Like all living bodies, the living Universe is subjected to accretion[27], wherein as per the NUE Law and Nu constant, with time, all the

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[27] Accretion: 1. The act of increasing by natural growth esp.the increase of organic bodies by internal accession of parts, organic growth. 2. The process of growth or incrrrrease, typically by the gradual accumulation of additional matter or layers.

Celestial bodies and natural matter within the Universe also expand and increase their size proportionately and their mass increases respectively and simultaneously, maintaining their respective density as a constant. This process increases Celestial bodies and the Universe from a smaller to a bigger Universe, with its extending horizon, circumference and curvature (*for more details, see CHAPTER-2, para 2-d & 2-e*).

3-f-ii.   How is the Earth getting bigger? (*see Fig. 3.3 above*)

The Earth, in the past, was smaller a few billion years ago compared to its present size, and it will continue to grow further and get larger a few billion years from now. When the Earth's size increases, every natural body on Earth also increases simultaneously. See examples below in para-3-f-iii.

3-f-iii.   Examples. When the Earth Expands radially, the Seas and Oceans will also increase, including the aquatic life in it, and everything naturally will increase in and on the Earth, in quantity proportionately and simultaneously.

It's like a human body: when a child grows to an adult, all parts of the body grow simultaneously, for example, the hands, legs, face, skull, eyeballs, the sockets in which the eyes are placed, including the internal body organs, the arteries, the blood quantity and the metabolism, of the body etc that is, when the living body grows all the matter in it also grows proportionately and simultaneously, maintaining its overall body temperature and density constant.

3-g.   Comparison of the change in Earth's Radius per year (Δr_E) with the data on NASA websites:

3-g-i.   As per NUE Law and Nu constant, the Earth is expanding at the rate $\Delta r = 0.64$ mm/year.

3-g-ii.   We have scanned various NASA websites, trying to compare Δr_E with their measuring the increase in the Earth's radius (*or Earth's size*). We share the data in the paragraphs below. However, one thing is very clear: even though the data may vary from NASA's website to other

prominent websites, all of them agree that the Earth is expanding, but without quantifying the expansion rate.

3-g-iii. We referred to the NASA website[28]. This website mentions the increase in the Earth's radius by 0.1 mm/year.

3-g-iv. We also referred to another NASA website[29]. This website gives an increase of 0.9 mm/year averaged over 27 years (*increased from 2.5 mm to 3.4 mm = 0.9 mm average of 27 years*.).

3-g-v. Thus, there is no coherence in the data presented by NASA itself. Measurements taken by satellite are subjected to an apparent error in not considering the recession of the satellite itself. (*see Fig.3.4 & 3.5 below*). Thus, when the satellite measures the increase in Earth's surface, it also ought to consider the recession of the satellite at the altitude at which it is placed.

3-g-vi. Example: The measurement of the Earth's radial increase (Δr_E) is undertaken by a satellite in space (*see Fig. 3.6*), placed in orbit at an altitude of 2600 km (***assumed***) from the Earth's surface.

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[28] https://www.jpl.nasa.gov/news/nasa-research

[29] https://sealevel.nasa.gov/faq/8/is-the-rate-of-sea-level-rise-increasing/
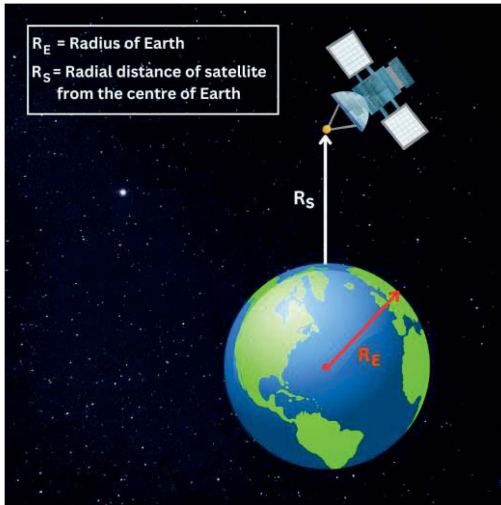
Fig. 3.4- The Satellite measures the rise in Earth's surface or sea level, without considering its own recession.
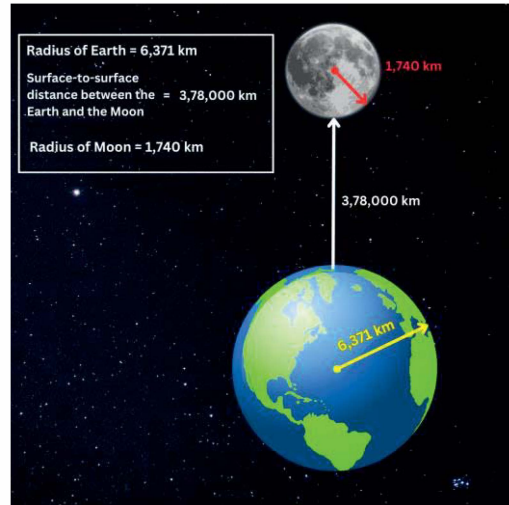
Fig-3.5: Earth-Moon recession measured by NASA's laser ranging system.

Fig-3.6: Satellite: Sentinel-6/ Michael Freilich Earth's surface

Fig-3.7. ISS in space at an average altitude of 400 km.

3-g-vii.   An increase in the radial distance is shown by the Satellite = $r_E + r_S = r_{ES}$, where r_E is the radius of the Earth, r_S is the radial altitude of the satellite from the surface of the Earth, and r_{ES} is the total distance between the centre of Earth and the Satellite. Therefore, the satellite is measuring

the total distance r_S = 2600 km. From NUE Law and Nu constant, the total recession of $r_S = \frac{0.64 \times 2600}{6371}$ = 0.26 mm/yr.

As per para **3-g-iv**, the satellite above measured a 0.9 mm rise in Earth's surface/year. However, the satellite measuring the increase in Earth's surface is recessing at the rate 0.26 mm/yr.

3-g-viii. **From 3-g-vii above, we have a change in radial distance in one year =** $\Delta r_E + \Delta r_S = \Delta r_{ES}$, = we have Δr_{ES}, = 0.9 mm.
We also have Δr_E = 0.64 mm, Δr_S = 0.26 mm. Thus, we have: $\Delta r_E + \Delta r_S = \Delta r_{ES}$ = 0.9 mm
Thus, we have $\Delta r_{ES} - \Delta r_S = \Delta r_E$ = 0.9 mm - 0.26 mm = 0.64 mm = Earth's radial increase per year.
NB: *This means that whenever we are taking direct measurements from the Satellite, the satellite's recession has also to be considered for exact and precise measurements.*

3-g-ix. **According to the Nu constant, the satellite designed to measure the rise in the Earth's surface should be at an altitude of about 2600 km from the surface.**

3-g-x. **Scientists should verify the satellite's altitude in space, as mentioned in para 3-g-ix above.**

3-g-xi. **To test check the NUE Law and Nu constant by ISRO, NASA, or ESA.**

3-g-xi-1. ISRO's Aditya-L1 spacecraft is about 1.5 million km from Earth in a halo orbit. According to NUE Law, Aditya should recess from the Earth **150.8 mm/year or 0.413 mm/day**.
If ISRO had installed reflector equipment on Aditya-L1 spacecraft (*or if it can make the solar panels as reflectors for laser ranging system installed at their mission control*) to measure this recession, it would have proven NUE Law. But it can still plan this test in it's future missions.

3-g-xi-2. If such laser ranging equipment is not installed in Aditya-L1 mission, it could be plan to install in the next Aditya spacecraft mission or

subsequent missions to find the recession and thus test-check the NUE Law and the Nu constant.
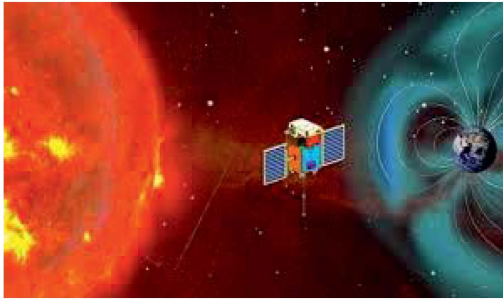
Fig-3.8-A. ISRO's Aditya-L1 between Earth and Sun's L-1 point.
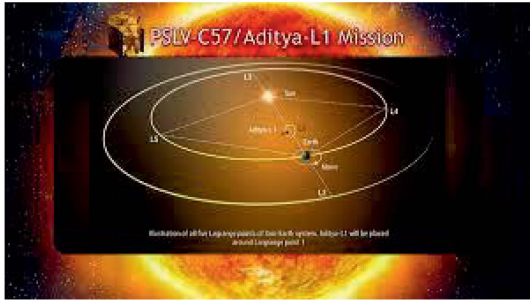
Fig 3.8-B; The 5 Larange points.

3-g-xi-3. Conclusion:

The Earth's surface increase is measured most accurately by the Nu constant, whose data is drawn from measurements of Earth-Moon recession by NASA's laser ranging system. Therefore, the surface of the Earth from its centre or the rise in the surface sea level is accurately measured by the Nu constant, and the satellite methods of measuring should also be calibrated to consider the satellite's recession.

3-g-xii. Is NUE Law applicable to the velocity of light?

The NUE Law and Nu constant are not applicable to the velocity of light c because, of two reasons

1. The velocity of light c is a ratio and therefore a constant which do not change, as mentioned under the principle of the NUE Law.
2. For anybody to expand there needs to be a mass which is the cause for recession/expansion. Photons do not have mass and therefore they are not subject to increase or decrease with time t. Hence c is a permanent constant at all ages.

Therefore, the velocity of light c in the past, since billions of years ago was the same as it is today, and will remain the same ever after.

3-h.   **Table-T-3.2 is a Table drawn from Nu constant w.r.t. time t v/s Continuous compounding rate of expansion/shrinking and the recession velocity V', of the satellite from its Principal body.**

3-h-i.   **Table-T-3.2:** Given period **t = 0** (*present period*), and **t =** the period for which D' and V' are being calculated. **r** is the Continuous Compounding rate of recession in decimals **(r.t)** (*as in column C*) at the rate Nu = 98.2889 km/s/Mpc correcting the distance $D'= D.e^{r.t}$ where D = 1 Mpc (*for Shrinkage in the past period or expansion in the future period, from the present period t = 0*).

For the variable distance D' (*as in column D*), we have a corresponding V', also a variable, as shown in column E in Table T-3.2.

NB: 1. Table **T-3.2** is concise, but there is a **Table 3.2-Annexe** with a period ranging from the past 100 bn years to the future 100 bn years, with a pointer where, for the distance D' of 1 Mpc, the velocity exceeds the speed of light.

2. The detailed table with calculations is given in **Table T-3.2 Annexe:** click to open online: https://arf-research.com/arf.pdf

Sr. no.	Time 't' in bn Years (10^9yrs) (-) refers to the past	r.t [*where, r = 31.8499×10^{-19} and Time 't' in sec*]	Continuous Compounded rate of Recession/ expansion for Distance = D' = $D.e^{r.t}$, from the Observer (*In Mpc*)	V' = NuD' (*where, V' is recession velocity in Km/s, Nu = 98.2889 km/s/mpc and D' = in Mpc*)
A	B	C	D	E
1	-91.75 (*Possible birth of the Universe*)	-9.222552594	0.00009878620448	0.009709587374
2	-25	-2.51295711	0.08102827509	7.964180028
3	-20	-2.010365688	0.1339396856	13.16478436

Sr. no.	Time 't' in bn Years (10^9yrs) (-) refers to the past	r.t [where, r = 31.8499×10^{-19} and Time 't' in sec]	Continuous Compounded rate of Recession/ expansion for Distance = D' = $D.e^{r.t}$, from the Observer (In Mpc)	V' = NuD' (where, V' is recession velocity in Km/s, Nu = 98.2889 km/s/mpc and D' = in Mpc)
A	B	C	D	E
4	-15	-1.507774266	0.2214022124	21.76137991
5	-10	-1.005182844	0.3659777119	35.97154672
6	-5	-0.502591422	0.6049609176	59.46094314
7	-4.46 (Start of visible spectrum, Violet band $\lambda = 380$ nm)	-0.4483115484	0.6387056653	62.77767726
8	-4	-0.4020731376	0.6689318198	65.74857275
9	-3.3756 (where, Nu = H_O)	- 0.37694	0.71226	70.00
10	-3	-0.3015548532	0.7396672521	72.70108058
11	-2	-0. 2010365688	0.817882522	80.38877342
12	-1	-0.1005182844	0.9043685764	88.88939257
13	-0.5 (= 500 mn yrs)	-0.0502591422	0.9509829528	93.47106834
14	-0.25 (= 250 mn yrs)	-0.0251295711	0.9751835482	95.84971825
15	-0.0000032 (3200 years ago)	-0.0000003216585	0.9999996783	98.28886838
16	0 (Present time)	0	1	98.2889
17	+0.25 (= 250 mn yrs)	0.0251295711	1.02544798	100.790154

Sr. no.	Time 't' in bn Years (10^9yrs) (-) refers to the past	r.t [*where, r = 31.8499 × 10^{-19} and Time 't' in sec*]	Continuous Compounded rate of Recession/ expansion for Distance = D' = $D.e^{r.t}$, from the Observer (*In Mpc*)	V' = NuD' (*where, V' is recession velocity in Km/s, Nu = 98.2889 km/s/mpc and D' = in Mpc*)
A	B	C	D	E
18	+0.5 (= *500 mn yrs*)	0.0502591422	1.05154356	103.3550599
19	+1	0.1005182844	1.105743859	108.6823476
20	+2	0.2010365688	1.222669483	120.1748385
21	+2.695 (*End of visible spectrum, Red band* λ = 780 nm)	0.2708967765	1.311139723	128.8704811
22	+3	0.3015548532	1.351959272	132.8825897
23	+3.3756	0.3393095208	1.403977838	137.9954374
24	+4	0.4020731376	1.494920664	146.9341076
25	+5	0.502591422	1.652999344	162.4714872
26	+10	1.005182844	2.732406831	268.5652618
27	+15	1.507774266	4.5166667	443.9382016
28	+20	2.010365688	7.466047092	733.829556
29	+25	2.51295711	12.34137095	1213.019775
30	+79.81566 (*Recession velocity V exceeds the speed of light, the possible end of the Universe*)	8.022933211	3050.110845	299792.0398

3-h-ii. Is Hubble Constant a particular case of Nu Constant?

See Table No.-**T-3.2** above; if we moved in the past 3.3756 bn years ago and take that time as **t** = 0, then see Table No.- T-3.2, Sr. No. 23, we have 3.3756 bn years from then into its future would give the present D′ = 0.71226 Mpc expanded to 1 Mpc and therefore, V′ = 70 km/s

Therefore, Hubble's Constant = 70km/s/0.71226 Mpc or 70km/s/Mpc at 3.3756 bn yrs ago.

Here, we can interpret that while observing Galaxies in deep space in the past, Astronomers might have measured the distance D′ of Galaxies that were 3.3756 bn years old (*or, say, observing Galaxies that were 3 to 4 bn years old*). Alternatively, if the Astronomers measured the distance at t = 3.3756 bn years ago, they would have found Nu = 70 km/s/Mpc = H_O.

Thus, Hubble's Constant is a particular case of Nu Constant.

3-h-iv. From Hubble's Constant, how do we derive the Nu Constant?

We refer to Table T-3.2, which shows that at

t = 3.3756 bn years ago, D′ = 0.71226 Mpc

Thus, for **D' = 0.71226 Mpc distance, the recession velocity V = 70 km/s.**

Therefore, By cross multiplication using Nu constant, we have for D'= 1Mpc, the recession velocity $V′ = \dfrac{70 \times 1}{0.71226} = 98.2889$ km/s/Mpc = Nu.

Thus, from Hubble's Constant, we can derive the Nu Constant.

3-j. The graphical presentation of recessional acceleration for D′ = D.e$^{r.t}$.

3-j-i. Graph G-3.1 is plotted **V'/t,** where **V'** (= *recession velocity*) plotted against time for period **t** ranging from = - 25 bn years (past) to the present **t** = 0, to the future, **t** = +25 bn years.

Thus, Graph G-3.1 presents the acceleration of V′/t.

Below, we have presented two graphs for periods ranging from - 25 bn years ago (in the past), to + 25 bn years (in the future) and - 15 bn years ago (in the past), to + 15 bn years (in the future), where we have taken t = 0, the Starting point at present. The purpose

is to observe the curve bend from a more extended period perspective w.r.t. the shorter period.

Graphs G-3.1-A and G-3.1-B are the same except for the period range.

that is, in G-3.1-A the range of period t = - 25 bn years to t = 0 to t = + 25 bn years.
and in G-3.1-B the range of period t = - 15 bn years to t = 0 to t = + 15 bn years.
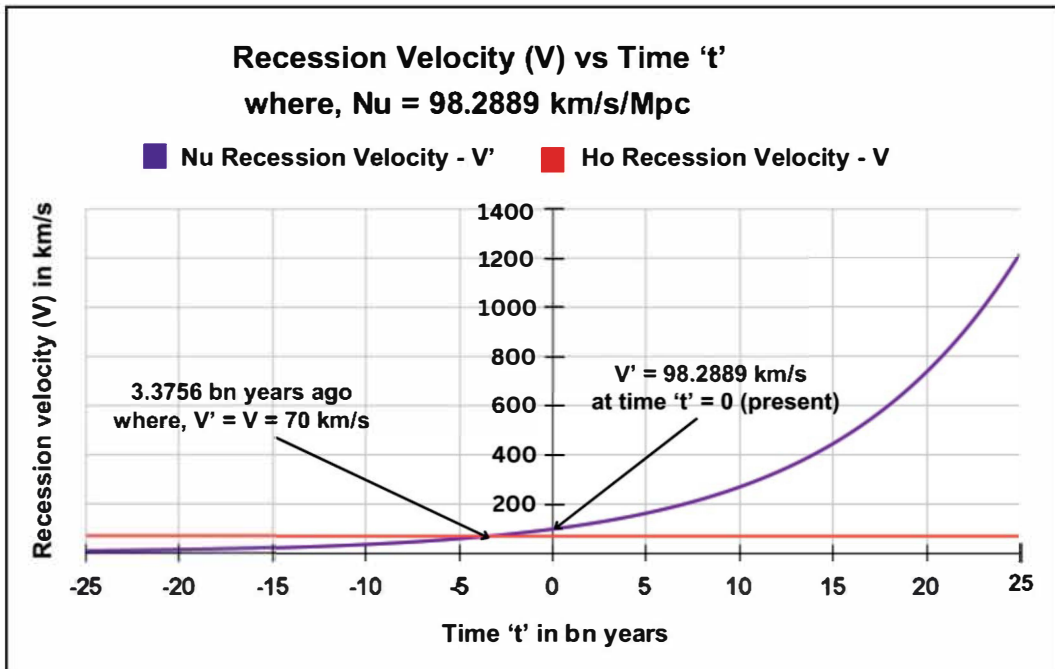
Graph - G-3.1-A: *Recession velocity vs Period t in bn years (in the time range -25 to +25 bn years) The red line is for H_O = 70 km/s/Mpc, and the Purple curved line is for Nu = 98.2889 km/s/Mpc.*
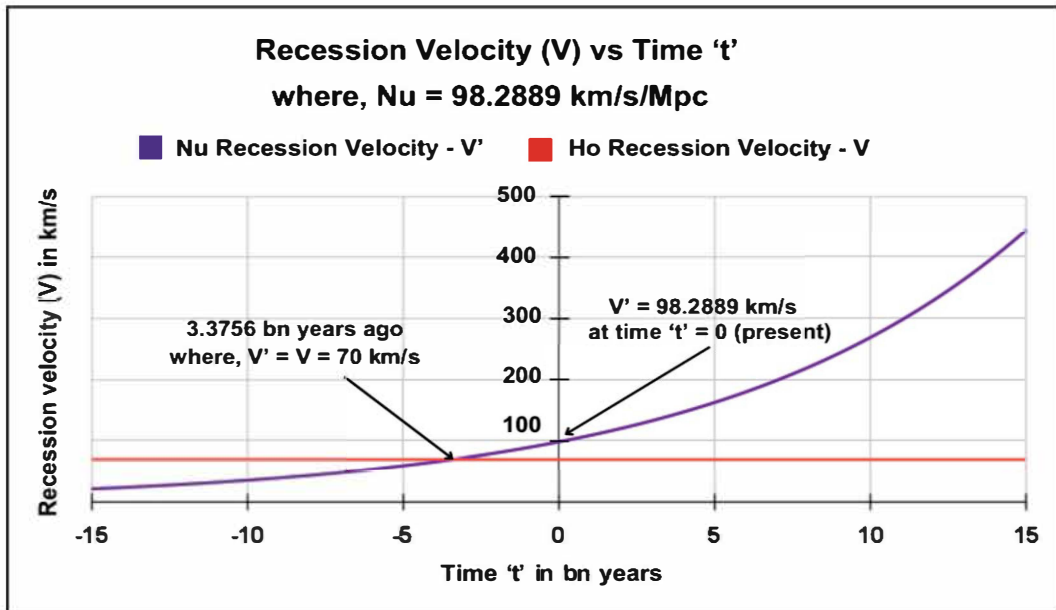
Graph-G-3.1-B: Recession velocity vs Period t in bn years (in the time range -15 to +15 bn years)

3-j-ii. Interpreting Graph G-3.1-A & G-3.1-B:

Here, we see that the Red line and the Purple curve intersect at - t* = 3.3756 bn years at V = 70 km/s, and the Purple line is at t = 0 (present time) with V' = 98.2889 km/s. *(-) refers to the past decay period.

3-j-iii. Graphical presentation of distance (D' in Mpc) vs time (in bn years):

Graph G-3.2-A is **D'** (= Distance from the observer) plotted against time for the period - **t** = 25 bn years (in the past) to the present **t** = 0 to the future, + **t** = 25 bn years. Thus, Graph G-3.2-A presents the slope of **D'/t**.

Graphs G-3.2-A and G-3.2-B are the same except for the period range.

that is, **in G-3.2-A** the range of period t = - 25 bn years to t = 0 to t = **+ 25 bn years**. and in **G-3.2-B** the range of period t = - 15 bn years to t = 0 to t = **+ 15 bn years**.
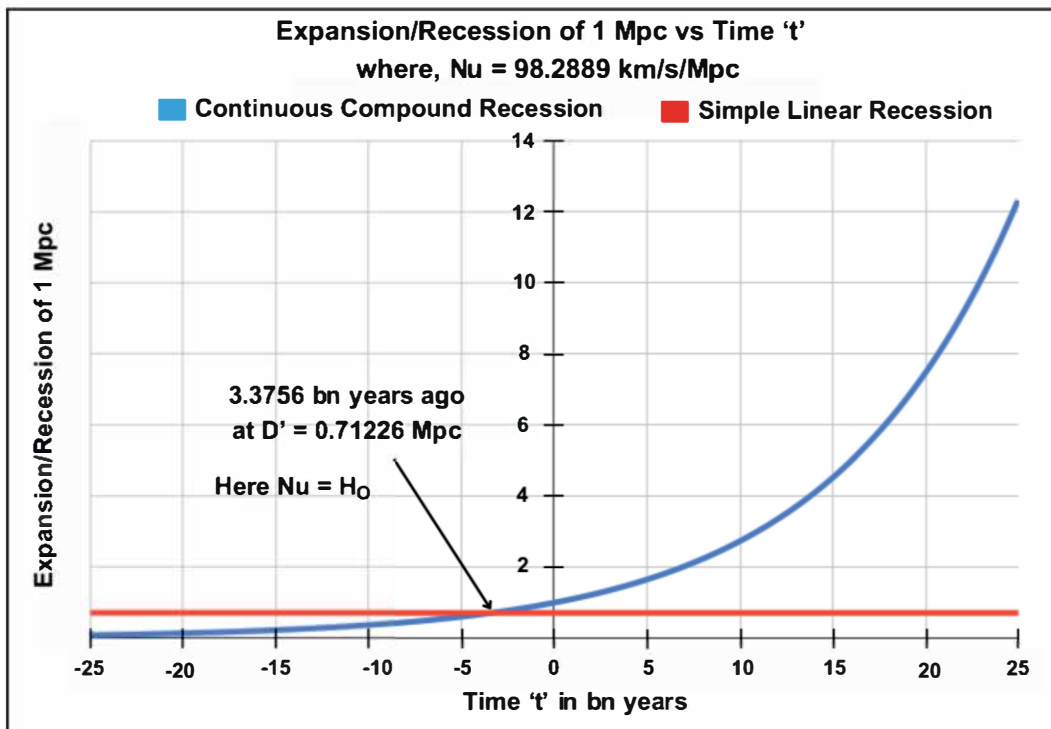
Graph-G-3.2-A: *D' from the observer (in Mpc) vs Period t in bn yrs (time range: -25 to +25 bn yrs)*

The red line indicates H_O = 70 km/s/0.71226 Mpc (refer to Table T-3.2), and the Blue curved line indicates Nu = 98.2889 km/s/Mpc.
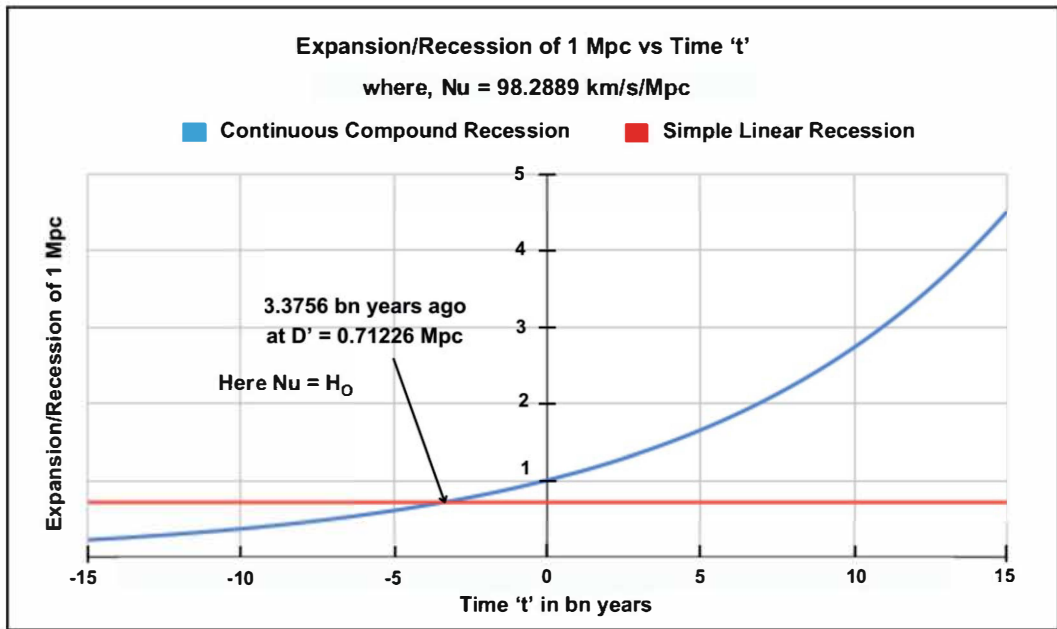
Graph-G-3.2-B: *D' from the observer (in Mpc) vs Period t in bn yrs (time range: -15 to +15 bn yrs)*

3-j-iv.   Interpreting Graphs G-3.2-A & G-3.2-B:

Here, the Red line (*represented by Hubble's Constant*) is horizontal and placed on the Y-axis at **D' = 0.71226 Mpc**. The Blue curve (*represented by Nu Constant*) intersects the Red line at **t = – 3.3756 bn years ago**, and the same Blue line intersects the Y-axis at **t = 0** (the present period) at **D' = 1 Mpc**.

3-k.   General Interpretation of Graphs: G-3.1-A, G-3.1-B, G-3.2-A & G-3.2-B:

3-k-i.   In Graph G-3.2-A and G-3.2-B, the red line is the Hubble's Constant H_O = 70km/s/D' where **D' = $D.e^{r.t}$ = 0.71226 Mpc** for **t = – 3.3756 bn years ago**.

3-k-ii..   The above graphs show that the Hubble Constant = 70 km/s/0.71226 Mpc is a special case of **Nu** at **t = – 3.3756 bn years ago.**

3-k-iii. H_O being a Constant, the Red line runs parallel to the X-axis from -25 bn years to $+25$ bn years at D = 0.71226 Mpc.

3-k-iv.   Para 3-k-iii can also be interpreted as follows: While deriving Hubble's Constant H_O = 70 km/s/0.71226 Mpc (*see Table T-3.2*), the Galaxies viewed belonged to the period 3.3756 bn years ago. From that time (*3.3756 bn years ago*) to the present time, the distance has expanded from 0.71226 Mpc to 1 Mpc = Nu constant = 98.2889 km/s/Mpc.

3-k-v.   The blue line is the Nu constant Nu = 98.2889 km/s/D.$e^{r.t}$ where D = 1 Mpc. Here, the exponential $e^{r.t}$ is the function of time with the constant rate of expansion **r**; it provides the continuous compounding rate curve (*blue*) as seen in the above graph.

3-k-vi.   **It shows that Nu is a linear equation for the present period when t = 0.** At the present period, t = 0, $e^{r.t} = e^0 = 1$,

Therefore, Nu = 98.2889km/s/Mpc, for the present period* is a linear equation. *ranging up to 250 mn years, as in **CHAPTER-2, para 2-q.**

3-l.   The Probable Birth time of the Universe:

3-l-i.   The distance$D$.$e^{-r.t}$ will keep shrinking; from the present (*t = 0 bn years*), as we see at - 25 bn years ago, 1 Mpc has shrunk to 0.081 Mpc (*see table T-3.2 above*). Since $e^{-r.t}$ can tend towards zero but will not be zero until it approaches minus infinity, that is, $e^{-\infty} = 0$, then D' = 0. This period indicates the singularity of the Universe, that is, the birth of the Universe, but when it could have happened is unknown.

3-l-ii.   **Did the probable Birth of the Universe happen 91.75 billion years ago?**
Practically, we have seen that the above Graph G-3.2-A flattens out as time decays beyond 25 billion years. Please see Table T-3.2 above.

We are also providing a link to a detailed Table T-3.2-Annexe[30]

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[30] https://arf-research.com/arf.pdf

At 91.75 billion years ago, the 1 Mpc shrinks to. 0.00009878620448 Mpc, but ≠ absolute 0. We can also call this a point of singularity, the practical birth of the Universe.

3-l-iii.   Conclusion:

The period at 91.75 bn years ago is the probable birth time of the Universe, and the period before 91.75 bn years is the prenatal* period of the formation of the Universe from the point of singularity.
*Refer to **CHAPTER-8, para 8-d.**

3-l-iv.   What is the actual time of singularity of the Universe?

For $D' = D.e^{r.t}$ For $t = -\infty$, we have $D' = 0$. This is the point of singularity of the Universe. Since the ∞ period is unknown, the singularity period is unknown, but from here, the conception* of the Universe was initiated.

*NB: *The conception of the Universe and the pre-natal period of the Universe is explained in the Model of the Universe presented by ARF[31] in* **CHAPTER-8, para 8-d.**

3-m.   The Universe expansion in the future w.r.t. t = 0 (*present period*):

3-m-i.   Let's move from the present period to the future period. $e^{r.t}$ is positive, and the curve can be seen accelerating in Graph G-3.1-A & G-3.1-B, which is happening much more rapidly w.r.t. the period t, as seen in the graph.

3-m-ii.   Table T-3.2 above provides the expansion rate w.r.t. t period from 1 bn years onwards is the continuous compounding rate, showing acceleration in the expansion w.r.t. 1 Mpc. More details are in **Table T-3.2-Annexe.**

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[31] ARF: Astrogenesis Research Foundation under which the research is undertaken.

3-m-iii.   The age limit of the Universe:

At 79.82 bn years (*See Table T-3.2 above*), the expansion is such that it approaches the speed of light. As per general relativity, at the speed of light, the length contracts as per the formula

$$L' = L.\left(1 - \sqrt{\frac{v^2}{c^2}}\right).$$

Therefore, at the speed of light V = c, L' = 0, which means the length of the Galaxies is reduced to 0 or in other words, the Galaxy disappears (*L' = 0*), or it could be considered as destroyed at 79.82 bn years when 1 Mpc expands to D' = 3050.11 Mpc (*See Table T-3.2 above*).

3-m-iv.   Thus, 79.82 bn years from the present could be the practical age limit of the Universe, giving the total finite age of the Universe = 91.75 + 79.82 = 171.57 bn years.

3-m-v.   What is the theoretical age of the Universe?

For $D' = D.e^{r.t}$. at t = −∞, we have $D' = D.e^{r.t} = D.e^{-r.\infty}$, where, $e^{-\infty} = 0$.

For $D' = D.e^{r.t}$. at t = ∞, we have $D' = D.e^{r.t} = D.e^{r.\infty}$, where, e^{∞} = undefined. Thus, at t = −∞, D = 0. The t = −∞ is the point of singularity of the Universe. In contrast, at t = +∞, the situation at t = +∞ is undefined and unknown. In other words the Universe has a beginning but no end, making it a Universe in perpetuity.

3-m-vi.   What is the practical age of the Universe?

3-m-vi-1. To derive a practical birth of the Universe

Since the Universe's exact birth time is unknown, we need to look at the practical time of birth of the Universe.

From Table T-3.2 (*Sr. No. 16*), we have t = 0 as the present time, and when we move backwards to D' = 0% of the present distance D' = 1 Mpc, it should give us the practical time of birth.

Referring to Table T-3.2 (*Sr. No. 1*), at D' = 0% from the present D' = 1 Mpc = 91.75 bn years ago.

3-m-vi-2. To derive a practical age at which the Universe could end.

We have taken 1 Mpc as a unit of the Nu constant. When this 1 Mpc increases in length to 3050 Mpc, the velocity of recession reaches the speed of light.

Referring to Table T-3.2 (*Sr. No. 30*), we find that D′ = 3050 Mpc when t = 79.82 bn years.

Thus, 79.82 bn years from the present could be the practical end age of the Universe.

NB: We have seen that when V velocity of recession approaches c, the speed of light, the size would shrink to 0 or it may simply disappear, as mentioned in para 3-m-iii above.

3-m-vi-3. To derive a practical age of the Universe as follows:-

The practical age of the Universe is from t = **- 91.75 bn years** post-natal period to the period of practical end of the Universe = **79.82 bn years.**

Thus, the total lifespan of the Universe on a practical basis is 91.75 + 79.82 = 171.57 bn years.

3-m-vi-4. The theoretical age of the Universe is infinite given by $De^{r\infty}$ = $De^{r\infty}$ = De^{∞} = Undefined.

However, if the Universe continues after 79.82 bn years, the Graph at 100 bn years, 1 Mpc, shall expand to 22,500 Mpc. This is simply mind-boggling. See Graph G-3.3 below.
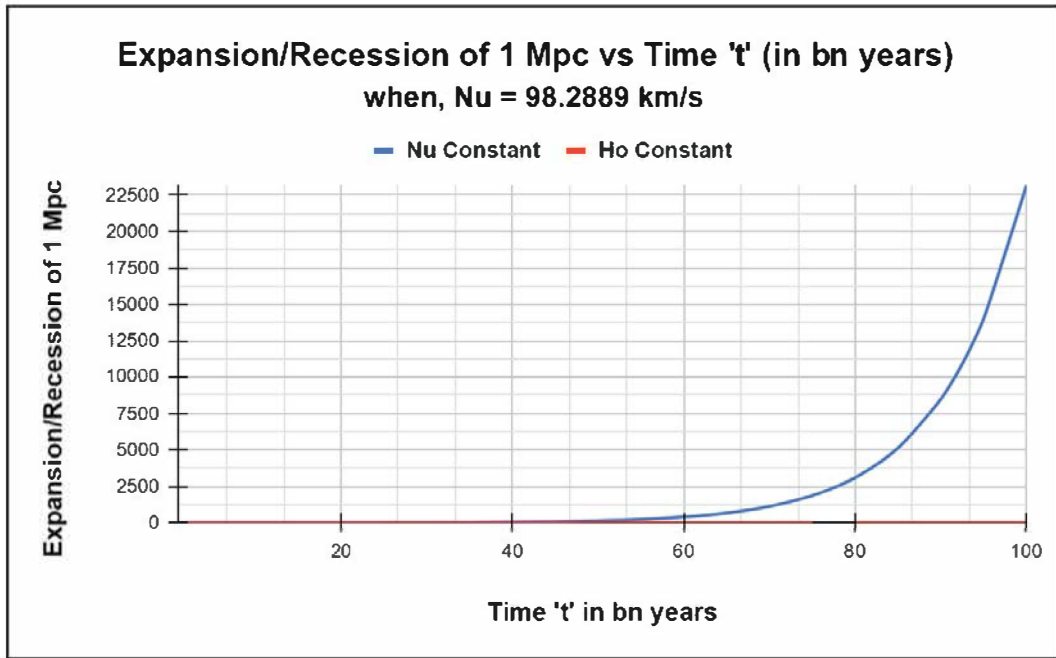
Graph G-3.3: *The future expansion of the Universe after the present period t = 0. The data is drawn from Table 3.2 and Table 3.2-Annex. Click on link = https://arf-research.com/arf.pdf*

The Red line along the X-axis represents Hubble's Constant, which is not a function of time and is, therefore, static throughout.

3-n.   Conclusion:

3-n-i.   The NUE Law provides Nu Constant as a function of period t and r, the natural expansion rate in percentage decimals = $31.8499 \times 10^{-19*}$, a constant.

     *1 Mpc = 31.8499×10^{-19} km. = if 1 Mpc = 100%, then the Nu rate 98.2889 k m = $\frac{98.2889 \times 100}{31.8499 \times 10^{-19}}$ = 31.8499×10^{-17}% = in decimals = 31.8499×10^{-19}

3-n-ii.   Nu is a non-linear equation, a function of time, that is, Nu is a time-dependent Constant. The continuous compounding rate of expansion, driven by the equation: $V' = Nu.D'$ where $D' = D.e^{r.t}$, **r** is the rate of expansion in percentage decimals, compounded continuously, **t** is the period in bn years, D = 1 Mpc. Here D is the distance (*measured in Mpc*), observed from Earth to the targeted Galaxy/Star/Celestial Body.

3-n-iii.   The value and behaviour of Nu constant at present period, t = 0.

Nu is a variable constant for a larger periods of time, in billions of years. Still, for relatively shorter periods of 1 to 2 million years or so, it is constant since, for the present period, time **t** = 0. Therefore, $e^{r.t} = 0$. Thus $e^{r.t} = e^0 = 1$.

Hence $V' = Nu.D.e^{r.t}$ **= V' = Nu.D,** where D = 1 Mpc that is, for the present time, D' = D,

Therefore, V' = Nu.D = linear equation whose value is 98.2889 km/s/Mpc

3-n-iv.   At what period is the Nu Constant calculated?

To calculate Nu for the present period (*taken as t = 0 seconds*), we have taken the laser ranging data from NASA[32] of Moon recessing from the Earth at the rate of 3.8cm/year. This data is the most precise and authentic one. We have V' = Nu.D' where $D' = D.e^{r.t}$. For now (present time), we take t=0s. Then $e^{r.t} = e^0 = 1$ Thus V'= Nu.D'.1. Therefore, V' = Nu.D'. **This equation is similar** (*but not the same*) **to the Hubble Law and H$_O$.**

Thus, we have Earth-Moon rate of recession = 3.8 cm/yr/378000 km = Nu This data also gives Nu = 98.2889km/s/Mpc.

3-n-v.   Applications of Nu Constant:

Nu applies to the present, future, and past (*decay*) periods, where t = billions of years. But for calculating the decay period or the past period, we take **t = - t**, for the past period. The product of r.t is negative = - r.t

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[32] https://science.nasa.gov/moon/facts/#:~:text=The%20Moon%20is%20an%20average, inch%20farther%20away%20each%20year.

Thus, **Nu for the past periods; the exponential function is** $e^{-r.t}$ = **V' = Nu.D'** where D' is $D.e^{-r.t}$. **For the future periods, we take t = + t, = V' = Nu.D'** where D' is $D.e^{r.t}$.

A select data is given in Table T-3.2, but detailed data is provided in Table T-3.2-Annexe. The data also include the shrinkage of wavelength in the past periods and the increase in the wavelength for future periods.

In the T-3.2 Annexe, if we know Nu, the distance D ($\frac{D'}{e^{r.t}}$), **we can find the velocity V' and the period to which the Galaxy/Star belong.**

3-p. The simultaneous dual application of the NUE Law and the Laws of Gravitation on all Celestial bodies in Space.

Ans:3-p-i Every Celestial body, that is, Galaxy, its Stars, Planets, Satellites, etc., are all in their respective motions following the laws of gravitation, general relativity, special relativity, and other cosmic laws. The NUE Law simultaneously superimposes on the motion of the Galaxy, the Stars, Planets, and their Satellites within them are expanding and recessing from each other w.r.t. Nu = 98.2889 km/s/D' where D' = $D.e^{r.t}$ measured in Mpc.

3-p-ii. When viewed laterally from a great distance in deep Space, the expansion/recession being linked to D' in Mpc gets magnified and therefore it appears to be unilaterally moving outwards and recessing at great velocity. Example: Let's take the distance of a targeted Star/Galaxy viewed at a distance of 1 Mpc from the Earth's observatory. The Earth-Moon recession of 3.8cm/year/3,78,000km when viewed at a distance of 1 Mpc gets super magnified as follows:

1 Mpc = 3.086×10^{19} km. Therefore, the recession of a Star at 3.086×10^{19} km will be, $\frac{3.086 \times 10^{19} km \times 3.8cm}{3,78,000\ km}$ = 3.102×10^{14} cm = 3.102×10^9 km/yr.

Therefore, per second the recession will be = $\frac{3.102 \times 10^9}{3.156 \times 10^7}$ = 98.2889 km.

Thus, 3.8 cm/year at a distance of 3,78,000 km super-magnifies to 98.2889 km/s at 1 Mpc distance.

3-p-iii. The simultaneous dual application of the Laws of Gravitation and the NUE Law.

When we take the Earth-Moon recession and the Gravitational Laws applicable to the Earth-Moon System, we find, as per Laws of Gravitation, $m.G = R.V^2$ where, m is the mass of the Principal Celestial Body, G is the Universal Gravitational constant, R is the Earth-Moon distance and V is the velocity of the Moon orbiting around the Earth.

Example-1: The mass of the Earth = 5.972×10^{24} kg, R the Earth-Moon distance (*centre-to-centre*) = 386108.4 km, G = 6.67430×10^{-11} N. m²/kg².

Calculations = $m.G = R.V^2 = V = \sqrt{\dfrac{m.G}{R}} =$

$$\sqrt{\dfrac{5.972 \times 10^{24}\ kg.\ [6.67430 \times 10^{-11} N.m^2/kg^2]}{386108400\ m}}$$

V = 1016 m/s = **1.016 km/s**.

This tallies with the observation data and the NASA fact sheet data.

Thus, the Laws of Gravitation apply to the Earth-Moon system. **----- (A)**

Example-2: By NUE Law, we have the radius of the Earth increases by 0.64mm/year,

By the NUE Law, Earth's density is constant. Therefore, an increase in radius causes an increase in volume, which consequently causes an increase in mass = **Δm.**

$D = \dfrac{m}{V}$, where m is the mass of the Earth. Since the increase in volume 'V' is minuscule, we calculate the mass of Earth from increased radius by cross multiplication as follows:-

For 6371 km (*radius of Earth*), the mass = 5.972×10^{24} kg

Therefore, 0.00064 m, the increase in radius of Earth, the increased mass **Δm** is as follows:- $\dfrac{5.972 \times 10^{24} kg \times 0.00064\ mm}{6371000\ mm} = \mathbf{6 \times 10^{14}}$ **kg** --------------**(B)**

Example-3: To calculate Earth-Moon recession from the increased mass Δm of Earth.

We have, from the Laws of Gravitation, $m.G = R.V^2$ --------------------- **(C)**

Thus, $(m+\Delta m)G = (R+\Delta R)V^2$ --- **(D)**

By diving (C) by (D), we get m/(m+Δm)= R/(R+ΔR)

or $\Delta R = [\frac{R.(m+\Delta m)}{m}]$ - R -- (E)

Here, we have m the mass of Earth = 5.972×10^{24} kg, $\Delta m = 6 \times 10^{14}$ kg, R = 386108.4 km = 3.861084×10^{11} mm,

Therefore, from (E) above, $\Delta R = [\frac{R.(m+\Delta m)}{m}]$ -R. Substituting the m, m, and

R values, we get **ΔR = 38.815mm,** the yearly recession for the Earth-Moon distance (*centre-to-centre*) = 386108.4 km. ---------------------------- **(F)**
However, NASA has calculated the recession using the laser ranging system for the Earth-Moon distance (*equatorial surface-to-surface*) = **3,78,000 km** --- **(G)**
Thus, by cross multiplication, we have: for 3,86,108.4 km, the recession

is 38.815 mm

Therefore, 3,78,000 km, the recession is = $[\frac{38.815 \times 3,78,000}{386108.4}]$ = 38 mm =

3.8 cm/year, **Thus, the Earth-Moon recession is 3.8 cm/year/**
3,78,000km -- **(H)**
From (A), we find the Earth-Moon system follows the Laws of Gravity.
From (B), we see the NUE Law is applicable, where the increase in the Earth's radius causes its mass by $\Delta m = 6 \times 10^{14}$ kg/year.
From (H), the increase in mass **Δm** causes the recession **ΔR = 3.8 cm/year. The 3.8 cm/year exactly tallies with the calculated NASA's Earth-Moon recession.**

3-p-iv. **Graph of increase in mass (*Δm*) per year (*or per unit of time*) in Earth versus the increase in the radius (*Δr*) of Earth.**

Table T-3.3:
Table T-3.3*, below presents a Table of increase in the radius (Δr) of Earth w.r.t. time period Δt versus increase in the mass (Δm). The period (Δt) is shown below for Δt = 1 year to 1 bn years.
For full details from (-)100 bn yrs to (+) 100 bn yrs is given in Table T-3.2-Annexe.

Sr.	Time 't' in bn Years (10^9) yrs	Radius of Earth (r) in km	Increase in the radius of Earth Δr (in mm)	Δr^3	Mass of Earth in kg	Δm per succeeding rows in x (10^{14}) kg
A	B	C	D	E	F	G
1	Time period 't'= 0 (the present)	6371	0.6404015949	0.2626377895	5.972×10^{24}	6.002946941
2	0.000000001 (1 year)	6371.000001	640433.5366	2.62677×10^{17}	5.972×10^{24}	6003247.655
3	0.001 (=1 mn yrs)	6371.640434	5766805.406	$1.91781 \times 10^{20}20$	5.9726×10^{24}	54056446.22
4	0.01 (=10 mn yrs)	6377.40724	57955901.1	1.94667×10^{23}	5.97801×10^{24}	543262661.1
5	0.1 (=100 mn yrs)	6435.363141	96250304.7	8.91674×10^{23}	6.03233×10^{24}	902223857.5
6	0.2476917681	6531.613445	1515637.366	3.48166×10^{18}	6.12255×10^{24}	14207167.4
7	0.25 (=250 mn yrs)	6533.129083	166254940.5	4.5954×10^{24}	6.12398×10^{24}	1558428040
8	0.5 (=500 mn yrs)	6699.384023	170485792.9	4.95524×10^{24}	6.27982×10^{24}	1598086886
9	0.75 (=750 mn yrs)	6869.869816	174824312	5.34325×10^{24}	6.43963×10^{24}	1638754970
10	1 bn yrs (=10^9 yrs)	7044.694128	179273237.7	5.76164×10^{24}	6.6035×10^{24}	1680457974

3-p-v.   Interpretation of Table T-3.3

In Sr. 1, $\Delta t = 0$ yrs (*present time*), where the Earth's radius, in col. C increases by $\Delta r = 0.64$ mm, the mass of the Earth in col. F increases by $\Delta m = 6.003 \times 1014$ kg.

Sr. 2, are respective increases for periods mentioned in col. B, the respective increase in radius r in col. D and m in col. G.
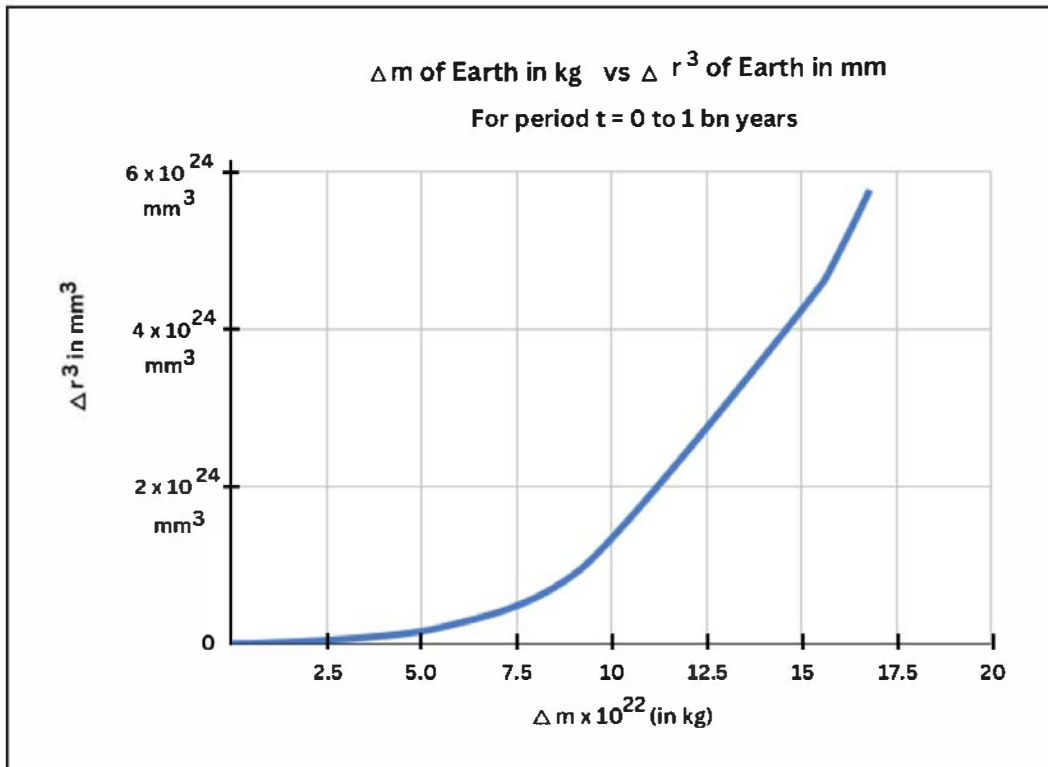
Graph G-3.4: *The graph representing the above Table T-3.3, plotting the increase in radius Δr^3 versus increase in mass (Δm) for a given period of time say from present time t = 0 to t = 1 bn years.*

3-p-vi. The above Graph G-3.4 presents the mass $\Delta m \propto \Delta r^3$, drawn from the formula $\Rightarrow m = \dfrac{D}{V}$ where m is the mass of the Earth, D is the density of Earth and V is its volume, of radius r. Hence m, the mass of the Earth

$= D \times \frac{4}{3} \pi r^3 = K \times r^3$, where $K = D \times \frac{4}{3} \pi$ or the increase in mass of Earth $\Delta m = K \times \Delta r^3$. Here K is constant and its value for Earth is K = 23,094.

The curvilinear bent of the above graph [$\Delta m \propto \Delta r^3$] is an exponential curve, but it appears the way it is because of unequal periods of plotting as seen in the Table T-3.3 above. For longer period of time say 25 bn years the graph shows a exponential cuve as follows:
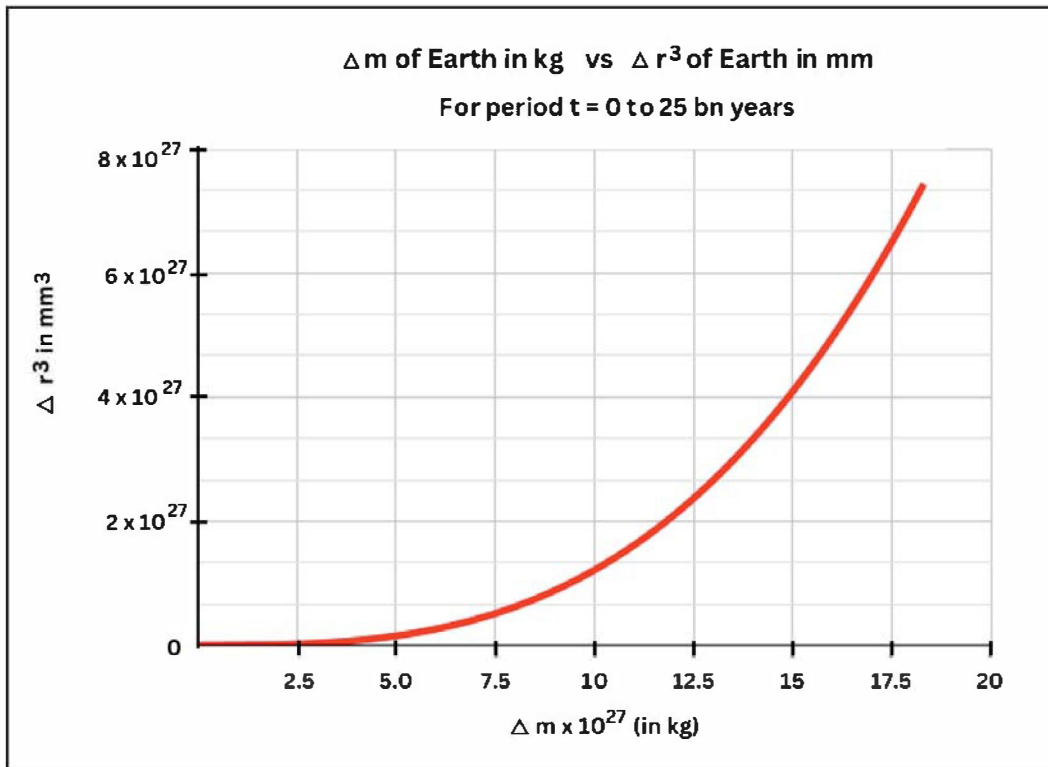
Graph G-3.5: *This graph is the same as that of G-3.4 above, except that the period of plotting is 25 bn years. The graph presents an exponential curve for [Δm (X-axis) $\propto$ Δr^3 (Y-axis)] for t = 25 bn years.*

Δ m of Earth in kg vs Time 't' in bn years

For period 't' = 0 to 25 bn years
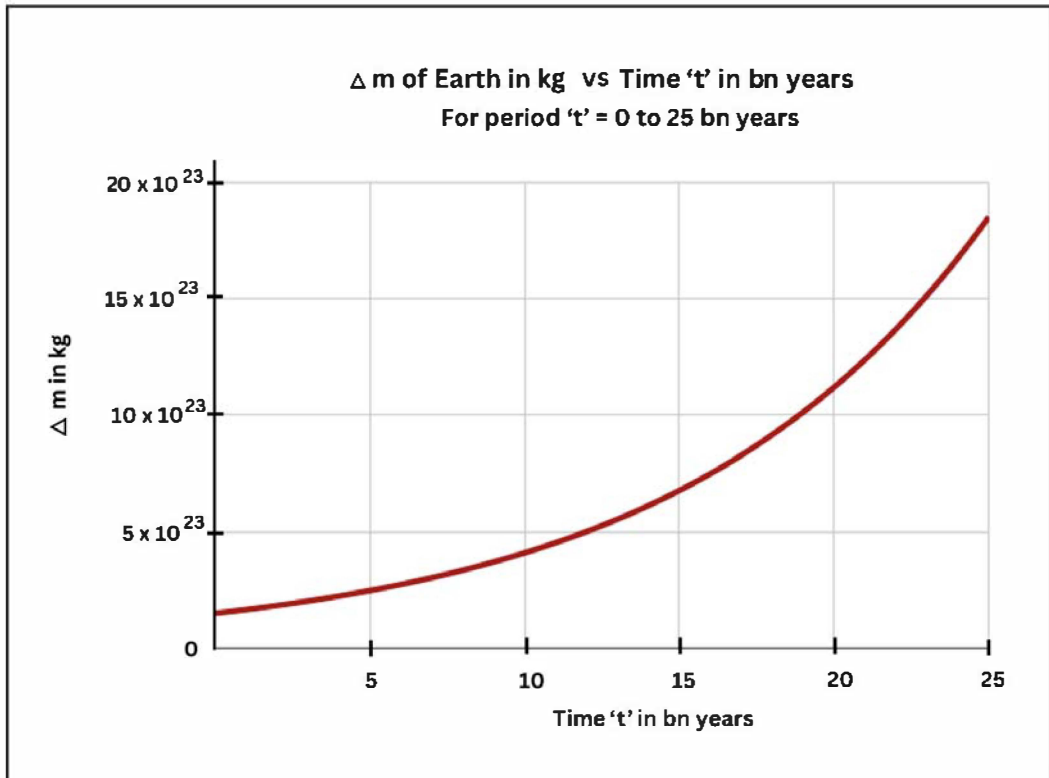
Graph G-3.6: Here, t is plotted on the X-axis in bn years, and **Δm** is on the Y-axis in Kg.

ΔR between Earth-Moon vs Time 't' in bn years

For period 't' = 0 to 25 bn years
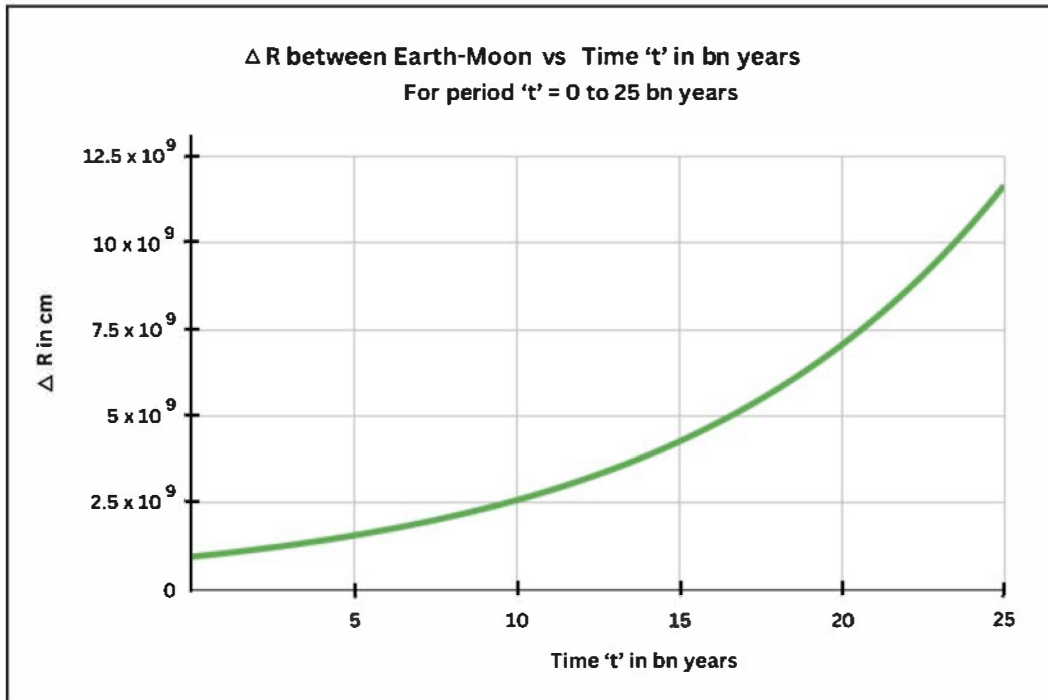
Graph G-3.7: *Here, t is plotted on the X-axis in bn years, and ΔR is the recession in cm for the Earth-Moon system, plotted on the Y-axis.*

This graph provides the rate of recession = $\frac{\Delta R}{\Delta t}$ = velocity of recession, which is an exponential curve, of accelerated recession observed over a more extended period of time, whereas for shorter periods of less than 1 bn years, it is almost linear. (***Also see Graph G-3.1-A and G-3.1-B***).

The same exponential curve applies to all Celestial bodies (*Stars, Galaxies, etc.*) in deep Space, showing exponentially accelerated growth over longer periods of time.

3-p-vii.   Observations:

3-p-vii-1. Drawn from the mass-volume equation, we have, for Δt = 1 yr, where Δm is the increase in mass of the Earth in one year ∝ Δr^3 where Δr is the increase in radius of the Earth in one year. (*see graph G-3.4 above*).

3-p-vii-2. Here, the graph is an exponential curve, similar to graphs G-3.6 plotted Δm versus Δt and G-3.7 plotted ΔR versus Δt. In the latter two graphs (*G-3.6 and G-3.7*), the values are drawn from the NUE Law and the Nu Constant.

3-p-vii-3. Hence, the mass-volume graph and the graphs drawn from the NUE Law and the Nu constant are similar exponential curves showing accelerated growth over some time.

3-p-viii.   Conclusion:

3-p-viii-1. The above examples 3-p-vii, 1, 2 and 3 show that the Earth-Moon System simultaneously follows the NUE Law and the Laws of Gravitation.

3-p-viii-2. We can generalise that what applies to the Earth-Moon System also applies to the Solar System, the Milky Way Galaxy, and all other Galaxies and Stars in deep Space.

Expanding Celestial Bodies, Space & perpetuity of Eclipses.

CHAPTER-4; Abstract :

As outlined in the NUE Law, the expansion of Celestial bodies and Space describes the uniform growth of all matter, including the Earth, Moon, and Sun, over time. By applying the Nu constant, one can calculate the sizes and distances of these Celestial bodies in the past and future. For instance, 4.5 billion years ago, the Earth, Moon, and Sun were significantly smaller, and their intermediate distances were shorter. The Moon was closer to the Earth, at 245,620 km, compared to its present distance of 386,108 km.

The NUE Law posits that the ratios of Celestial body sizes and their distances remain constant despite expansion, meaning that the proportionality of distances and sizes 4.5 billion years ago mirrors those of today. This ensures that Solar and Lunar eclipses, which rely on these proportions, will perpetually occur as long as the Solar system exists. The model disproves the notion that the Moon's recession will one day prevent Solar eclipses from happening.

The NUE Law also explains the increase in mass of Celestial bodies over time, which impacts gravitational forces and the Sphere of Influence (SOI) of planets like Earth. As the Earth's mass increases, its gravitational reach expands, ensuring that the Moon will never escape Earth's influence. This expanding mass and gravitational influence align with the observed expansion of the Universe and support the NUE Law's cosmological model over hypothesised "dark energy" theories.

4.   How do we find the size of Earth, Moon, and Sun 4.5 billion years ago and their respective distances between them?

4a.   Finding the size of Celestial bodies at different periods:

4-a-i.   We can find the size of Celestial bodies in different past and future

periods, w.r.t. in the present period ($t = 0$), by applying the NUE Law and the Nu constant.

4-a-ii. The NUE Law states that the Universe expands uniformly everywhere, including the Solar System, that is, the Sun, the Earth, the Moon, and all other Planets and their Satellites, rings, belts, etc.

4-a-iii. According to the NASA and National Geographic websites, the Earth's age is 4.5 billion years.

4-b.   How do we calculate backwards in time 4.5 bn years ago?

4-b-i. All these calculations are meticulously undertaken in Table T-3.2 above and in detail in Table T-3.2-Annexe Link =
https://arf-research.com/arf.pdf

4-b-ii. The various distances of the Sun, Earth and Moon = D, drawn from the fact sheet, NASA website[33] is as follows:
The present Sun's radius = 6,95,700 km, Earth's radius = 6371 km, Moon radius = 1737.4 km
Sun-Earth distance (*centre to centre*) = 149.6 mn km, Earth-Moon distance (*surface to surface*) = 3,78,000 km. Earth-Moon distance (*centre to centre*) = 3,86,108.4 km.
The Moon's present recession rate (= *expansion rate*)
= 3.8 cm/year/ 3,78,000 km.

4-b-iii. To calculate the Earth-Moon (E-M$_{C-C}$) distance (*centre-to-centre*), we refer to Table T-3.2-Annexe
At 4.5 billion years ago, the expansion has shrunken to 0.6361427572, from the present, which gives us the E-M$_{C-C}$ =
= 3,86,108.4 km x 0.6361427572 = **2,45,620 km**
E-M$_{C-C}$ **= 2,45,620 km.** was the distance of the Moon from Earth **4.5 bn** years ago -- **(A)**

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[33] https://nssdc.gsfc.nasa.gov/planetary/factsheet/sunfact.html

Thus, in **4.5 bn** years, the E-M$_{C-C}$ distance has expanded by
1,40,488.8 km -- **(B)**

4-b-iv. The Moon at 4.5 bn years ago had its radius shrunken from the present
1737.4 km given by 1737.4 x 0.6361427572 = 1105.234 km
Moon's radius was 1105.234 km at 4.5 bn years ago.------------------------ **(C)**
Thus, in 4.5 bn years, the Moon's radius has expanded by
632.166 km -- **(D)**

4-b-v. The Earth's radius has shrunk since 4.5 billion years ago, from 6371 km
to 6371 x 0.6361427572 = **4052.8655 km.**
Earth's radius was **4052.8655 km**. At 4.5 bn years ago.--------------------- **(E)**
Thus, since 4.5 bn years, the Earth's radius has expanded by
2318.1345 km -- **(F)**

4-b-vi. The rate of E-M$_{C-C}$ expansion 4.5 bn years ago was = 3.8815 cm/yr
(*expansion w.r.t. E-M$_{C-C}$*) x 0.6361427572 = 2.469 cm/year/2,45,620 km --**(G)**
(G) in km/s/Mpc works out to 98.2889 km/s/Mpc = Nu Constant. ---- (H)
From **(G),** we have 3.8815 cm/yr (*at present, expansion w.r.t. E-M$_{C-C}$*).
Thus, in 4.5 bn years, we have
The E-M$_{C-C}$ expansion average rate increased by 1.4125 cm/yr/
1,40,488.8 km-- **(J)**

4-b-vii. To calculate the Earth-Sun (E-S$_{C-C}$) distance (*Centre-to-centre*),
E-S$_{C-C}$ = 149.6 × 10^6 km (*average distance given by NASA website[34]*)----- **(K)**
We refer to Table T-3.2-Annexe. At 4.5 billion years ago, the expansion
has shrunken to 0.6361427572, from the present, which gives us the
E-S$_{C-C}$ = 149.6 × 10^6 km x 0.6361427572 = 95166956.477 km
Thus, 95166956.477 km was the distance of the Sun from Earth 4.5 bn
years ago ---**(L)**
In 4.5 bn years, the E-S$_{C-C}$ has expanded by (K) - (L) = 54433043.6 km -- **(M)**

4-b-viii. To find the Earth-Sun present rate of expansion:
We have Nu = 98.2889 km/s/Mpc = 3.8 cm/year/3,78,000 km; therefore,

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[34] https://nssdc.gsfc.nasa.gov/planetary/factsheet/sunfact.html

for distance = 149.6×10^6 km, the recession would be 1503.915 cm/year = 15.03915 metre/year/149.6×10^6 km. --- **(N)**.

The expansion rate of E-S$_{SS}$, 4.5 bn years ago, was 15.03915 m x 0.6361427572 = 9.5670 m/year/95166956.477 km.

Thus, the increase in the rate of expansion is 5.47215 m/year in 4.5 bn years --- **(P)**

4-b-ix. What's the size of the Sun? Was it 4.5 bn years ago?

The present size is r_S = 6,95,700 km. From Table T-3.2- Annexe, 4.5 bn years in the past gives a shrunken by

= 0.6361427572 x 6,95,700 km = 4,42,564.516 km. ---------------------------**(Q)**

Therefore, the Sun has expanded 2,53,135.484 km in 4.5 bn years ------ **(R)**

4-b-x.
To test-check, the radius of the Sun was calculated 4.5 billion years ago at 4,42,564.516 km. When expanded for the next 4.5 billion years, it should give the present radius of the Sun.

4-b-xi.
Ans: Here, we take the radius 4,42,564.516 km as a base radius, 4.5 bn years ago, at period **t = 0.** We calculate the expansion from this **t = 0** period to 4.5 bn years in future from that time, when the Sun's radius was 4,42,564.516 km

Again, we refer to Table T-3.2-Annexe for the period + 4.5 bn years **from t = 0** and get the expansion rate = 1.571974197. Thus, 4,42,564.516 x 1.571974197 = 6,95,699.99 km = 6,95,700 km.

NB: This test check also applies to all the calculations done for E-S$_{C-C}$, E-M$_{C-C}$, and the Radius of Earth, Moon, and Sun above.

4-c. Will the eclipse of Sun-Earth-Moon be perpetual or transitional in the present period?

4-c-i.
The NUE Law provides that the ratios of the Sun's radius r_S, Earth's radius r_E and Moon's radius r_M are not altered before and after the recession, and so also the ratio of distances Sun-Earth (R_{S-E}) and Earth-Moon (R_{E-M}). we can say as follows:

4-c-ii. **Table No.-T-4.1:** The ratios of Celestial bodies and their intermediary space between them are constant. They don't change with the Universe's expansion.

Sr. No.	Celestial Body	Present Radius	Radius 4.5 bn years ago [Increase in radius (Δr) in 4.5 bn years]	The ratios (are unchanged)	The ratios (are unchanged)
A	B	C	D	E	F
1	Sun	$r_S =$ 695700 km	$r'_S =$ 4,42,564.516 km $\Delta r = 2,53,135.484$ km	$\dfrac{C1}{C1} =$ 1.5719	$\dfrac{D1}{D1} =$ 109.1979
2	Earth	$r_E = 6371$ km	$r'_E = 4052.8655$ km $\Delta r = 2318.1345$ km	$\dfrac{C2}{C2} =$ 1.5719	$\dfrac{D2}{D2} = 3.667$
3	Moon	$r_M =$ 1737.4 km	$r'_M = 1105.234$ km $\Delta r = 632.166$ km	$\dfrac{C3}{C2} =$ 1.5719	
4	E-M$_{C\text{-}C}$	$R_{E\text{-}M} =$ 3,86,108.4 km	$R'_{E\text{-}M} = 2,45,620$ km $\Delta R_{E\text{-}M} =$ 1,40,488.8 km	$\dfrac{C4}{D4} =$ 1.5719	$\dfrac{C5}{C4} = 387.456$ = D5/D4
5	E-S$_{C\text{-}C}$	$R_{E\text{-}S} =$ 149.6 x 10^6 km	$\Delta R_{E\text{-}S} =$ 95166956.477 km $\Delta R_{E\text{-}S} =$ 54433043.6 km	$\dfrac{C5}{D5} =$ 1.5719	

4-c-iii. The ratio of present Earth-Sun (E-S$_{C-C}$) to Earth-Moon (E-M$_{C-C}$) is 387.456, and the ratio of 95166956.477 km to 2,45,620 km is 387.456, that is, the ratio of the present period = the ratio of that of 4.5 bn years ago.

4-c-iv. The ratio of the Sun's radius to Earth is 109.1979 for the present period and 109.1979 for the period 4.5 billion years ago, which is the same as it is now.

4-c-v. The ratio of the radius of Earth to the moon is 3.667 for the present period and 3.667 for the period 4.5 bn years ago, that is, the same as now.
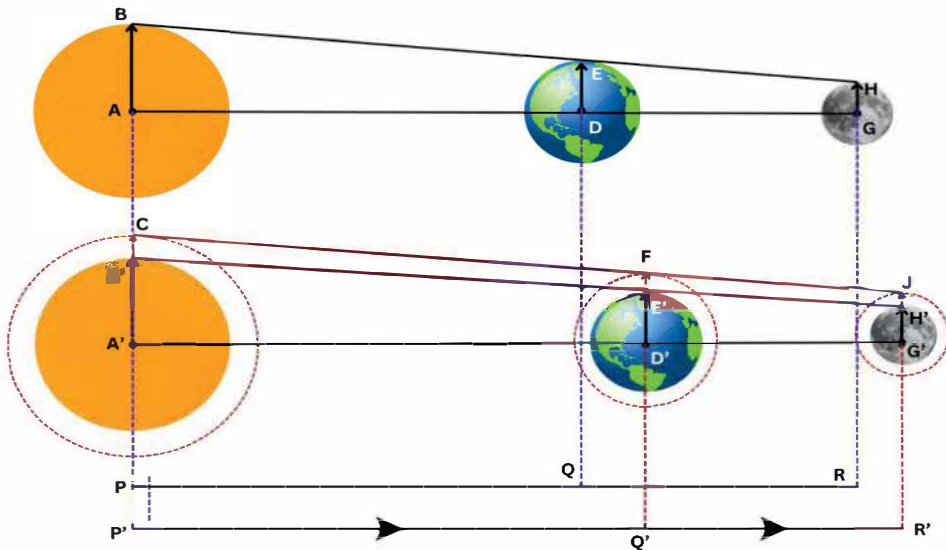
Fig: 4.1 = 4.5 bn years ago, the size of the Sun, Earth and Moon is represented by A, D, G At present, the size of the Sun, Earth and Moon is represented by A', D' and G'. The red and purple lines (dotted and straight lines) represent the increase in size throughout 4.5 bn years ago. Thus, the ratio of inter-spaces AD/DG = A'D'/D'G' and the ratio of the radius AB/DE = A'C/ D'F and DE/GH = D'F/G'J. (See Table T-4.1 columns E and F)

NB: **1. Graphic G-4.1 is not to scale but demonstrates an increase in radius and radial distances before and after 4.5 billion years.**
2. The constant ratios, before and after the recession, are unchanged, satisfying the NUE Law.

4-d.   Conclusion:

4-d-i.   The present knowledge and the understanding of the Earth-Moon recession.

The present knowledge and the understanding of the Earth-Moon recession at the rate 3.8 cm/year will translate into the Moon moving away from the Earth to a distance sometime in the future that the Solar eclipse event does not show up on Earth. In other words, the Solar eclipse is an event at a phase where we are privileged to see it happening.

4-d-ii.   According to the NUE Law, we have seen that the ratio of the Sun's radius to Earth's radius and Earth's radius to the Moon's radius, before and after 4.5 billion years of increase, remains constant (*see Table T-4.1 columns E and F above*). Similarly, the radial distance between Sun-Earth and Earth-Moon remains constant before and after 4.5 billion years of increase.

4-d-iii.   Since the ratios of the radius of Celestial bodies are constant and the ratio of their intermediate distances are also constant, the Eclipses happened 4.5 bn years ago, as they happen in the present times, and they will continue to occur for all other times.

Thus, the Eclipses, both Lunar and Solar, shall be perpetual and take place as long as the Solar system exists.

4-d-iv.   The above ratios also imply that the entire solar system, with all its Planets, Satellites, and other Celestial bodies, was smaller in the past and has grown proportionately larger over time, as per the Nu Constant.

4-d-v.   The fact that the Earth a smaller in the past is also proven by the slowing of the Earth's rotation. For details see CHAPTER-3, para 3-d and CHAPTER-9, para 9-l-v.

4-e.   Formation of Moon:

4-e-i.   The present knowledge and understanding on the Moon's formation:

As per the present knowledge and understanding of the Earth-Moon

Collision Theory drawn from the NASA website[35], a Celestial body of the size of a small planet like Mars hit the Earth, which impacted it so violently that a chunk of Earth separated and Started revolving around the Earth as its natural satellite, the Moon.
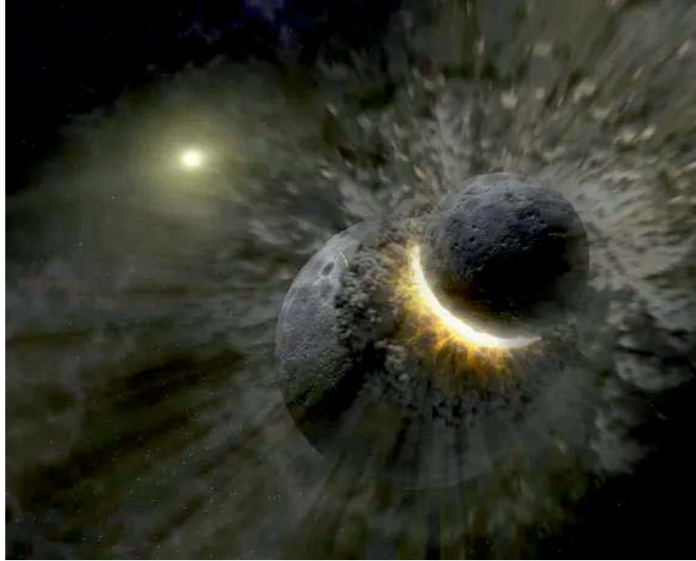
Fig: 4.2- Earth's Moon is thought to have formed in a tremendous collision. A massive object — of a size of a small Mars-like planet crashed into Earth, flinging material into space that became the Moon ⇒. NASA

4-e-ii. According to the NUE Law and the **propounded new Model of the Organic Universe (***see CHAPTER-7***)**, about 4.5 bn years ago, the Earth and Moon were created simultaneously as a two-body system with rotation and revolution periods of the Moon, being the same.

4-e-iii. Such high-precision motions of Celestial bodies are designed and programmed to cause the Moon's same side to face the Earth at all times and manage the high tide and low tides of the Earth's seas and oceans, which cannot merely be an accidental event unless designed, planned and programmed to achieve a certain purpose.

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[35] https://science.nasa.gov/moon/formation/

4-e-iv. As per para 4-c above, 4.5 billion years ago, the Earth and Moon already existed, and the radial distance between them was 2,45,620 km. At that time, the radius of the Earth was 4052.8655 km (*as compared to 6371 km as of now*), and that of the Moon was 1105.234 km (*as compared to 1737.4 km as of now*).

4-e-v. The Astrogenesis Theory based on NUE Law presents the New Organic Universe Model in **CHAPTER 7**.

4-f. Does an increase/decrease in mass in a Celestial body influence Space in its neighbourhood and the Universe?

4-f-i. **Ans:** An increase in the mass of a Celestial body impacts the Celestial body and the gravitational field outside the Celestial body.

Here, we have taken the example of Earth, but on similar lines, the increase in mass in each Celestial body, whether Earth, Moon, Sun or any other Celestial body(s) or a Galaxy or a Cluster, etc., would impact the Celestial body itself, its immediate neighbourhood, and cumulatively the Universe as a whole.

4-f-ii. **Impact-1:** Does it impact g, the gravitation due to acceleration?

By Law of Gravitation $= \frac{F}{m} = \frac{GM}{R^2} = g$, where m is the mass of the Earth, F is the Force of attraction between two bodies, M is the mass of the Principal body (*or other Celestial body*), R is the distance between these two bodies, G is the Gravitational Constant and g is the acceleration due to gravity.

$F = m.g = \frac{M.m.G}{R^2}$, Thus, g $= \frac{M.G}{R^2}$ --- (A)

Thus, g $= \frac{M.G}{R^2}$ -- (B)

After one year, the mass of all the Celestial bodies and the distance between them increase as per Nu constant.

Thus, after one year $\frac{(M + \Delta M).G}{(R + \Delta R)^2}$ ---(C)

4-f-iii. **Impact of NUE Law on g the Gravitation due to acceleration:**

Since, $\frac{M}{(R+\Delta R)^2}$ is a non-linear ratio therefore it will impact g = (g-Δg). Thus, the NUE Law makes the value of g (*at present = 9.82 m/S²*) to decrease inversely with an increase in time Δt. It implies that 'g' value was larger in the past compared to the present and will further decrease.

4-f-iv. **To calculate the value of g 4.5 bn years ago: Example:**

4-f-iv-1. **The present value of g**

$$= \frac{M.G}{R^2} = \frac{(5.9722 \times 10^{24} \ kg) \times [6.67430 \times 10^{-11} NM^2/kg^2}{(6371000 \ m)^2} = 9.820 \ m/S^2 . \text{--------- (D)}$$

4-f-iv-2. **The value of g 4.5 bn years ago** (*see Para 4-c-ii, Table T-4.1 above*)

$$= g_{4.5bn} = \frac{M_{4.5bn}.G}{(R_{4.5bn})^2} = \frac{(3.7992 \times 10^{24} \ kg) \times [6.67430 \times 10^{-11} NM^2/kg^2}{(4052865.5 \ m)^2}$$

$$= 15.437 \ m/S^2 \text{ --- (E)}$$

4-f-iv-3. As in (D) above when the present mass of the Earth has increased to 5.9722 × 10²⁴kg and radius of the Earth 6371 km, we have g = 9.82 m/S².

4-f-iv-4. **Summary and Conclusion:**
A. Thus, by the NUE Law, when the mass of the Earth was smaller 4.5 bn years ago, the g then was 15.437 and as the mass and the radius of Earth increased, the value of g has decreased to 9.82 m/S². Similarly in future when Earth's mass and the radius increases further with time the value of g will further decrease.
B. The above calculations are shown for 4.5 billion years ago, but they could be worked out for 1 billion years ago or 1 billion years in the future, w.r.t. the present t = 0, using Table T-3.2 or T-3.2-Annexe.
C. As seen on various websites, including NASA's, the present knowledge and understanding of g is that it has remained constant throughout Earth's history since its creation. However,

the NUE Law makes g variable, being higher in the past and lesser in the future, w.r.t. the present, where g = 9.82 m/S^2.

D. Higher value of g also implies that the people in the past (*in terms of periods more than 250 mn years ago and beyond*) weighed more than those in the present and vice-versa.

4-g. Impact-2: The increase/decrease of the mass of the Earth in period t to (t ±Δt) how will it impact Earth's sphere of influence?

4-g-i. On an approximation, the Sphere of Influence (*SOI*) of a celestial body, like Earth, is the region around it where its gravitational influence is dominant over that of a more massive body it orbits, such as the Sun. Within this sphere, objects are more strongly attracted to the Earth than to the Sun.

The formula to calculate the radius of the sphere of influence (*SOI*) of Earth is: Earth's SOI = $a.\left(\frac{m}{M}\right)^{2/5}$.

Where a is the semi-major axis (*radial distance*) between the Earth and the Sun, m is the mass of the Earth and M is the mass of the Sun.

When calculating for the future period, by the NUE Law, when t = (t ±Δt), m = (m ±Δm), and M = (M ±ΔM).

4-g-ii. To calculate the present radius of SOI of the Earth w.r.t. the Sun.

We have, the radial distance between the Sun and Earth (a) = 149.6 × 10^6 km, Present mass of the Sun (M) = 1.988 × 10^{30} kg and Present mass of the Earth (m) = 5.9722 × 10^{24} kg

Thus, Earth's SOI = $a.\left(\frac{m}{M}\right)^{2/5}$ = 149.6 × 10^6 $km.\left(\frac{5.9722 \times 10^{24}\ kg}{1.988 \times 10^{30}\ kg}\right)^{2/5}$

= **9.247 × 10^5 km**

Therefore, The radius of the Sphere of Influence of the Earth at present = **9.247 × 10^5 km** ---(A)

4-g-iii. **To calculate the SOI radius of the Earth 4.5 bn years ago w.r.t. the Sun.**

The radial distance between Sun and Earth **4.5 bn** years ago ($a_{4.5bn}$) = **95166956.477** km (*see Table T-4.1 above*), Mass of the Sun 4.5 bn years ago ($M_{4.5bn}$) = $\mathbf{1.265 \times 10^{30}}$ *kg* (*from Table T-3.2-Annexe*) Mass of the Earth 4.5 bn years ago ($m_{4.5bn}$) = $\mathbf{3.7992 \times 10^{24}}$ *kg* [*from (E) above*]

Thus Earth's $SOI_{4.5bn}$ = $a_{4.5bn} \left(\dfrac{m_{4.5bn}}{M_{4.5bn}} \right)^{2/5}$ = 95166956.477 km

$\left(\dfrac{3.7992 \times 10^{24} \ kg}{1.265 \times 10^{30} \ kg} \right)^{2/5}$ = $\underline{\mathbf{5.882 \times 10^{5}}}$ km

Thus, the radius of the Sphere of Influence of the Earth 4..5 yrs ago = $\underline{\mathbf{5.882 \times 10^{5}}}$ km ---**(B)**

4-g-iv. **Conclusion:**

4-g-iv-1. From (A) and (B) above the present radius of the Earth's SOI is increased as compared to that at 4.5 bn years ago. Thus, the Earth's SOI ∝ the mass of the Earth at a given point of time.

4-g-iv-2 **The present knowledge and understanding of the Earth's SOI is that the radius of SOI does not change and that it is constant that is, R_{SOI} = $\underline{\mathbf{9.247 \times 10^{5}}}$ km.**

4-g-iv-3. **Will the Moon ever escape the Earth's SOI?**

Since the Moon is receding away from the present Earth-Moon distance = 3.86×10^{5} km, a time would come in a few bn years that the Moon would drift away from the Earth's SOI and may directly be under the Sun's SOI becoming another Planet of the Sun, closer to Earth.

4-g-iv-4. **The Moon will always be under the Earth's SOI.**

Under the NUE Law the Moon will never be able to drift away from the Earth's SOI because the Earth's radial SOI is increasing with time t.

4-h. How is the Universe Expanding and the mass increasing? Do we subscribe to the proposed 'dark energy cosmology model'?

4-h-i. The Earth-Moon system is like a molecule unit of the Universe, whose behaviour is akin to those of the Universe. From here, the same behaviour applies to the Sun-Earth system and the Solar system, where the increase in the mass of the Sun is causing Earth's recession from the Sun and simultaneously to other Planets of the Solar system (*for details see CHAPTER-2, Table T-2.1*).

4-h-ii. All these recessions are a function of the same operator, that is, the Nu constant. Therefore, in para 4-c, the perpetuity of the Sun-Earth-Moon eclipses (*the Solar eclipse and the Lunar eclipse*) is mathematically proven.

4-h-iii. Para 4-h-i & 4-h-ii above prove that the increase in mass is happening in every Celestial Body, which is responsible for the expansion of the Solar System, the Milky Way Galaxy, the Galaxy cluster group, and consequently, the Universe as a whole.

4-h-iv. The cumulation of all the masses increased in each of the Celestial Bodies are acting at the centre of the Universe (*as per General Relativity*), which in turn is causing the peripheral circumference of the Universe to expand, which is observed as a general recession of all the Celestial Bodies in the far off deep Space to be flying away from each other.
Let's say the increase in mass in all Celestial bodies (*depending upon their sizes, respectively*) is = $\Delta m_1 + \Delta m_2 + \Delta m_3 + \Delta m_4 + \text{........} \Delta m_N$. All these masses are acting virtually at the centre point of the Universe, creating huge mass Σm_N, but the volume at this centre is nearly zero, causing a huge Black hole.

4-h-v. The targeted Galaxies or Stars observed in deep Space are the older ones, a few billion years old and therefore, their recession is observed to be accelerated as per Nu = $98.2889 \text{ km/s}/D.\,e^{r.t}$ where distance D is in Mpc.

Thus, the recession velocity observed in far deep space is observed to be in acceleration mode. (*See CHAPTER-3, Graphs G-3.2-A and G-3.2-B*)

4-h-vi. Since Δr is very minuscule when compared with r, and Δr is a function of Δt where t is the period therefore, it takes a very long period before the accelerations begin to show up. This time is 0.2 bn years to up to 0.5 bn years before it becomes observable (*see CHAPTER-2, para 2-s-vi*).

The NUE Law and the increase (stretching) of the Wavelengths.

CHAPTER-5; Abstract :

The NUE Law explains the natural expansion of wavelengths over time, connecting it with the age, temperature, and energy of celestial bodies like stars, including the Sun. The law posits that all Celestial bodies, when formed, emit radiation starting from a minimum wavelength, which then stretches over billions of years. The relationship between time and wavelength is exponential, as detailed in the equation $V' = Nu.D.e^{r.t}$, where the Nu constant governs the rate of this expansion.

The Sun's journey in the visible spectrum began around 380 nm (in the violet band) and will end at 780 nm (in the red band). This transition takes about 7.155 billion years, of which 4.46 billion years have already passed. The current wavelength emitted by the Sun is approximate 595 nm, placing it in the yellow band of the electromagnetic spectrum. As the Sun ages and transitions through the visible bands, its size increases, culminating in its largest form as a red giant at 780 nm.

The NUE Law also establishes relationships between wavelength, temperature, and energy. As wavelength increases, energy decreases, and the volume of Celestial bodies expands. This intrinsic stretching of wavelengths across the Universe ensures the expansion of Space and the ageing of Celestial bodies without increasing the Universe's temperature, thus ensuring the overall temperature of the Universe remains constant.

5-a.   The Sun and the Universe:

5-a-i.   When created, the Universe was like a baby Universe with all its organs in their designated slots, but in a baby size. The Living Organic Universe (*LOU*) Model (*see CHAPTER-7*) provides that the essential organs of the Universe are the active Galaxies in the Universe (*either as a standalone or a*

Galactic cluster), which are simultaneously created to keep the baby Universe active and alive from its birth to the end of its lifespan.

5-a-ii. Just like an organ of a human, say a kidney, a liver, or a heart, etc., are live and active all through the lifespan of a person, which could be for 100 years or so. Still, the cells in the organ have a short lifespan; they are born, actively perform, and then die off, being substituted by new ones, such that the organ is active and performing all through the lifespan of a human. The Sun is an equivalent energy cell that keeps itself and its sub-cells active and thriving during its lifespan. In turn, the Sun draws its energy from the Universe system.

5-a-iii. The Sun, an integral part of the Milky Way Galaxy, is born with its sub-cells (that is, Planets and their Satellites); it performs, ages, and then dies off, being substituted by a newborn young Sun with its subsystems (that is, Planets, etc.).
Chapter 7 provides more about the LOU Model.

5-b.   The limitations of the Nu constant.

5-b-i.   The equation $V' = Nu.D.e^{r.t}$. gives us the pattern of the progress of expansion or its decay but it does not give us the start and end points. We only know the singularity at $t = -\infty$ and at $t = +\infty$ the state of expansion/recession which is mathematically undefined.

Therefore, this equation cannot determine any Celestial body's start and endpoints.

5-b-ii. Similarly, we still determine when the Sun existed via the Nu equation. However, we can estimate it by considering some physical evidence and correlations. For example, if there is proof to find the Earth's age, then the Sun, the Principal body, is very close to it.

5-b-iii. According to the 'postulates', every Celestial body emits a typical wavelength (λ) time-bound emission at birth. Thus, once the λ is established, its transition period w.r.t. time is standard and decided by the Nu Constant.

5-b-iv. Similarly, the end of the Celestial body is pre-programmed, and therefore, it cannot be determined by the Nu equation. Thus, the lifespan of a Celestial body is pre-programmed by its creator system to serve the purpose for which it is created. Although physically, all celestial bodies appear to be similar in appearance, individually, they are all different and customised for performing a specific task.

5-b-v. The appearance in the EM visible spectrum (*VIBGYOR*) is transitional in its journey of its lifespan. Thus, the Sun's journey could have started, for example, at λ = 300 nm and ended at λ = 850 nm, whereas the journey between 380 nm and 780 nm is in the visible band. The journey from 300 to < 380 and 780 to < 850 nm would be in the non-visible but in an active dark matter phase.

5-b-vi. How is the Earth's age determined at present?

As seen in various texts and on the National Geography website[36], evidence is found in rocks in Canada and Australia, which have been 4.03 bn years to 4.3 bn years old. Methods of radiometric dating and Isotopes have also been deployed. Still, samples collected from Moon rocks and meteorites, which are not subjected to rock cycles, suggest the age of Earth is 4.54 billion years ± 0.5 bn years. that is, according to these estimates, the present age of the Earth could be 4.04 to 5.04 billion years. However, the discovery of rocks in Canada, Australia, Moon rocks, and meteorites could be coincidental, and archaeologists, geologists, and others may still need to search deeper to excavate such rocks that could date ancient periods prior to 4.5 billion years ago.

Now referring to Table T-3.2-Annexe[37], we observe that the Sun-Earth system at 4.04 bn years ago and 4.46 bn years ago was in the visible range whereas, the Earth was in non-visible range prior to 4.54 bn years ago, and 5.04 bn years ago. See Table T-5.1 below.

5-b-vii. Table T-5.1: Table shown period-wise (*age*), size of Earth, corresponding wavelength (λ_{MAX})

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[36] https://education.nationalgeographic.org/resource/resource-library-age-earth/

[37] https://arf-research.com/arf.pdf

Sr.	Age (*in bn yrs ago*)	Size (radius) of the Earth (*in km*)	Wavelength (λ_{MAX}) (*in nm*)
1	4.04	6371 x 0.6662476245 = 4244.664	396.417
2	4.46	6371 x 0.6387056653 = 4069.194	380.029
3	4.54	6371 x 0.6335901332 = 4036.603	376.986
4	5.04	6371 x 0.6025334157 = 3838.74	358.507

5-b-viii. Since scientists have estimated the Earth's age in years = 4.54 bn ± 0.5bn, therefore in the above table, we have calculated the minimum and the maximum variations in age and its related size of the Earth at that time and the Wavelength (λ_{MAX}) emitted by the body at that period

5-b-ix. At 4.54 bn years, λ_{MAX} was at 376.99 nm, which was in the UV range of the EM Spectrum, in an active dark matter. Similarly, at 5.04 bn years ago, the size of the Earth was r = 3838.74 km, and λ_{MAX} was at 358.51nm, which was in the UV band of an active dark matter. However, at age = 4.46 bn years, λ_{MAX} just entered the EM Spectrum's visible band. At 4.04 bn years, λ_{MAX} was in the violet-indigo band, which was the brightest at a temperature of about 40,000°C.

5-b-x. Celestial bodies in the EM spectrum's Gamma, X-ray, UV, IR, MW and Radio bands are detectable by spectroscopic methods from Space Telescopes and other methods. They are in the non-visible band, called active dark Celestial bodies or "active dark matter".

5-b-xi. Summary:

5-b-xi-1. According to the NUE Law and the Nu constant, the Earth and, consequently, its Principal Celestial body, the Sun, entered the visible band 4.46 billion years ago, whereas, at 4.54 billion and 5.04 billion

years, the Sun was an active dark matter in the EM spectrum. However, from Table T-5.1, we find the threshold λ_{MAX} at 380.029 nm just enters the visible band, which continues when λ_{MAX} is at 396.42 nm, in the visible range at 4.04 bn years.

5-b-xi-2. We correlate the age of the Earth with the age of the Sun. However, the exact age of the Sun and its lifespan period are not known. What is predicted is the age of the Sun's transition in the visible band, which ends with it as a red giant at λ_{MAX} = **780 nm.**

5-c. NUE Law applicable to the wavelengths (λ):

5-c-i. The NUE Law is one of the critical applications of the intrinsic increase in wavelengths, w.r.t. time. It unravels the mystery of exponential expansion of λ w.r.t. the period t. and its relationship with Celestial bodies like the Stars (*including the Sun*) and the Galaxies in determining their age, temperature, etc.

5-c-ii. The NUE Law concerns the increase of all linear distances such as space (*the Space-time fabric*) or the radius of Celestial bodies, like Planets and their satellites, the Sun, the Galaxies and others.

5-c-iii. The Universe is expanding at the rate Nu Constant, Nu = 98.2889 km/s/ Mpc. When the Universe was created, the Celestial bodies also Started emitting radiation, which began with wavelength λ $\simeq$ 0. After that, its intrinsic increase is initiated with time, starting with the emission of Gamma rays at 10^{-3} nm. (***see Table T-3.2-Annexe, column M***)

5-c-iv. We refer to Table T-3.2 (*see Table T-3.2-Annex*), which gives us the time-period-wise recession rate for the exponential component $e^{r.t}$. Where r = rate of increase and t = period for increase (*recession*).

5-c-v. Taking the present time t = 0 in Table T-3.2-Annex[38], in column M, we see the Shrinkage from sr. no. 40 to sr no. 21; we have 595 nm shrinks to 380 nm in 4.46 bn years ago.

5-c-vi. We referred to the HR diagram (*see Fig.5.1 below*) presented by Swinburne University[39]. Here, the Sun is more than midway between Yellow and Orange, which implies λ = 595 nm.

5-c-vii. At 780 nm, the Red band of the EM spectrum ends (*see Table T-5.2 below*), which is hitherto considered the end of the Sun's existence.

Table T-3.2-Annex[40] = 380 nm to 780 nm gives the Sun's transition period in the visible spectrum of **7.155 bn** yrs.

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[38] https://arf-research.com/arf.pdf

[39] https://astronomy.swin.edu.au/cosmos/h/hertzsprung-russell+diagram

[40] https://arf-research.com/arf.pdf
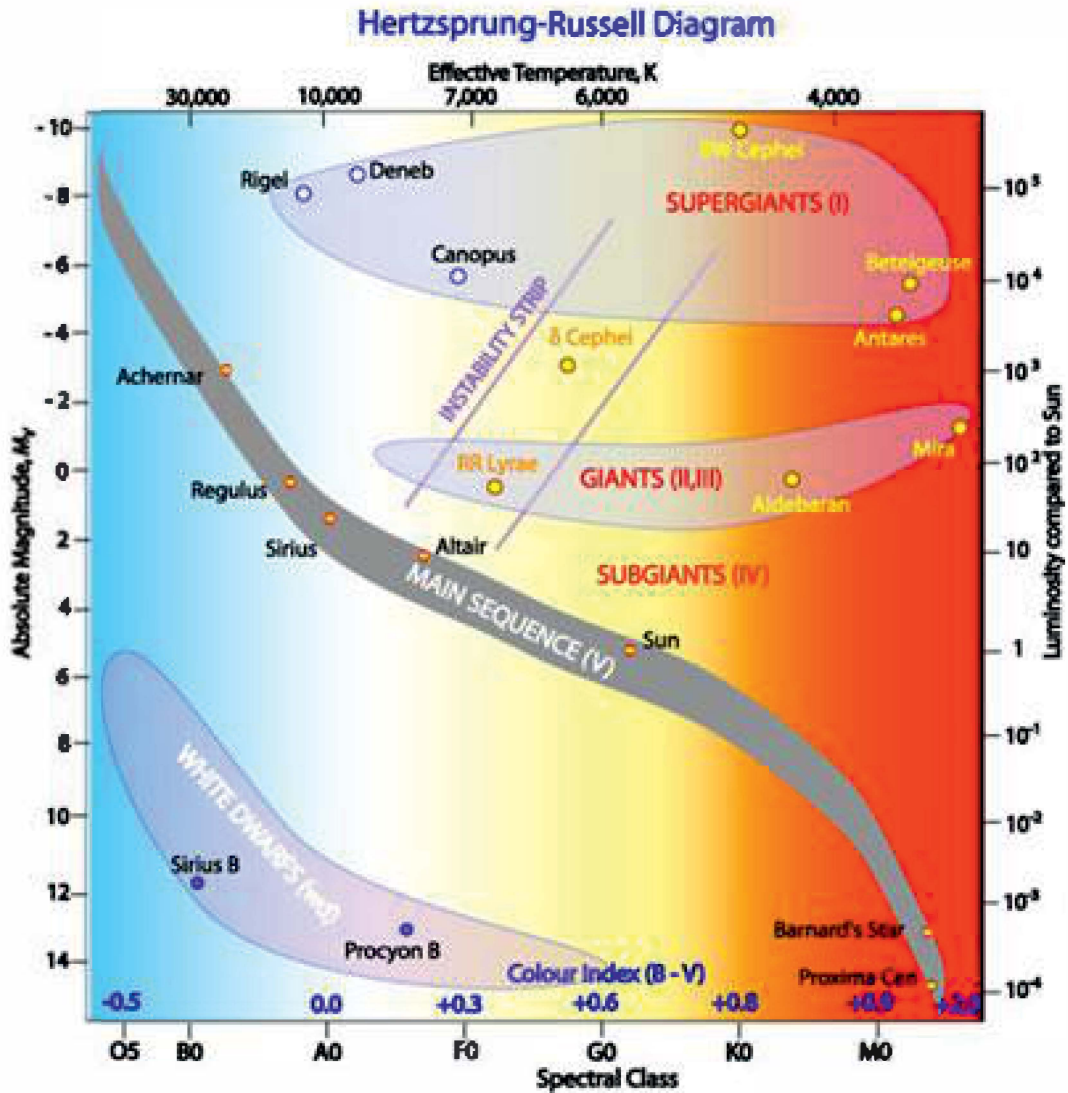
Fig. 5.1- *the HR Diagram, indicating the position of the Sun in the yellow band. It's closer to the orange band.*

5-c-viii.   Conclusion:

5-c-viii-1. The transition period of   the Sun since it entered the visible spectrum's brilliant violet colour at $\lambda = 380$ nm to the present period when it is in the middle of the Yellow band at $\lambda = 595$ nm [*see Table T-*

3.2-Annex, sr. no. 40 for λ = 595 nm at t = 0 (present time), and sr. no. 21 for λ = 380 nm at t = – 4.46 bn years ago]

Total t = 4.46 bn yrs--- **(A)**

5-c-viii-2. The transition period of the Sun when it exits the giant Red band at $λ_{MAX}$ = 780 nm, from its entry in the visible band at 380 nm (*see Table T-3.2-Annex, sr. no. 57 for λ = 780 nm at t = + 2.695 bn years) = (**t** Total = 4.46bn yrs + 2.695 bn yrs.) = 7.155 bn yrs* ---------------------------------- **(B)**

5-c-viii-3. The balanced age of the Sun in the visible range.
= (B) - (A) = 2.695 bn yrs (*from the present t = 0*)-------------------------**(C)**

5-d. What's the Current understanding of the lifespan of the Sun and its age derived from the NUE Law?

5-d-i. The present understanding of the Sun's lifespan.
Cosmologists and Astronomists say that the Sun's age is about 9.5 bn years, whereas 4.5 bn years is already completed, and the balance lifespan is about **five** bn yrs.

5-d-ii. NASA's estimate of the Sun's lifespan.
NASA's estimate is based on current Cosmology models, observations, and understanding of the life cycle of Stars and the expansion of the Universe. Here are some key points contributing to this estimate: It is based on the Lambda Cold Dark Matter (LCDM) model, the current standard model of Cosmology. It describes the Universe as composed of dark energy, dark matter, and normal matter. This model helps predict the future evolution of the Universe. Thus, the Sun's age is merely propounded and predicted based on a hypothetical model of Cosmology.

5-d-iii. Sun's lifespan is derived based on the NUE Law.
However, from the NUE Law, we have calculated the lifespan of the Sun through the increase in λ, the wavelength emitted by the Sun. The gross period of the Sun's lifespan in the visible spectrum is given as 7.155 bn years [*see (B) above*]. Out of these 7.155 bn years, the Sun has

already traversed 4.46 bn years [*see (A) above*], and thus its balance lifespan in the visible spectrum is 2.695 bn years [*see (C) above*].

5-e.   Relationship of the wavelength (λ) with time t:

5-e-i.   Fig-5.2-A and 5.2-B below show that, with time, $f(x) = e^x$ where $x = r.t$ is an exponential Graph; therefore, the wavelength lambda(λ) is expanding exponentially, that is, the increase in wavelength is not linear.
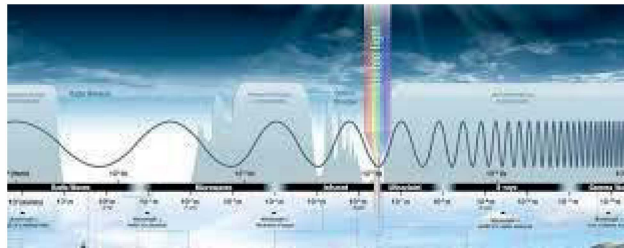
Fig-5.2.-A: the Em Spectrum by NASA Science
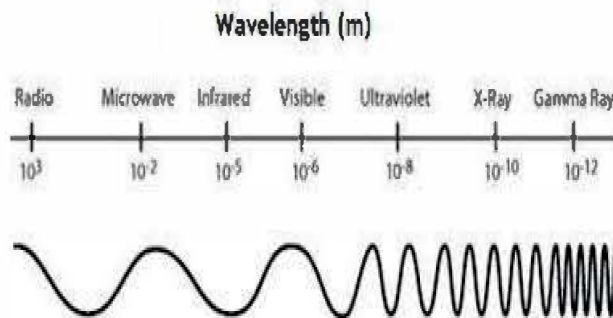
Fig 5.2-B The exponential wavelength expansion.

5-e-ii.   The NUE Law causes an increase in wavelength (λ) at the rate Nu constant, that is, $V' = Nu.D.e^{r.t}$. With the increase in time t, the λ increases exponentially. Thus, the wavelength λ accelerates over a large period of billions of years. The rapid increase in wavelength can be seen in Graph G-5.1 below.

Wavelength (λ) vs Time 't'

At present 't' = 0,
λ= 597 nm

Wavelength (λ) in nm

Time 't' in bn years
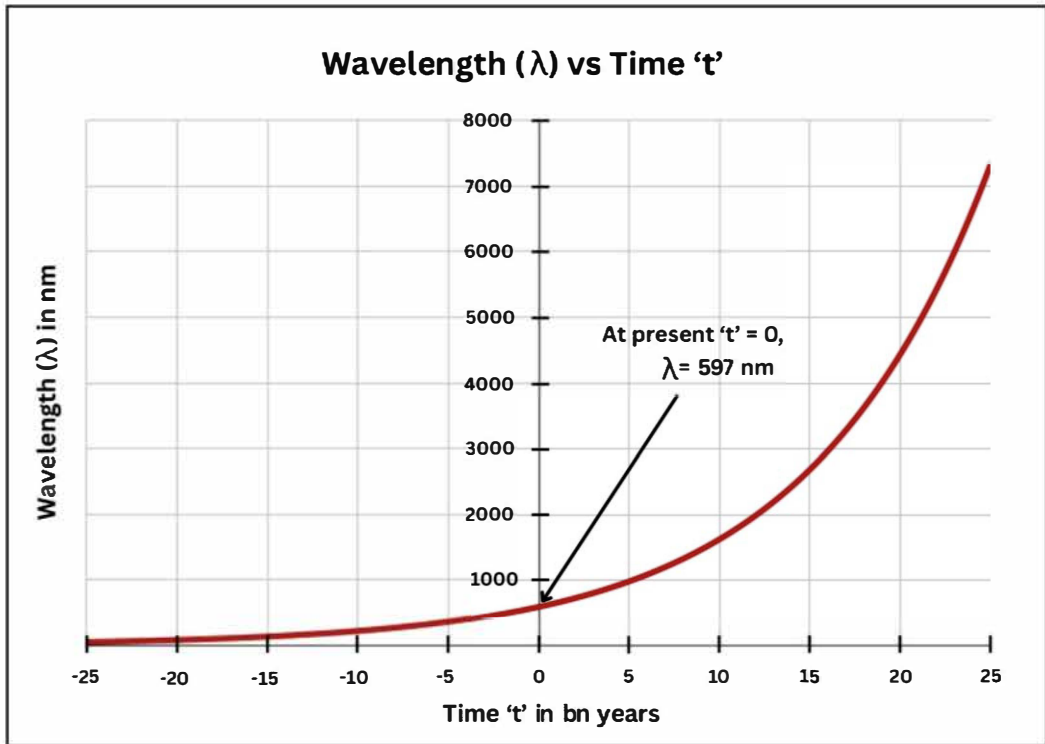
Graph- G-5.1: Graph showing an increase in wavelength w.r.t. time t. The present time is shown as t = 0. The Sun is in the yellow band as shown in the graph, whereas the Sun's entering the visible band was at 4.46 bn years ago, and the Sun's exit from the red band was shown at 780 nm. The rest of the Sun's journey in the past and in the future beyond the exit of the red band is in the invisible range i.e. the post-infrared zone and the pre Ultraviolet zone.

5-f. Relationship of Wavelength (λ), Temperature (T), and Energy (E):

5-f-i.   The relation between the wavelength and the temperature is inverse of each other. Thus, the higher the surface temperature, the lower the wavelength it emits.

5-f-ii. Wien's Law:

Wien's law, a law of physics (*expressed mathematically as λ max = constant/T*), explains the relationship between the object's temperature and the wavelength it emits.

Wien's Law equation is given as $\lambda_{MAX} = \dfrac{k}{T}$ or $\lambda.T$ = constant ---------- (A)

Where T is the object's temperature in Kelvin, and k is the constant = 2,897 μm = $(2.897 \times 10^{6}$ nm).

5-f-iii. Relationship between volume (V_O) of a Celestial body and its emitted wavelength (λ_{MAX})

From 5-f-ii, we have from (A) above = $\lambda_{MAX} = \dfrac{k}{T}$ or $\lambda.T$ = constant.

We have volume $V_O \propto T$, and the increase in volume caused by NUE Law gives = $(V_O+\Delta V_O)$ = D. $(\frac{4}{3}\pi r^3)$ where D is density = constant and

Therefore, $(V_O+\Delta V_O) = k.(r_O+\Delta r_O)^3$ where $k = \dfrac{4}{3}\pi.D$ and r is the radius of the Celestial body emitting wavelength (λ).

Thus, after time $(t+\Delta t_O)$, the volume will increase to $(V_O+\Delta V_O) \propto (r_O+\Delta r_O)^3$, where $(r_O+\Delta r_O)^3 = (\lambda+\Delta\lambda)$. Thus, $(V_O+\Delta V_O) \propto (\lambda+\Delta\lambda)$.

Thus, the increasing period t $\propto$ increase in volume $V_O \propto$ increase in λ

Therefore, $V_O \propto \lambda$ -- (B)

That is, an increase in the volume of a Celestial body increases its size. Thus, Increase in size of the Celestial body $\propto \lambda_{MAX}$, That is, the wavelength of the Celestial body emitting it. ------------------------------- (C)
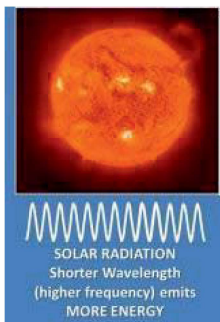
Fig: 5.3 *Radiation emitted by Sun at temperature is 5772K (5499ºC) Image Credit: NASA (Sun & Earth)[41]*

5-g.   Relation between wavelength (λ) and Energy (E)

5-g-i   The wavelength (λ) of the radiation is inversely proportional to the Energy (E) of the radiation.

We have **c = ν λ,** where ν is the frequency.

E = **hν.** where h is Plank's Constant, c is the speed of light, and E is the Energy of the radiation. Thus, E = **hν** = $\frac{hc}{\lambda}$ = λ = $\frac{hc}{E}$, **or E.λ = hc = constant or λ ∝ $\frac{1}{E}$.** --- **(D)**

Hence, the wavelength and its energy are inversely proportionate to each other. Thus, when the wavelength increases, the radiation's energy decreases; conversely, when the wavelength decreases, the radiation's energy increases.

5-g-ii.   From (A) and (B) above, we have λ ∝ $\frac{1}{T}$ and λ ∝ $\frac{1}{E}$

Therefore, T ∝ E; thus, the higher the temperature, the greater the energy in the radiation. Thus, in the HR diagram, see Fig 5.1 above. The temperature at λ = 380 nm could be more than 40,000ºC and Energy E = 5.231×10^{-19} J, where J is in Joule. For λ at 595 nm, the temperature is about 5500ºC and Energy E = 3.341×10^{-19} J.

The data proves temperature 'T' ∝ E -- **(E)**

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[41] *https://www.ces.fau.edu/nasa/module-2/correlation-between-temperature-and-radiation.php*

5-g-iii. Relation between wavelength (λ) and period (t)

We have $c = v.\lambda$, where v the frequency is inversely proportional to the period t. Therefore, $\lambda = \dfrac{c}{v}$, $v = \dfrac{1}{t}$, Thus $\lambda = \dfrac{c}{1/t}$

Therefore, $\lambda = c.t = \lambda \propto t$ (*see graph G-5.1 above*) ------- (F)

Thus, when t the time period increases, λ, the wavelength also increases. Note: The increase or decrease in λ w.r.t. t the period in billion years is given in Table T-3.2-Annex.

5-h. How is the Size of the Sun determined?

5-h-i. The wavelength and the size of the Celestial body:

As in (C) above, we have λ ∝ size of the Celestial body.

According to the NUE Law, the Sun's radius increases with time, and the Sun's volume also increases simultaneously; hence, the Sun appears larger. The Sun is also emitting wavelength (λ).

The HR diagram (*see Fig. 5.1 above*) shows that the Sun's λ = 595 nm is placed in the yellow band. Thus, we can see that the size of the Sun is larger in the yellow band than when it entered the bright violet band in the HR diagram.

5-h-ii. In Table T-5.2 below, we see that as the Sun transits from the violet and indigo bands, the wavelength keeps increasing, and so does the size. In the red band, the size of the Sun shall appear to be the largest because λ in the visible spectrum is the largest at λ = 780 nm. This large size of the Sun is also referred to as the 'Red Giant'.

Table T-5.2: Relationship of wavelength (λ) with colour

Sr. No.	Colour Band	Wavelength (λ)	λ (Mean)	Size of Sun*(radius in km) [*see Table T-3.2-Annexe*]
1	Violet + Indigo	380nm - 450nm	415 nm	4,85,236
2	Blue	450nm - 490nm	470 nm	5,49,545

Sr. No.	Colour Band	Wavelength (λ)	λ (Mean)	Size of Sun*(radius in km) [see Table T-3.2-Annexe]
3	Green	490nm - 580nm	535 nm	6,25,545
4	Yellow	580nm - 600 nm	595 nm	6,95,700
5	Orange	600nm - 620nm	610 nm	7,13,239
6	Red	620nm - 780nm	700 nm	8,18,471
7	Red Giant	780 nm	780 nm	9,12,159.91

Table T-5.1: For finding the radius of the Sun for the decay period, we refer to Table T-3.2-Annexe column M for wavelength and column 'I' for shrinkage/expansion, and column B for the period t at which the shrinkage/expansion has happened.

5-j. Why does the Universe not heat up when billions of Stars in each Galaxy and billions of such Galaxies have continuously thrown heat into Space for billions of years?

5-j-i. We know that the NUE Law governs the expansion of the Universe, and the Nu constant causes the Universe expansion and recession between the Celestial bodies w.r.t. time t.

An increase in volume V ∝ increases in temperature T.

Also, an increase in volume V ∝ increases in the wavelength (λ).

Therefore, Increase in volume V ∝ λ.T.

Thus, when V increases λ and T both increase, but when λ increases, T decreases proportionately.

5-j-ii. **Thus, the volume and the increase in wavelength neutralise the temperatures and cancel them out equally because the operator for the volume and the wavelength is the same, that is, the Nu constant.**

Therefore, the temperature at certain regions surrounding the Star may increase, like the Sun throwing heat into Space, but the overall temperature of the Universe remains constant at 2.725 K[42].

5-j-iii. Conclusion:

The wavelength is directly proportional to the size of the Sun as shown in Table T-5.2 above, or for that matter, any Celestial body in the Universe, be it a Planet, another Star or a Galaxy, etc.
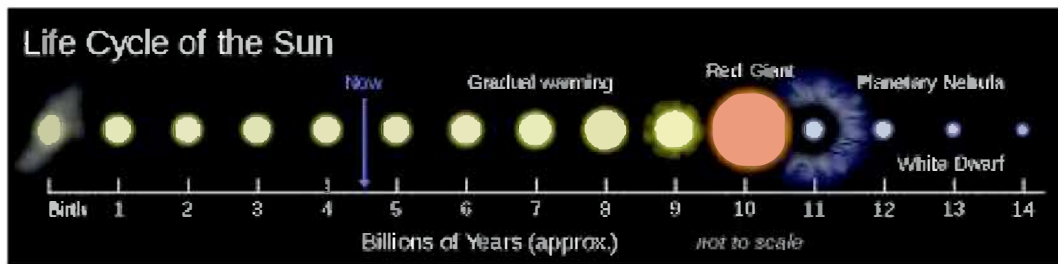
Fig-5.4[43]: The lifecycle of the Sun from birth to death in the visible band. Even here, we can see that the size of the Sun at birth in the Violet band is the brightest but smallest, whereas, at about 9.5 bn years in the red band, it appears to be the largest.

5-k.   Why does the Sun's size keep increasing as it moves in the violet band towards the red band?

5-k-i.   According to the presently accepted model of the Sun, its size increases, as seen in Fig-5.3 and Table T-5.2 above, from its birth in the Solar system until it reaches the edge of the red band when it is at its maximum as a giant red Sun.

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[42] https://www.space.com/how-cold-is-space

[43] https://spaceplace.nasa.gov/all-about-the-sun/en/

5-l.   The paradox of the Sun's size increases with its ageing versus its present model of the Sun, where the fuel is Hydrogen consumption and its mass depletes to produce light and energy.

5-l-i.   The Sun's Model and its energy source, as per the present knowledge:

The present knowledge and model of the Sun's energy creation is happening by the fusion of Hydrogen into Helium, resulting in the creation of Sunshine, light and energy thrown out by the Sun by burning 600 mn tonnes of Hydrogen fuel per second[44]. Thus, it implies that the mass of the Sun should reduce as it ages with time, and so should its volume, and consequently, the size should shrink.

5-l-ii.   The paradox of the size of the Sun increase versus its Hydrogen depletion to generate energy:

How is it that the size of the Sun increases as we see in Fig-5.3 and Table T-5.2 above, that is, the size of the Sun is observed to be increasing from its birth (λ= *380nm*) until it reaches the edge of the red band when it is at its maximum size (λ=*780nm*).

5-l-iii.   Contradiction and a serious flaw in the Sun's present Model?

The Scientists who have developed the Sun's Energy-Generation Model should reconsider their present Sun's Model because Energy generated through Hydrogen consumption is huge at the rate 600 mn tonnes per second. Thus, its mass, volume, and size shrinkage contradict the present observations that with ageing, the size of the Sun is increasing and that it would become a large Red Giant toward the end of its lifespan. (*See Fig. 5.3 above*).

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[44] https://cosmicopia.gsfc.nasa.gov/qa_sun.html#:~

5-l-iv. Contradiction of the Sun's energy model with the expanding Universe.

The reducing mass will also reduce its force of gravity between Earth and the Sun $F = \dfrac{G.m_S.m_E}{R^2}$ = $\mathbf{m_S} = \dfrac{F.R^2}{m_E.G}$ (*where m_S is the mass of the Sun, m_E the mass of the Earth, F the force of gravity, R the distance between the Sun and the Earth, and G is the gravitational constant*). Thus, for G constant, when the mass m_S decreases to (m_S - Δm_S), then it should result in reducing the Sun-Earth radial distance $(R - \Delta R)^2$ and the force of gravity (F) decreases to (F-ΔF). that is, when the Sun's mass decreases, the radial distance between the Sun and the Earth should also decrease by its non-linear $(R$-$\Delta R)^2$.

In practical observations, such a decrease in the radial Sun-Earth distance is not observed; on the contrary, the Sun's mass is increasing, and the Sun-Earth distance is also increasing* in the expanding Universe Model.

5-m. Does the Sun die out after reaching the edge of the Red Band?

5-m-i. Sun's transition in various bands of the EM spectrum, w.r.t. time t:

As per the NUE Law, the wavelength is subject to natural recession and stretching by the Nu constant. It's a gradual transition from the pre-UV (*non-visible band*) to the visible VIBGYOR band, which then transits to the non-visible band in the IR region and beyond.

5-m-ii. The birth of the Sun as presented in the present Sun's model:

According to the present model of the Sun, it is considered to be born from the thick clouds of Solar Nebula[45] when on birth the wavelength of the Sun's emission was λ = 380 nm. It continues its life's journey through ageing and transits through various VIBGYOR E-M bands.

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[45] https://science.nasa.gov/sun/facts/

5-m-iii. The death of the Sun as presented in the present Sun's model:

According to the model, the Sun is currently nearing the edge of the yellow band at λ = 595 nm (*at the age of 4.46 bn years*). It would continue ageing with time until it reaches the edge of the red band at 780 nm. At this stage, the Sun will appear like a 'Red Giant' and suddenly disappear with a huge burst and a thud, like a supernova, gradually converting it into a white dwarf. (*see 5-m-iv below*)

5-m-iv. Describing the present model of the Sun,

we reproduce a paragraph narrating the end of the Super Red Giant, the Sun's death.

*When the core of the former red giant has exhausted all of its fuel and shed all the gas it can, the remaining dense stellar cinder is called a white dwarf. The white dwarf is considered "dead" because its atoms no longer fuse to give the Star energy. But it still "shines" because it is so hot. **NASA also mentions in its website**[46], that the Super Red Giant Sun will expand so much that it will engulf Mercury, Venus and possibly even the Earth.*

Fig 5.5: As per the present model, the Sun becomes a red giant before it collapses.

5-n. The ARF[47] model of the Sun and its views:

5-n-i. As referred to in para 5-a, the Sun and its Solar System were created when it is unknown, but it was a much smaller baby Sun with its Solar system at its birth. The Sun and all its Satellite Planets, including the Earth, have grown from a small baby-size to what it is today at λ = 595 nm.

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[46] https://science.nasa.gov/sun/facts/

[47] ARF = Astrogenesis Research Foundation under which the research and study by the scientists is carried on.

5-n-ii.   Thus, the baby Sun keeps growing with period of time t.

When λ increases to 380 nm, it enters into the violet-indigo band of the visible VIBGYOR E-M spectrum and, therefore, is visible to the human eye. The wavelength λ of the Sun's emission further transits with time and enters subsequent VIBGYOR bands. The Sun's present position is in the yellow band at λ = 595 nm, as seen in the HR diagram (*see Fig 5.1*).

5-n-iii. The Sun will reach the edge of the red band λ = 780 nm in 2.695 bn years from the present t = 0 (*see graph G-5.1 above and Table T-3.2-Annex*). This gives the age in the visible spectrum = 4.46 + 2.695 = **7.155 bn years**.

5-n-iv. The Sun's birth in the pre-VIBGYOR band as an active dark matter is unknown until it enters the visible VIBGYOR band and exits to the non-visible IR band at λ ≥ 780 nm. Its journey would continue in the post-VIBGYOR band until its programmed end.

5-p.   Conclusion:

5-p-i.   The ARF Model of the Sun (*see para 5-q below*):

The ARF Model presents the Sun as a composite 'Solar system' body. It is an important element or an organic cell of the Milky Way Galaxy, a vital organ of the Universe, where the composite cells are created, grow and then perish and are substituted/replenished by the new composite cells.

5-p-ii. The NASA Sun's Model:

The age of the Sun, which is the presently accepted model of the Sun, considers the Sun's birth to begin when it has entered the visible violet brilliant white colour of the E-M spectrum at λ = 380 nm and its lifespan shall end at the age when λ = 780 nm. We are at λ = 595 nm, equivalent to 4.46 billion years since its entry in the visible band of the E-M spectrum and considered to be born at λ = 380 nm.

5-q.   The propounded ARF* Model of the Sun:

ARF = Astrogenesis Research Foundation, under which the research and study by the scientists are carried out.

5-q-i.   **The present model of the Sun's birth, given by NASA[48] is as follows:**

The Sun formed about 4.5 billion years ago in a giant, spinning cloud of gas and dust called the solar nebula. As the nebula collapsed under its gravity, it spun faster and flattened into a disk. Most of the nebula's material was pulled toward the centre to form our Sun, which accounts for 99.8% of our solar system's mass. Much of the remaining material formed the planets and other objects that now orbit the Sun. (*The young Sun's early solar wind blew away the remaining leftover gas and dust*.)

5-q-ii.   According to the ARF Model, the Sun is a giant Celestial body that has generated and regulated uninterrupted energy for billions of years in a safe and accident-free process. This is only possible when a sophisticated super-technology is at work, which manages the Sun's energy generation by creating heat and sunshine with a regulated temperature.

5-q-iii.   Imagine a person from his balcony viewing the distant skies. Suddenly, the clouds shake, and an aeroplane emerges and continues to fly towards the observer. The plane appears to get bigger as it advances towards the observer.

5-q-iv.   Can the observer conclude that the aeroplane emerged from the clouds due to some violent movement of the clouds? Can the clouds produce a sophisticated technology-driven aeroplane? Does the cloud have the technology, the workshops, the assembly hangers, the designing, the manufacturing process, the raw materials and the consumables to create an aeroplane? (*see Fig 5.6-A & B, Fig 5.7-A & B*).

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[48] https://science.nasa.gov/sun/facts/
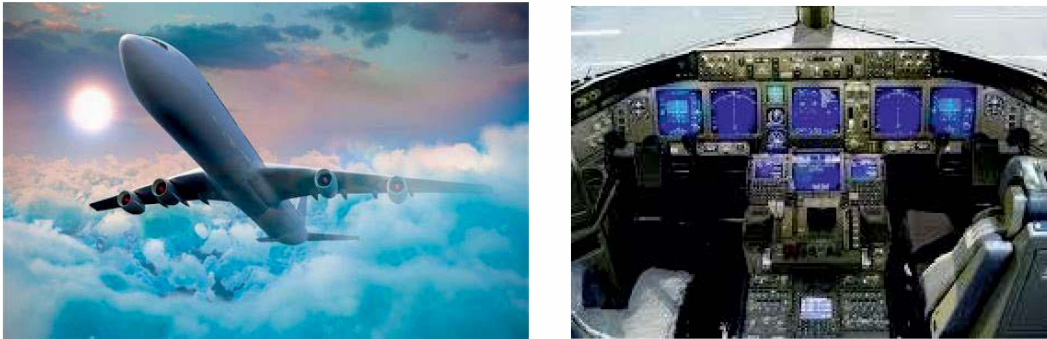
Fig 5.6-A & B: Is the plane emerging from clouds a coincidence chance from violently shaking clouds? or did the aeroplane's entry cause the clouds to shake and get away violently so that the aeroplane could emerge? Can such a sophisticated high-tech aeroplane be produced in the clouds with no infrastructure? It's not only the technology that created it but also the fuel and consumables, maintenance and periodic overhauling that sustain its flight in the skies.
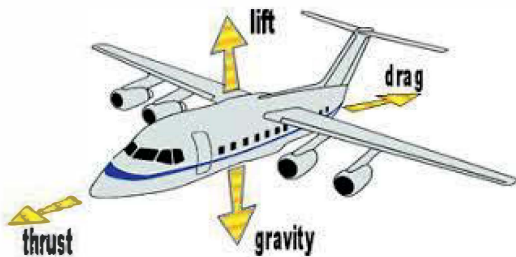
Fig- 5.7-A & B: A look at the sophisticated cockpit of an aeroplane, the science and technology on which the body of the aeroplane is designed. When viewed externally by the observer, only the outer body is seen. Thus, the observer is likely to believe that the outer body of the aeroplane is self-capable of its motion without any pilot in it or a support system by way of ATC (Air Traffic Control), which guides and regulates the height, speed and the aeroplane's movement.

5-q-v.   Like the aeroplanes, their flight paths are kept at safe distances from each other and at different heights (planes) to safeguard from

accidental crashes. Similarly, the Sun and its planets move in specific orbits kept at a safe distance, as per Bode's Law, and placed in different planes from the Sun's equatorial plane.

5-q-vi.   The multiple motions of the Sun and the Planets are regulated, that is the rotation, revolution, the motion of precession, specific eccentricities, obliquities (*that is*, *Earth's obliquity is 23.45^O*), and other specific parameters like the changing aphelion-perihelion of the planets and their satellites around their principal Celestial bodies.

5-q-vii. The multiple motions in 5-q-vi cannot be accidental or a matter of chance or coincidence. A system is always technology-driven, regulated, monitored, and methodically repaired and maintained. The Solar system and its motions could only be created with a specific design, super technology, and matter to serve some specific tasks and purposes.

5-q-viii. Below, we give an example of a huge aircraft carrier with all its support ships and submarines to protect the aircraft carrier. At the same time, it is in motion towards its targeted objective, which is known to the government ministry and the commanders in charge. The objective cannot be known to a casual observer outside the system.

5-q-ix.   The Sun and its planets are all in motion in a specific formation around the Milky Way Galactic centre, whereas its objective is unknown to humans.

Fig 5.8: *The aircraft carrier is a highly sophisticated and technology-driven system, where other Navy ships protect it and move in a particular formation, ensuring its safety and vulnerability. The solar system similarly has the Sun and its planets moving out together in a formation patterned by Bode's Law and the Laws of gravitation.*
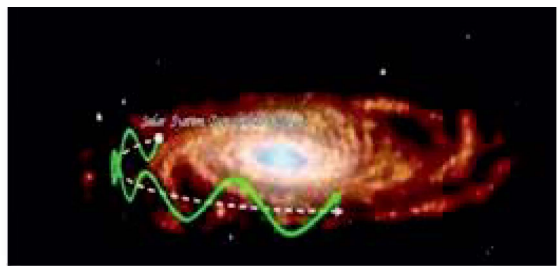
Fig 5.9-A & B: The Sun and its planets are moving around the Milky Way Galactic Centre at a speed of 230 km/s (given by NASA), and it takes 230 million years to complete its one revolution. This orbiting of the Sun around its Galactic Centre has been happening for billions of years.

5-r.   Conclusion:

5-r-i.   The Sun, the planets, and their satellites form the solar system. It is not created out of chance or coincidence but a sophisticated system with regulated movements that adhere to specific parameters during its motion around the Galactic centre. Similarly, the Solar system's birth, transition to the visible spectrum, and exit from the visible spectrum towards the end of its lifespan are part of a Galactic-Universe System-driven activity.

5-r-ii.   The age and size of the Solar system and its transition are as per the NUE Law and are regulated by the Nu constant in conjunction with Table T-3.2-Annex.

Propounding the New Universe Model

CHAPTER-6; Abstract :

The Living Organic Universe (LOU) Model proposes a dynamic, organic structure to the Cosmos, addressing shortcomings and flaws in the presently considered Universe models.

Historically, various models have emerged, from Plato's geocentric view in 400 BC to Einstein's General Relativity in 1916, which introduced the idea of an expanding Universe. Newton's finite and bound Universe and Einstein's static Universe marked significant stages in understanding the Cosmos. Friedman later expanded on Einstein's work by presenting a dynamic model in 1922, which opened the door to theories like the Big Bang 1927 by Father Georges Lemaître. Although widely accepted, this theory faces several limitations, such as the anomalous red shift and dark matter, which are not well-explained.

Other models, like the Steady-State Theory (1948) and the Quasi Steady Cosmology (QSSC, 1993), attempt to address these issues but remain incomplete, particularly regarding cosmic microwave background radiation (CMBR) and the observed acceleration of the Universe's expansion.

While these models provide insights based on observations of their time, they still need to be completed. The LOU Model offers a fresh perspective, proposing an interconnected, living cosmos where cosmic evolution follows organic principles. This approach aims to bridge gaps left by previous models and better align with current observations and the need for a more holistic understanding of the Universe.

6. The History of the popular Universe Models presented.

6-a-i. Prehistoric:

We searched the history and found that since 400 BC, Plato presented a geocentric model of the Universe. Scientists grew curious to understand more about the Universe and interpret it by presenting various Models.

6-a-ii. Multiple Universe Models:

Various models were presented, from Eudoxus' Universe in 380 BC to Aristotle's Model of the Universe in 320 BC, the Ptolemaic Model in 150 AD, the Copernican Model in 1543, Tycho Brahe in 1583, the Kepler Model in 1609, and the Galileon Model in 1610.

6-b. Newtonian model of the Universe:

6-b-i. Newton's Universe:

According to Newton, a finite and bound Universe would 'fall into the middle of the whole space, and compose one great spherical mass'. In an infinite Universe, he believed, 'the fixed Stars, being equally spread out in all points of the heavens, cancel out their mutual pulls by opposite attractions.

6-b-ii. The Laws of Gravitation:

Newton put forward the Universal laws of gravitation in 1687 and used them to explain the observed motions of the planets and the moons.

6-b-iii. General Note:

All the above models are classical and archived compared to present knowledge. The 20th-century models, beginning with Einstein's model, are contemporary with current knowledge and comparable with the observational data gathered through space telescopes and other technological advancements like spectroscopy, digital photography, laser ranging methods, etc.

6-c. Einstein's model of the Universe:

6-c-i. The Universe Model Emerging from General Relativity:

The idea that the Universe had a beginning was first suggested by Albert Einstein's General Theory of relativity, completed in 1916. Einstein's equations, which describe the structure of space and time, suggested that the Universe should not be static but should be expanding.

6-c-ii. Einstein's Finite Static Homogeneous Universe:

Einstein was led to a finite, static* Universe of spherical spatial curvature, assuming a Universe that was static in time and possessed a uniform distribution of matter on the largest scales.

a cosmological model in which the Universe is spatially and temporally infinite, and space is neither expanding nor contracting.

6-d. Friedman's Model of the Universe:

6-d-i. Friedmann's Model was a dynamic which needed motion:

Friedmann Universe is a model of the Universe developed in 1922 by the Russian meteorologist and mathematician Aleksandr Friedmann (1888–1925). He believed that Albert Einstein's General Theory of Relativity required a theory of the Universe in motion, as opposed to the static Universe that scientists had proposed until then.

6-d-ii. Friedmann Universe assumptions are as follows:-

1. It assumes that the Universe is homogeneous and isotropic.
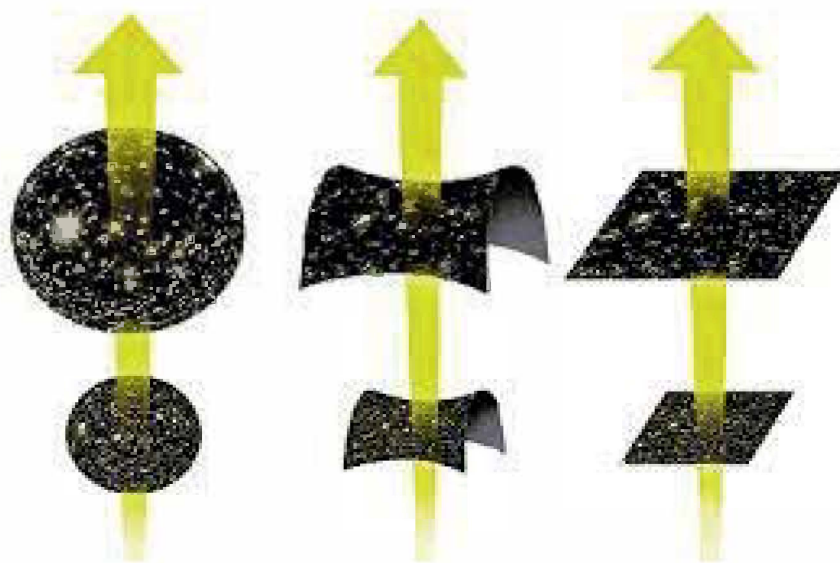
Fig: 6.1-A, B & C: Friedman's Dynamic model

2. The Friedman's model supposes a closed Universe. Still, he also proposed similar solutions involving an open Universe (*which expands infinitely*) or a flat Universe (*in which expansion continues infinitely but gradually approaches a rate of zero expansion*).

3. Assumptions. Where Space (ds_3^2) is a three-dimensional matrix that must be one of (a) flat space, (b) a sphere of constant positive curvature or (c) a hyperbolic space with constant negative curvature. The above matrix is the Friedmann–Lemaître–Robertson–Walker (FLRW) metric.

6-e. Big Bang Theory model by Father Georges Lemaître in 1927.

6-e-i. The Big Bang Theory:

The Big Bang Theory is considered the most credible scientific explanation of how the Universe was created. It suggests that hydrogen gas, the lightest element, was created through expansion and explosion, which led to the formation of Stars, and their death (supernova) led to the creation of life.

6-e-ii. Key Assumptions of the Big Bang Theory?

The Big Bang theory relies on three assumptions, namely,

1. Cosmological singularity,

2. Homogenous expansion space, and

3. Infinite horizons.

6-e-iii. The four stages of the Big Bang theory:

The temperature of the fireball drives the resulting mix of particles and radiation, and we can divide the Universe's evolution into four stages:

A. Heavy particle era.   **B. light particle era.**
C. a radiation era, and   **D. the present-day era of matter.**

According to the Big Bang, its temperature and density decline as the Universe expands.

6-e-iv. Key observations supporting the Big Bang theory include

(A) expansion of the Universe (*Hubble's Law*),

(B) Cosmic microwave background radiation (CMBR),

(C) Abundances of the lightest chemical elements, and

(D) Age of the oldest-known Stars.

6-e-v. The faults of the Big Bang theory.

The shortcomings are as follows:-

A.   The evidence for anomalous redshift,

B.   the age problem.

C.   The low abundances of helium.

D.   The failure to find any feature in the MW background as predicted by the theories of structure formation.

E.   It does not account for dark matter and energy, which comprise most of the Universe's mass and energy.

F.   If the Universe was born out of the Big Bang, then why and how the event happened? What was the situation before the Big Bang?

G.   The theory needs to clarify how matter is created without violating the Laws of conservation of matter and energy. This implies that all of the matter was made during the Big Bang.

H.   The Geometry of Space at the time of the Big Bang was in such a state that its mathematical description could not be given because all the formulae and equations broke down at that event.

I.   The density and temperature of the Universe are not constant but variable.

6-f.   The Steady-State Theory

6-f-i. The Steady State (SS) Theory:

The Steady State Theory was first put forward in 1948 by British scientists Sir Hermann Bondi, Thomas Gold, and Sir Fred Hoyle.

6-f-ii. Features of the Theory:

The Steady-state theory, in cosmology, is a view that the Universe is always expanding but maintaining a constant average density, with matter being continuously created to form new Stars and Galaxies at the

same rate that old ones become unobservable as a consequence of their increasing distance and velocity of recession.

6-f-iii. A Steady State (SS) Condition:

A Steady State is a condition or state in which all variables remain constant and do not change with time despite continuous activity that tries to alter them.

6-f-iv. The Universe Age Prediction by Steady State and Big Bang Theories:

According to the Big Bang theory, the Universe has an age (~ *13.8 billion years*). The steady-state model asserts that although the Universe is expanding, it does not change its appearance over time (*the perfect cosmological principle*); the Universe has no beginning and no end.

6-f-v. Assumptions of SS theory.

There was no beginning, and there will be no end (*that is*, *the age of the Universe is infinite*). The Universe is in a state of dynamic equilibrium. Matter is continuously created to fill in space created by the expansion. The Universe appears the same at all places and at all times.

6-f-vi. The flaws of S-S Theory:

The Steady State Theory says the Universe is constantly expanding with constant density. But what we observed is an accelerated expansion. Also, we did not see any visible matter being created. Of course, the best refutation is the Cosmic microwave background, which the Steady-State Theory cannot predict.

6-f-vii. The Disapproval of Steady State Theory:

The Steady-State Theory was disproved using two observations:
(1)   Counts of radio sources and
(2)   Cosmic microwave background radiation. Observations show that the density of faint radio sources is higher than strong ones, implying that there were more Cosmic Radio sources billions of years ago than now.

6-g. Quasi Steady State Cosmology (QSSC)

6-g-i. Steady State Theory in new Avtaar:

In 1993, Fred Hoyle, Geoffery Burbidge and Jayant Narlikar resurrected the Steady State Theory and formulated the QSSC theory as follows:

6-g-ii. While the Universe is steady on the large time scale, there are changes on the smaller time scale. The Universe oscillates over these smaller time scales while expanding over the longer ones (*see Fig 6.2 below*).

6-g-iii. Here, matter is being created but not continuously, not in equal amounts everywhere. Matter creation occurs selectively and only around dense collapsed objects like black holes.

6-g-iv. When the Universe expands and grows too big, the creation activity drops, and contraction begins.

When the size of the Universe is small enough, the creation of matter begins a new process and expansion starts.

The universe of the quasi-steady state theory keeps expanding on a long time-scale. But it also has oscillations of shorter periods. They alternately cause expansions and contractions of the universe, while on the long time-scale the universe expands steadily.
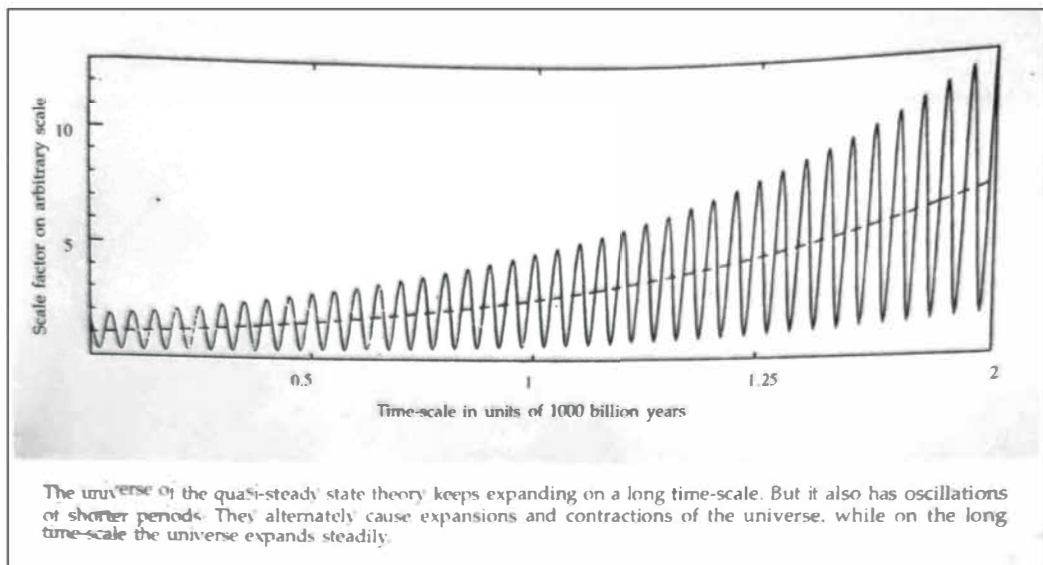
Fig.-6.2: *A model of QSSC*

6-g-v. **The Flaw of QSSC:**
Still not able to answer CMBR, acceleration of the Universe expansion and mass creation

6-h. The Theory of Eternal Inflation (*April 27, 2018*):

6-h-i. Under a variation of the theory that Stephen Hawking and Hertog work with, called eternal inflation, this inflation continues forever in most places, but, in some patches, it stops.

6-h-ii. Where it stops, the universe's form — our own and others'- is in a never-ending process. In this Universe, the laws of physics all look different, meaning constants we take for granted, like the speed of light, would vary between them.

6-j. Conclusion:

6-j-i. Each model of the Universe explains what was known when the theory was presented and what the measurements and the observations could confirm then and after that. We cannot say these theories were wrong or right; perhaps it would be truer and best to say they were incomplete.

6-j-ii. The Big Bang theory is widely accepted but only sometimes accepted. Microwave background radiation is the strongest evidence in support of the Big Bang theory, whereas the other proof of evidence is circumstantial.
The flaws of the theory are mentioned in para **6-e-v** above.

6-j-iii. The Steady State and the QSSC Theory are also not accepted for reasons mentioned in para **6-f-vi, 6-f-vii, and 6-g-v.**

6-j-iv. **A suitable Universe model still needs to be discovered to match observation and correct the flaws of the present Universe Models, especially the Big Bang, the SS, and the QSSC models. Therefore, the arena is open to better options and alternate Universe Models, which continue to be sought after.**

THE LIVING ORGANIC UNIVERSE (LOU) MODEL.

CHAPTER-7; Abstract :

The Living Organic Universe (LOU) Model proposes a new conceptual framework for understanding the Universe, addressing shortcomings in existing models like the Big Bang, Steady State, and Quasi-Steady State theories. It presents the Universe as a dynamic, expanding, and interconnected living system governed by natural laws akin to those seen in biological organisms.

This model emphasises that the Universe's growth and functioning resemble living bodies' development, expansion, and metabolic processes. It suggests that Celestial bodies, such as Stars and Planets, follow a pattern of procreation similar to living organisms, supported by interstellar interactions like energy exchange and waste removal, making the Universe an open system.

The LOU Model integrates scientific laws such as gravitation and thermo-dynamics, viewing the Universe as internally regulated and externally replenished. It proposes that Celestial bodies expand and evolve, maintaining constant density and temperature. The theory also posits that the Universe functions optimally, like superconductivity, and exchanges energy and matter with its surroundings.

Through a unique analogy between human biology and cosmology, the LOU Model highlights the parallels between humans and the Universe, asserting that the Universe, like humans, is a living, self-regulating system. This approach aims to provide deeper insights into cosmic behaviours and unify biological and cosmological principles into one organic framework.

7.   Introduction to the LOU MODEL:

7-a-i.   Is the Theory of Living Organic Univere (LOU) a better option?

The LOU Theory presents a new model of the Universe that provides answers and solutions to the shortcomings and flaws of the Big Bang Theory, the Steady State Theory, the Quasi Steady State Theory and others.

7-a-ii. The LOU Theory throws light on many aspects of the living Universe which cannot be gauged by just looking and observing in the skies the various amazing movements of the Celestial bodies and trying to attach scientific and arguable logic to answer some of the most interesting and intriguing queries being posed by the inquisitive astronomers, the cosmologists and the scientific world.

7-a-iii. The LOU Theory provides mathematical equations and formulae to resolve the reason for the expanding and accelerating Universe rather than relying on hypothetical propositions such as Dark Energy Theory (DET), ΛCDM, Quintessence, and Space wrinkles.

7-a-iv. The LOU Theory provides a solution to the Universe's constant temperature in spite of two major factors that are responsible for increasing it: (i). The recession increases the volume of Space, and an increase in volume increases the temperature. (ii). The other reason is the continuous heat being pumped into space for billions of years by billions of Galaxies, each having billions of Stars and millions of black holes. Yet, the Universe temperature is constant at **2.725K**.

7.b. A dynamic Universe:

7-b-i. We see and observe the Universe in the skies; it is orderly, active, dynamic, and expanding. The Universe is finite, but to a human's observation, the scale of the large expanse of the Universe appears infinite.

7-b-ii. The EARTH-Universe connection:
The Earth and the Universe have the same elements, presenting their same E-M spectrum. This spectrum acts as a unifying and integrating factor of the Universe as in General Relativity. The shift in the spectral lines also provides the Celestial bodies' motion, direction, speed, near homogeneity, and isotropic characteristics of the Universe.
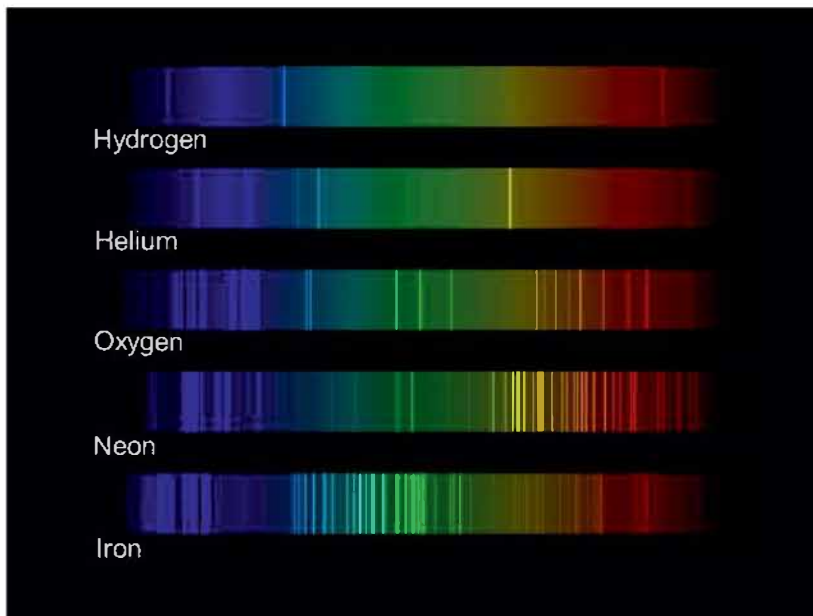
Fig 7.1: *The spectra for elements on Earth and in deep Space are the same.*

7-c.   The Living Universe:

7-c-i.   According to Einstein's Special Theory of Relativity, the physical laws, scientific laws, and Laws of Gravity apply throughout the Universe, and so does the speed of light, c, which is a constant. These are the unifying factors of the Universe acting as a single Universe body system.

7-c-ii.   The living bodies:

The laws of Science and the Nature system:
Let's understand the standard features among the living bodies on Earth. The Science Laws and the Laws of Nature apply to Celestial bodies in Space as well as to all living bodies on Earth, be it a rat to an elephant, including humans, from the grass to the banyan tree placed on the terrestrial Earth's surface, a sparrow to an eagle in the air or a fish to a whale in the marine world (*that is, the laws apply to flora, fauna, aquafauna, and avifauna*)

7-c-iii. What are common Science Laws the living bodies obey?

The standard science laws are also applicable to humans and all living bodies: For example, all electrical charges, opposite to in polarity, attract and connect in pairs, the chemicals of opposite characteristics (*like alkali and acids*) pair up to form a salt, all living bodies of opposite genders attract, mingle in pairs procreate and carry out their daily chores to fulfil their responsibilities.

Similarly, the laws of Gravitation, like the law of action and reaction and the law of inertia, also apply to humans and the Celestial bodies in Space.

7-c-iv. The nature of all living bodies is similar:

The Celestial bodies in the Universe also adhere to the laws of gravitation and follow a similar pattern as humans. The characteristic of the Universe expansion also applies to human nature, who naturally strive to expand their family, house, occupy or encroach and occupy more area, business extension., fund flow, craving for more influence in society, etc.

7-c-v. Living bodies and the Laws of Gravitation:

As in para 7-c-iii above, all living bodies obey the Gravitation Law of action and reaction, where people react with equal and opposite strength to counter abuse on them or when someone respects or appreciates someone, that person also reacts with respect and gratitude. The law of inertia is the natural tendency in every being to continue to be in the same mode unless some other person provokes them to change their stance. Among humans, the force of attraction between them is stronger when they get closer than when they are at a distance. ($F \propto \dfrac{1}{R^2}$).

7-c-vi. The Laws of Gravitation and the Law of electrical charges are similar:

What is true in Universe Space on the law of Gravitation, that is, Force $F = G. \dfrac{m1 \; x \; m2}{R^2}$, is true for humans as in 7-c-v above, it is also true for electric charges where Coulomb's law is applicable.

According to Coulomb's law, viz; F = k. G. $\frac{q1 \times q2}{R^2}$ Where F = electric force, k = Coulamb's constant, q1 and q2 are charges, and R is the distance of separation between the charges. Thus, the two laws are similar. Colulombs's Law was published in 1785, whereas Newton's Law of Gravitation was published in 1687. Thus, the activities in space caused by planetary motions are similar to the electrical charges on Earth and human interconnectivity.

7-c-vii. The model of an atom and the Solar system is similar:

Bohr's model has a heavy nucleus in the centre and electrons revolving around it, similar to the Solar System's Sun at the centre and the motion of all Planets revolving around it.
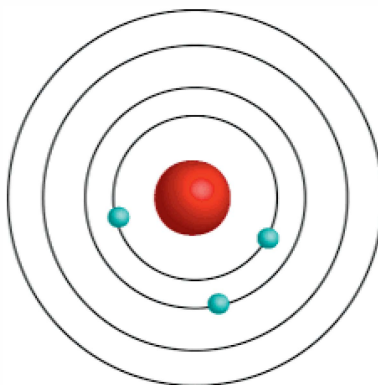
Fig 7.2: Bohr's model of an atom, which is similar to the Sun and its planetary motions.

7-d. What are the shared characteristics and features generally found among living bodies

The common characteristics and features of living bodies are as follows:

7-d-i. All living bodies are tiny when born but grow and expand organically and orderly with time.

7-d-ii. To compare it, the Universe is also increasing (*expanding*) and has grown organically orderly.

7-d-iii. **The human body emits radiation λ_{MAX} = 9.34 micrometres (µm) from within its radiation field inside the body. This wavelength falls within the electromagnetic spectrum's infrared (IR) region. However, since the radiation is temperature-sensitive, 9.34 µm at 37ºC equals approximately 1062.82 µm or 1.06 mm. This is the microwave range, where the peak wavelength of the Cosmic Microwave Background Radiation (CMBR) lies, and it is equivalent to the human emission wavelength at 37ºC.**

7-d-iv. **Are the human body emissions and Universe CMBR the same?**
The inference from para 7-d-iii above is that the emission wavelengths inside the human body and the Universe are the same. **Hence, humans and the Universe are similar because their wavelengths (λ are the same when calculated at equivalent temperatures.**
For example, the CMBR λ_{MAX} = 1.06 mm at 2.725 K is the same as the λ_{MAX} of humans calculated at 2.725 K. The vice versa is also true, that is, when CMBR λ_{MAX} = 9.34 micrometres (µm) when calculated for 37ºC (*310 K*), which is the same as for λ_{MAX} for humans.

7-d-v. Since the ambient temperature of the Universe is maintained at 2.725 K, according to the 3rd law of thermodynamics, the entropy of the Universe system is maintained at the lowest superconductivity temperature, that is, the functioning of the Universe is the most efficient operating system, where the entire energy is converted into motions, movements of the Celestial bodies, and transmission of energy, light, and data in the Universe is at least resistance (superconductive).

7-d-vi. **Living bodies are not self-sufficient.**
Let's take an example of a human. People draw matter and energy from outside their bodies; e.g. all of them breathe in oxygen and exhale (*excrete*) carbon dioxide; all of them need to intake matter (*water and food, etc.*) to sustain themselves since life cannot survive on its own, in isolation. The living bodies convert the inputs (*that is, the air they breathe, the food they eat, and the water they drink/absorb*), to excrete outputs

through the metabolic process for creating energy for human functioning. Humans excrete urine, faeces, and sweat.

7-d-vii. Similarly, as a living body, the Universe cannot be self-sustaining. Otherwise, it would violate the laws of thermodynamics. It ought to consume matter and other natural resources from outside the Universe and excrete energy through its metabolic process to cause movements and motions of the Celestial bodies, other activities and transmissions, etc., discharge their waste matter, probably through the black holes and other means.

7-d-viii. **The Input and the output of the Universe are hitherto unknown; hence, these can only be propounded and hypothesised at this stage.**

7-d-ix. All living bodies of a species are designed for a specific density of the body system to function at ambient body temperature. For example, the human body's ambient temperature is 37°C (98.6°F), and density is 1070 *kg/m³*, a dog's body's temperature is between 37.5°C and 39.2°C for adult dogs. It varies slightly depending on the dog's breed, size, etc.; a cow's and buffalo's body temperature is 38.2°C. (NB: The density of a dog, cow or buffalo is unavailable on Google search, but the dog, the cow, and the buffalo can float on water; hence, their density should be slightly less than 1000 *kg/m³*

7-d-x. **To compare the constant body temperature of humans and other living bodies with the ambient temperature of the Universe, the Universe has an ambient temperature of 2.725 K. Although the temperature is high at certain places where the Stars and Galaxies are located, on average, the Universe is at a constant ambient temperature of 2.725 K.**

7-d-xi. **Data drawn from the website[49] presents the density of the Universe 9×10^{-27} kg/m3. This density, however, is the total density of matter and energy.**

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[49] https://www.sciencefocus.com/space/how-dense-is-the-Universe

7-d-xii.   **NB: It is to be noted that the density of the Universe need not be the same as that of the Celestial bodies, Stars, Galaxies, etc. All these individual Stars, Planets, their Satellites, Galaxies, etc, could function with their respective densities, but the overall density of the Universe remains constant.**

7-d-xiii   **For** *example,* *a ship to sail in water must have a density of less than one, but the multiple contents in the vessel can have various densities. For example, the iron pillars mounted on it have a density of iron, the ceramic tiles flooring, the Italian marble as wall claddings, and the containers loaded on the ship; each may have different densities. Still, the combined average density, that is, the mass and volume of the total of all the products and the contents in the ship, including that of the Ship, should be less than one.* **Similarly, a human body has an overall density of 1.07 g/cc, but the bone density is much higher at 1.85 g/cc**

7-d-xiv.   Are Celestial bodies gender-specific? If so, why?

All living bodies are programmed to procreate at an appropriate age and time. Humans, animals, aquatics, trees, birds, and others are either born with a male or female gender, but a few are neutral, that is, neither male nor female.

7-d-xv.   The procreation process of living bodies:

At an appropriate age, the opposite genders mate and pair up or cross-pollinate to procreate, have newborns, raise their families, and increase their population. A newborn is delicate and helpless; it needs parental care to survive infancy weakness until it grows up and can take care of itself.

7-d-xvi.   The procreation of Stars and other Celestial bodies:

To compare 7-d-xv with the Universe, the LOU Model of the Universe also follows the same pattern of procreation where the Stars create Stars and populate over a period of time. The Galaxy is one such big family of Stars coming together as humans are in a village or a town, a city or a mega metro city; all of them are integrated, forming a connectivity network. The Universe also displays similar patterns,

equivalent to villages, that is, small Galaxies followed by larger Galaxies and a large cluster of networked Galaxies, which appear like Constellations.

7-d-xvii. How the procreation process happens in Stars and Celestial bodies:

Each Star can procreate baby Stars through its female Planets. However, on the looks of the Celestial bodies, there is no physical evidence of a Star's or planet's gender. The physical process of mature Celestial bodies mating could be like that of the trees that stay in their position, but the pests do the cross-pollination. In contrast, in the case of Celestial bodies, certain comets could be responsible for procreation through the cross-pollination process.

More research needs to be undertaken to discover the gender and the procreation process. But we know that the Universe is populated with billions of Stars when at singularity there were none.

7-d-xviii. NB: Knowledge of Star's gender through scriptures and other studies.

In the study of Astrology, the Sun and the Planets are designated with genders, where the Sun, Mars, and Jupiter are male, and Earth and Venus are female. Accurate predictions on the foetus's gender at the prenatal stage can be predicted based on the genders of Planets.

7-d-xix.
The human body comprises billions of bio-cells, which obtain and use energy to survive, sustain, and thrive. The cells in the body and the neurons in the brain are networked and interconnected, forming a web circuit in which the movement of the cells creates activities such as wishes, desires, thoughts, that catalysed physical activities, decisions etc.

7-d-xx.
To compare it, the Universe is also Cellular, where the Stars obtain energy from the Universe system to support their activities. The Stars are like the bio-cells networked to create a web-like interconnectivity wherein their movement creates an activity for the Universe system to thrive.

Fig-7.3. *Starry skies: If we closely observe the picture above, we can see a huge population of Stars forming cellular patterns. The constellations are also one such example of a cellular pattern in space.*

7-d-xxi.   Can we compare the human body's open system with the open-body system defined by the laws of thermodynamics?

According to the laws of thermodynamics, an open system can exchange energy and matter with its surroundings. In contrast, a closed system, on the other hand, can only exchange energy with its surroundings, no matter what.

Humans exchange both matter and energy with an outside system. For example, we take in food and give off waste. **So, this interaction and exchange make humans an open system.**

7-d-xxii.   In Cosmology, is an expanding Universe a closed or open system?

7-d-xxii-1. In Cosmology, the Universe, which has a defined curvature, is a closed Universe system with $\Omega > 1$. In contrast, the open Universe system has no curvature with $\Omega < 1$ and a flat Universe system where

Ω = 1 (*given on website*: https://www.fas37.org/wp/geometry-omega-and-the-universe/)

7-d-xxii-2. The NUE Law allows the Universe to be of constant density. Thus, the mass and volume increase constantly as a fixed ratio (*density*); therefore, the circumference of the Universe sphere can indefinitely keep increasing, since the Universe is an organic model.

7-d-xxii-3. The process of the end of the Universe:

However, towards the end, when the Universe is getting older and the expansion approaches the velocity of light ($V = c$) there will be some contraction determined by Einstein's equation = $L' = L_O \sqrt{\frac{1 - V^2}{c^2}}$

where L' = the contracted length, L_O = the original length.

This implies that when the recession rate approaches the speed of light, L_O will keep shrinking until v = c. At **v = c, L' = 0** that is, the radius of the spherical Universe will be 0 = disintegratable.

7-e. Summary and Conclusion of how the Universe and the living human models are comparable:

7-e-i. From para 7-b, c, and d above, we observe that all the significant characteristics are nearly common to living bodies, including humans and the Universe. Hence, the Universe is also a living body in the same pattern as humans on Earth.

7-e-ii. From 7-b, c, & d above, we realise that what is true for the Universe is true for the Galaxy, which is also true for the Solar system, and also true for the Earth, and true for all living bodies on the Earth.

Thus, the Universe, the Solar system, the Earth, and all living bodies on the Earth are similar and integrated. Therefore, from humans' behavioural patterns, we can get important clues about the Universe's characteristics and behaviour.

7-e-iii. From 7-c and 7-d above, we can say that humans are an integral part of the Universe, and we can summarise to make a statement: **"AS IS THE HUMAN, SO IS THE UNIVERSE"**.

7-e-iv. Birth, upbringing, behaviour, and other human characteristics are similar to the Universe's.

7-f. Why explore the Universe through the anatomy of a living human?

7-f-i. Understanding the similarity between a human and the Universe makes it much easier to study and understand a human than the vast, massive, and colossal Universe.

7-f-ii. Thus, getting clues and ideas about the Universe through human behaviour is much easier than groping in the dark trying to understand the Universe by simply using hi-tech observational laced with some logical interpretations of a few scientists, astronomers and cosmologists.

7-f-iii. Para 7-f-i above does not imply that efforts to discover the Universe through technological advancements should be overlooked; it means that these advanced technologies, such as Space telescopes, digital measuring precision instruments, laser ranging systems, Spectroscopy, Doppler effect and others, can be deployed to discover the happenings in the deep Space.

7-f-iv. Therefore, the Universe could also be studied with these (*7-f-ii*) technologies that aid and correlate with human behavioural patterns to better understand its cosmology.

7-f-v. Thus, the living Universe is an Organic Universe because it grows, expands, and metabolises. It needs an external energy source to replenish the energy it consumes to undertake its activities and throw out the waste generated internally from the Universe's body system.

7-f-vi.   Another similarity of a human with the Universe.

1. As mentioned in para 7-d-xx above, a cell in the human body is a fundamental unit of life and a building block of all living organs and organisms. It draws its energy from the respiratory system. There are trillions of cells, each with a specific role in integrating the body into a single body unit system.

2. Similarly, a Star is like a cell with its subcells (*Planets, etc.*). Energy is drawn from the Universe system, and it acts as the building blocks of the Universe system. Here, Comets play an important role in delivering energy and meeting the other needs of the Stars. Some specific comets also play a role, like that of pests in the flora domain, doing cross-pollination between the matching opposite genders.

3. The Universe is also organic, procreating Celestial bodies through cross-mating with its matching opposite genders with the help of specific comets. The procreation process adds Stars and Galaxies to the Universe, where the older ones die off, and the new ones are created, whereas the Universe remains active in perpetuity. It is like the cells die in our body and are replenished by the new ones as an ongoing process.
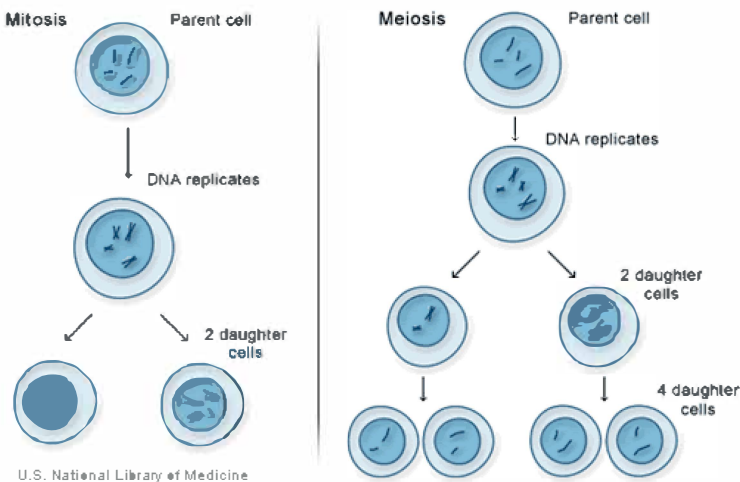
Fig. 7.4 Every organic matter is designed to procreate

7-g. The Model of the Universe's living system is comparable with the Model of the Earth's living system:

7-g-i. On Earth, we have more than 9 million species, each with its own population that continues to live indefinitely. For example, the human is one of the 9 million species with a population of 8 billion plus persons.

7-g-ii. However, the individuals in each species are born, grow, mature, procreate, provide parental care to the newborns, and continue to live with them as a family until the parents grow old and die a natural death. Sometimes, death may occur from accidents or other unnatural deaths. However, the population of the species continues to live and thrive at all times until the world exists.

7-g-iii. In the equivalence model of the Universe, the Stars are like the bio-energy cells of the mega Universe, where different species of Stars coexist and network to form internal activities like the equivalents of a kidney, a liver, glands, etc.

An example of a typical Galaxy could be a kidney in a human body, where millions of cells of different species combine to create multiple activities to keep the body system healthy and thriving.

The kidney performs like a powerful chemical factory to undertake the following functions:

1. remove waste products from the body.
2. remove drugs from the body.
3. balance the body's fluids.
4. release hormones that regulate blood pressure.
5. produce an active form of vitamin D that promotes strong, healthy bones.
6. Others

7-g-iv. This kidney system in a human is like an equivalence of an active Galaxy having billions of Stars of different species, which combine to form a system activity in Space. Such a Galaxy, like the Milky Way or the

Andromeda Galaxy or others, is networked together but serves no known purpose.

7-g-v.   But one thing is very clear: such a massive mega-universe system is not here for no reason since nothing exists without a purpose. What that purpose is unknown.

7-g-vi.   Just like a human body is healthy and functioning normally because all the organs are performing and contributing to the overall functioning of the body system within its designated parameters.

7-g-vii.   When an organ of the body system, like a kidney, starts malfunctioning, we only then realise its importance and external medicines are taken to heal it. Similarly, if any of the Galactic systems begin to malfunction beyond their self-healing system, an external means ought to be injected to repair the Galactic system.

7-h.   What could the Universe within (*internally*) and outside (*externally*) on a Human-Universe similarity model?

7-h-i.   Observing the vastness of the Universe physically, we have nothing direct to compare or relate with the Universe to understand its functioning in totality. However, we have a living human model created by the Earth system through a mother's womb to know in a limited form how the Universe functions. **The comparison of the living Universe with that of a living human is as follows:-**

7-h-ii.   **The physical human body system has two parts, these are:-**

PART-1; The external part of the physical body system.

Fig 7.5: The external body Captain.

7-h-iii. The Captain of the external body:

The External visible part is the physical body of a human, known by its name and facial identity. Here, we shall call it the Captain of the body. In reality, the Captain is natural software loaded on the body that behaves like an owner of the physical body and has a name for it by which the captain is recognised and identified by other fellow humans.

7-h-iv. Captain's responsibilities:

The Captain interfaces with the people at large, earns money according to one's talent, skills, expertise, experience, and performance, meets all needs and desires, and fulfils responsibilities, including procreation, parenting, family matters, etc., within one's means and circumstances. The Captain gets involved in social and family networking and ensures the body is always safe, secure, healthy, active, occupied, and happy.

7-h-v.   The outer (*external*) Body segments:

The physical body has three parts.

Segment A is the head. It has a protective skeleton that houses the delicate, viscous brain and the face in front. The face has all sensors, like ears for hearing, eyes for seeing, skin for covering, sensitivity, and body protection, and hair as fibre antennae for collecting data and directing it to the brain. Thus, The brain is connected to the Earth System, where it works as a transceiver and a transmitter.

The other two segments are Segment B, the torso. and Segment-C the feet for mobility.

7-h-vi.   The Captain:

The brain has two natural software programs. One part is integrated with the Captain, which occupies about 5% of the brain's activities. We call it the conscious mind. Thus, the conscious mind is the body's **Captain**, managing the activities of the physical external body.

7-h-vii.   What happens when the Captain is forced to sleep (*unconscious*)?

This condition is possible when a person is given an anaesthesia or hit on back of the head, or in a state of deep sleep, or sleepwalking, sleeping pills etc. We know under anaesthesia the body's Captain sleeps and therefore, the Master is stands directly exposed and open to misappropriation in the absence of security provided by the Captain.

In the Captains forced sleep state, the body can be surgically operated and the patient wouldn't know anything about it. Similarly, it happens in other cases also. When the person is about to die, the Captain does everything for the body to survive. Once the Captain dies along with the body, the body is helpless in this state anything can be done to the body e.g. removal of eyes, kidney and other body parts and even necrophilia. In case of animals their body is used as food.

7-h-viii.   The Master:

The 'Master' software is integrated into the internal body system, which occupies 95% of the brain's activities and is called the subconscious mind. We shall call this subconscious mind a natural

software, i.e. the **'Master'.** The Master controls, regulates, and manages the body's internal organs, networking systems, and circulatory system, which keeps the body energised at all times. The 'Master' is also responsible for sustaining, monitoring and regulating the parameters of all the organs and body components within their tolerance limits. The 'Master' is also responsible for the upkeep, repair and maintenance of physical and other damages or illnesses to the body system, whether internally or externally.

7-h-ix.   The Master manages the brain's activity:

The Master creates mental perceptions, instincts, intuitions, etc. It interprets the signals from the sensors in real time and shares them with the Captain. The 'Master' shares the needs of the internal system with the Captain, who, in return, fulfils the demands of the Master.

7-h-x.   The Master's needs:

The 'Master' directs the Captain (*by way of urges, desires, feelings, etc.)* to comply with its needs to manage the internal System and ensure its smooth functioning at all times. Practical examples are given in para 7-l-iv below.

7-j.   Segment A: The human face:

7-j-i.   The Nose:

The face has a nose with two nostrils for breathing, which provides energy to the internal body system.
NB: Since breathing is critical for sustaining life, two nostrils are provided so that if one is blocked, the other remains functional. In case both are blocked, one can breathe through the mouth.

7-j-ii.   The mouth:

The **mouth** is an "input" or a feeding organ. It is for drinking water, beverages, fluids, food, and other eatables.
The **tongue** is a filter for taking in the right food, liquids, etc., at the right temperature and taste. The tongue is also an organ that facilitates conversation. The **teeth** cut, grind, and pulverise the food, and the

tongue mixes it with saliva before the food enters the throat and stomach.

7-j-iii. Segment B: The arms and hands on the upper torso:

The upper part of the torso has arms and hands to procure water, beverages, food, eatables, etc., to feed them to the mouth. Hands also do all physical activities for earning, serving, relationships, emotional connections, touching, feeling, holding, grasping, balancing the body momentum while in motion, defence, attacks, gesturing, and others.

7-j-iv. The body output: The body waste discharge and reproductive system.

The skin discharges sweat, whereas the lower part of the torso has the anus to discharge solid waste from the body, and the front side has two functions, urine discharge and the reproductive system for procreation.

7-j-v. Segment C: The feet.

A. The feet are for the mobility of a person.
B. The feet also bear and balance the weight of the body,
C. The feet are also used to attack or defend from an adversary.

7-k. PART-2: The internal part of the physical body system.
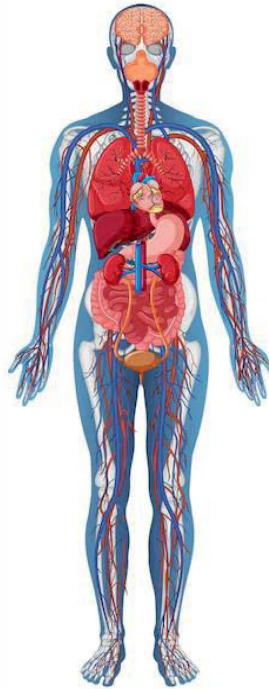
Fig 7.6: The internal body system

7-k-i. The Internal Torso Body Function and Management by the 'Master':

The 'Master' manages the internal body functions as a self-activated voluntary system. It controls and regulates the internal body system, as in para-7-h-vi, 7-h-vii, and 7-h-viii above. The internal body's torso functions like a motor mechanism that drives the external body and maintains the internal temperature and density of the body as a fixed constant.

7-k-ii. Management and Control by the Master.

The internal body system actively functions 24x7 throughout the body's lifespan. The 'Master' controls, manages, and regulates the breathing and functioning of the internal body's eleven major organ systems while creating internal customised medicine to repair and maintain the body cells, organ components, and other body parts.

7-l. Comparing the human internal System with the Universe.

7-l-i. Where are the Galaxies, the Solar System, and Earth positioned in the Universe?

All the Galaxies and Stars in the Universe, including the Solar system, its Planets, and their satellites, including the Earth, are positioned in the Universe's internal body's torso system. Its functions are similar to the human body's internal torso system.

7-l-ii.

Before we correlate the two, let's understand how the Master of Internal Body System instructs the Captain to comply with its needs.

7-l-iii. The Captain fulfils the needs and demands of the Master:

The Master fulfils its responsibility for the smooth functioning of the internal body system, as mentioned above in para 7-h-vi, 7-h-vii, and 7-h-viii. Hence, whatever the internal body system needs from outside the body (that is, outside the Universe), it signals its needs to the Captain, and the Captain fulfils them.

7-l-iv. Practical examples:

Example 1. When the water level goes down in the human internal body, the Master signals the 'thirst' desire to the Captain. The Captain fetches water from somewhere and drinks it, quenching and raising the body's hydration level.

Example 2: When the urinary bladder is full, the Master signals the Captain, who then goes to a place (*washroom, etc.*) where urination can be done in privacy.

Example 3: A similar signal from the Master comes for the discharge of stools. The Captain reaches out to a toilet place to empty the bowels in privacy, after which one feels relieved.

Example-4. When the food level in the stomach needs replenishment, the Master posts the hunger signal to the Captain, who feeds as soon as possible, the food into the mouth, which then pushes it into the body.

Example-5: When a particular mineral or element in the body gets drained, the Captain desires to eat a particular food that is rich in that mineral or element. For example, a pregnant woman suddenly desires to eat calcium-rich food, like spinach (palak), methi, milk, or quick-lime (*CaO or lime or chuna used in paan*). Some women also eat chalk. But after the pregnancy, the taste for such elements disappears.

7-m. How is the Universe drawing energy from external sources and discharging waste and unwanted matter outside the Universe?

7-m-i. The Captain and the Master for the Universe System:

Just like a human body has a 'Captain' on the outer (*external*) and a 'Master' in the inner (*internal*) body system similarly we also have the 'Captain' for the outer Universe and the 'Master' for the internal Universe.

7-m-ii. Energy, Consumables, and Debris:

The dynamic, open Universe system consumes massive amounts of energy and other consumables that need replenishment. It also accumulates a lot of physical debris matter generated from the collision among the Celestial bodies in motion, the rocks colliding in the belts (*the Asteroid belt, the Kuper belt*), in the rings (*around Jupiter, Saturn, Uranus, and Neptune*), and also from the Supernova, etc.

7-m-iii. The Universe's Captain Complies with the Universe Master's demands:

The Universe Master signals it to the Captain present on the Universe's external body domain, which complies faithfully, fulfilling its needs. Thus, the Universe's needs, such as replenishing energy and consumables and removing debris and other unwanted matter from the Universe, are always fulfilled, keeping the Universe's system alive and active in perpetuity.

7-m-iv. The Universe is an Open system or a Closed System?
The LOU (Living Organic Universe) Model is an Open system as per the Laws of Thermodynamics, where matter and energy can be exchanged with the surroundings.

7-m-v. Conclusion:

7-m-v-1. The LOU Model of the Universe is comparable to a human body.

7-m-v-2. Thus, the Universe has an internal System where all Galaxies, the Solar System, and the Earth are placed. The Universe's Master system manages all activities, in its internal system.

7-m-v-3. Since we compare the Universe to humans, the Captain of the Universe fulfils the internal system needs and requirements.

7-m-v-4. This also implies that there are external surroundings where the Captain procures and feeds the energy and matter into the Universe and the waste (that is, debris of the remains of the Supernova, collisions of the Celestial bodies, etc.) of the Universe generated within the torso system of the Universe, is discharged outside it (that is, through the black holes, etc.), making it an open Universe system.

7-n. Are the laws of Gravitation being violated in an expanding Universe?

7-n-i. The NUE Law and the Laws of Gravitation are interwoven:
The NUE Law and the Laws of Gravitation complement each other and act simultaneously everywhere and all over the Universe. Thus, Gravitation laws apply all over the Universe in their respective inertial frames, and the NUE Law is superloaded and acts simultaneously on all the Celestial bodies and the Celestial Systems active in the Universe. **More details are given in CHAPTER-3, para 3-p-iii.**

7-n-ii. An example:
1. The Solar system is an integral part of the Milky Way Galaxy and, consequently, the Universe. Thus, the laws applicable in other

parts of the Universe also apply to the Solar system, all the Planets, and all the Satellites in it. Thus, the NUE Law and the Laws of gravitation also apply to the Earth-Moon System.

2. The Earth-Moon System follows the laws of gravitation: $mG = RV^2$ where m is the Earth's mass, R is the Earth-Moon distance, V is the Moon's velocity orbiting the Earth, and G is the Gravitational constant.

7-n-iii. The NUE Law and the Laws of Gravitation act together simultaneously:

7-n-iii-1. According to the NUE law, the linear distance between the Earth and Moon increases simultaneously, obeying the Nu constant, and so does the radius of the Earth and Moon. The increase in the radius of the Earth increases its volume, and the mass of the Earth increases to maintain its constant density.

7-n-iii-2. The increased mass of the Earth (Δm) in a year is responsible for pushing and increasing the Earth-Moon distance (ΔR) in a year. Thus, by the law of gravitation $mG = RV^2$ and the recession rate, ΔR/year are both sustained. **= that is, (m+Δm). G = (R+ΔR).V².**
This is mathematically proven and explained in CHAPTER 3, para 3-p-iii.

7-n-iii-3. The laws of gravity bind all Celestial bodies with their Satellites, and the NUE Law and Nu Constant also keep increasing their sizes and intermediate distances with time, at the rate Nu Constant, so that the laws of gravitation are not violated but complement each other.

The LIVING ORAGANIC UNIVERSE

CHAPTER-8; Abstract :

The Living Organic Universe (LOU) Model postulates that the Universe functions like a living organism, with a life cycle that includes birth, growth, and eventual death. This model challenges current theories such as the Big Bang and Steady State by proposing that the Universe is constantly expanding and evolving, with the consumed matter and energy being replenished from external sources.

The LOU model addresses the limitations of dark matter by introducing two types: active dark matter, which can be detected through various spectroscopic methods, and inactive dark matter, which represents dead Celestial bodies that no longer emit radiation.

In this model, every celestial body emits radiation, and its wavelength increases over time, allowing for the determination of its age. The Universe's expansion follows the NUE Law, which governs its continuous growth while maintaining constant density and temperature. The LOU Model further suggests that the Universe behaves similarly to a biological system, with Stars and Galaxies as its components, following specific life cycles of birth, ageing, and death.

The model emphasizes that the Universe is an open system, drawing energy from external sources and expelling waste, much like living organisms. The LOU Model challenges the flat Universe model and dark energy concepts, offering a closed, spherical Universe that expands indefinitely while adhering to physical and thermodynamic laws.

An important discovery is that the Universe's Cosmic Microwave Background Radiation (CMBR) and Human body emission are equivalent constant at respective temperatures, thereby inferring that the Universe and Humans are alike, connected and an integral part of each other.

8. The Postulates[50] of the Living Organic Universe (*LOU*) Model.

8-a-i. The Universe is a 'Living Organic Body':

The Universe is a living organic body that has a birth, grows and continues to grow during its lifespan, on a time scale, until it reaches old age and consequently dies a natural death or premaurely dies by multiple reasons.

8-a-ii. The Universe emits radiation:

Like any other organic living body, the Living Universe emits radiation (aura) outside the body from an energy field within the body (*i.e. the same as CMBR: Cosmic Microwave Background Radiation*)

8-a-iii. The increase in wavelength and the age of Stars, Galaxies and others:

The λ_{MAX} of an emission band is the signature age of a Celestial body or a Star or a Galaxy, based on which the HR diagram is presented (*see Fig 8.1 below*). Those Stars that emit faint radio waves (*of larger wavelength in mm or in metres*) are very old compared to those that emit very strong radio waves (*wavelengths in mm*). Still, those sources emitting microwaves and infrared radiations are relatively older than those in the visible range or those in the ultraviolet spectral band.

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[50] Postulates: Suggest or assume the existence, fact, or truth of (something) as a basis for reasoning, or discussion.
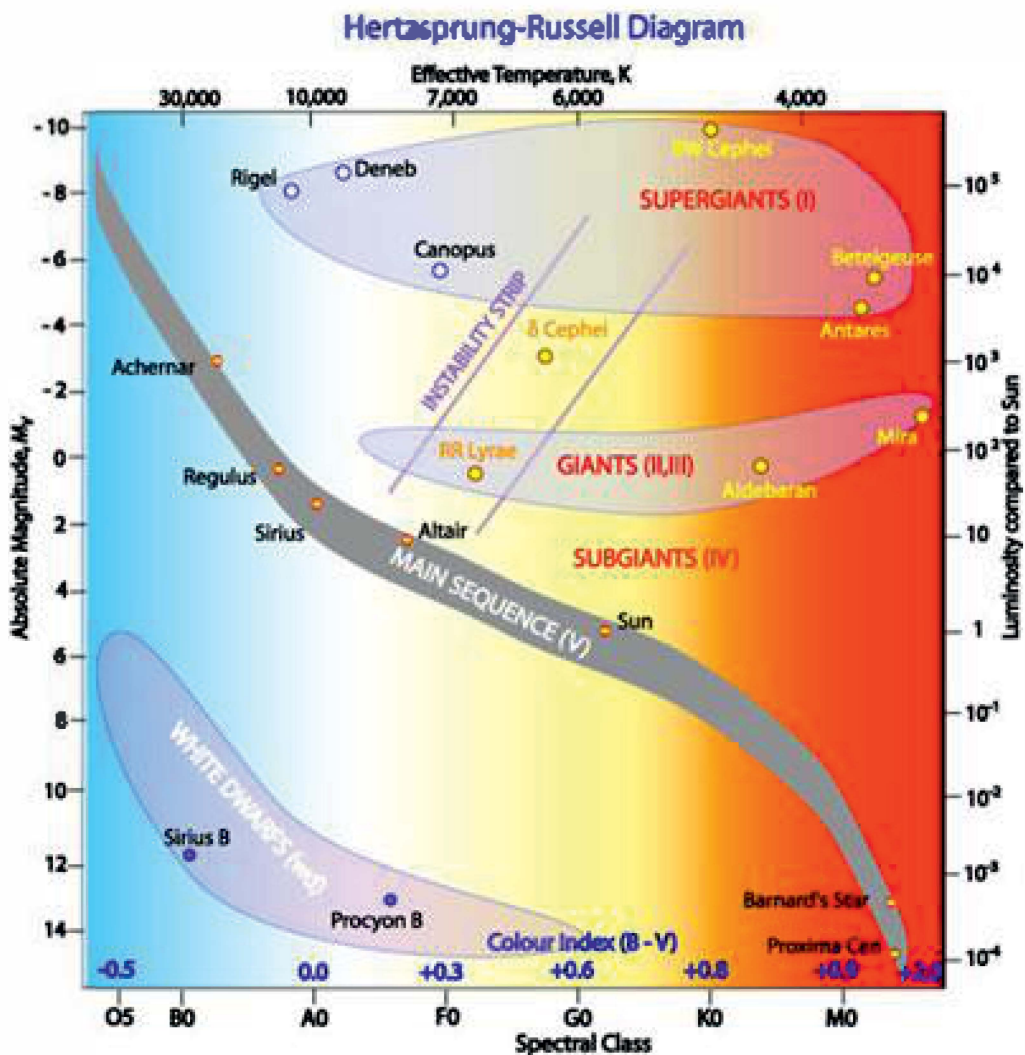
Fig. 8.1- *the HR Diagram, indicating the position of the Sun in the yellow band. It's closer to the orange band.*

8-a-iv. Dark matter:

All Celestial bodies in the pre-ultraviolet, infrared, and post-infrared spectral bands are invisible to our eyes. They are active but not visible; hence, we could call them active non-visible or **'active dark matter'**.

These active dark matter Celestial bodies can be detected under respective spectroscopies, such as Gamma-Ray Spectroscopy, UV Spectroscopy, IR Spectroscopy, Microwave Spectroscopy, Radio Spectroscopy, and others.

8-a-v. The active Dark Matter:

Celestial bodies are also in space in the non-visible spectrum and do not interact with the electromagnetic field. Therefore, these non-visible Celestial bodies are not detectable by any spectroscopic method. In Cosmology, these Celestial bodies are termed as **'dark matter'.**

According to the NUE Law, such dark matter does not interact with an electromagnetic field, does not emit any radiation, or where $\lambda = 0$ are dead Celestial bodies present in space. Therefore, they cannot be detected by any of these Spectroscopic methods.

8-a-vi. Example and the present knowledge of the Sun:

The present understanding of the Sun is that at the end of its lifecycle, it turns into a massive Red Giant and, finally, running out of fuel, collapses to a 'white dwarf'. The Sun's core continues to emit radiation because it is still hot. But when it cools down, the radiation will drop and become dark matter because dead bodies do not emit radiation. It will not interact with any electromagnetic force or field in this inert state. *See Fig: 8.2 below.*

8-a-vii. Thus, according to present Cosmology, after its status of a post-Red Giant, the Sun turns into a white dwarf, which will eventually cool down, do not emit any radiation. The state where the white dwarf does not emit any radiation is is called the black dwarf or the 'dark matter'.

```
                          ┌──────────┐
                          │  Matter  │
                          └──────────┘
                    ┌───────────┴──────────────┐
                    ▼                           ▼
          ┌──────────────────┐          ┌──────────────┐
          │ Celestial bodies │          │ Other Matter │
          └──────────────────┘          └──────────────┘
        ┌──────────┼──────────────┐
        ▼                         ▼
```

Non-visible	Visible
(CBs in pre-UV, or post Red giant spectrum are known as 'emitting sources' of those non-visible wavelengths. These sources are detectable by various spectroscopies.)	↓

```
                                          ┌────────────────────────┐
                                          │ End of life (Red Giant)│
                                          └────────────────────────┘
        ▼                                           ▼
┌───────────────────┐                     ┌─────────────────┐
│ Active Dark Matter│                     │  White dwarf    │
└───────────────────┘                     └─────────────────┘
                                                   ▼
                                     ┌────────────────────────────┐
                                     │ Hot and emitting radiation │
                                     └────────────────────────────┘
                                                   ▼
                                          ┌─────────────┐
                                          │    Cold     │
                                          │(black dwarf)│
                                          └─────────────┘
                                                   ▼
                                          ┌─────────────┐
                                          │ Dark Matter │
                                          └─────────────┘
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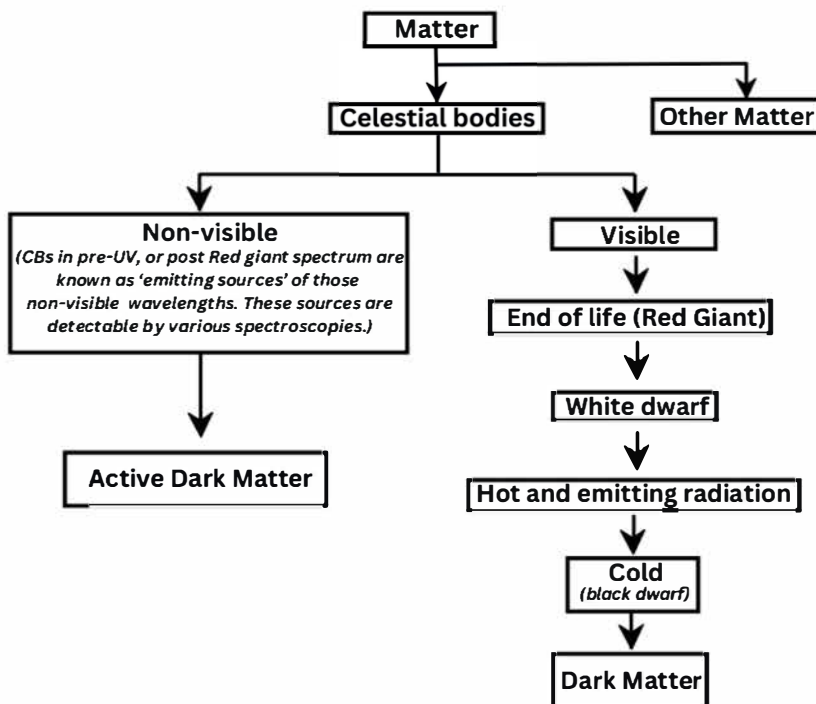
Fig 8.2: A chart explaining the classification of matter, active and inactive dark matter, by the present knowledge of Cosmolog.

8-b. Celestial bodies, when created (*or born*), emit a specific wavelength at its birth keep increasing on a timescale at the rate Nu constant.

8-b-i. Every Celestial body, when born, emits initial wavelength (λ_{MAX}) at a specific nm. Thus, the Celestial body may begin its journey from the X-ray, UV, Visible, IR, or post-IR bands. The journey would continue on a regular time scale proportionately increasing (λ_{MAX} as per Nu Constant.

8-b-ii. Thus, a Celestial body born in a certain bandwidth would continue its journey until it reaches its programmed end, ranging from less than ten billion years to more than ten billion years, or until it naturally disintegrates or attains its natural or fatal death.

8-b-iii. As mentioned in 8-a above, the Celestial bodies which are not in the visible band are active in the non-visible band, or **'active dark matter'.** As mentioned in para 8-a, these active dark matter Celestial bodies can be detected and tracked by various spectroscopies.
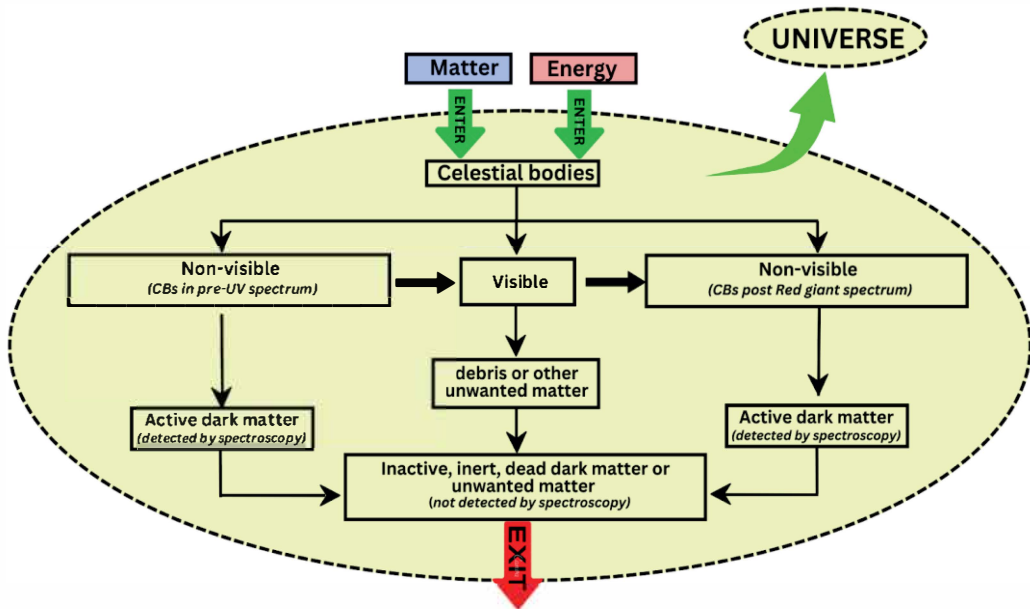
Fig-8.3: *The NUE Universe model is an 'open Universe model' where matter and energy enter the Universe from external sources (by the Laws of Thermodynamics), and the unwanted matte exits from the Universe.*

8-b-iv. The dark matter (*evolved from the NUE Law*):

When visible or non-visible matter gets destroyed, disintegrates, say by Supernova or meets its natural death, it becomes ' dead' or 'inactive dark matter' or simply called a 'dark matter'. The 'dark matter' does not emit radiation and hence cannot. be detected by spectroscopic methods. The **'dark matter'** is expelled and excreted. from the Universe.
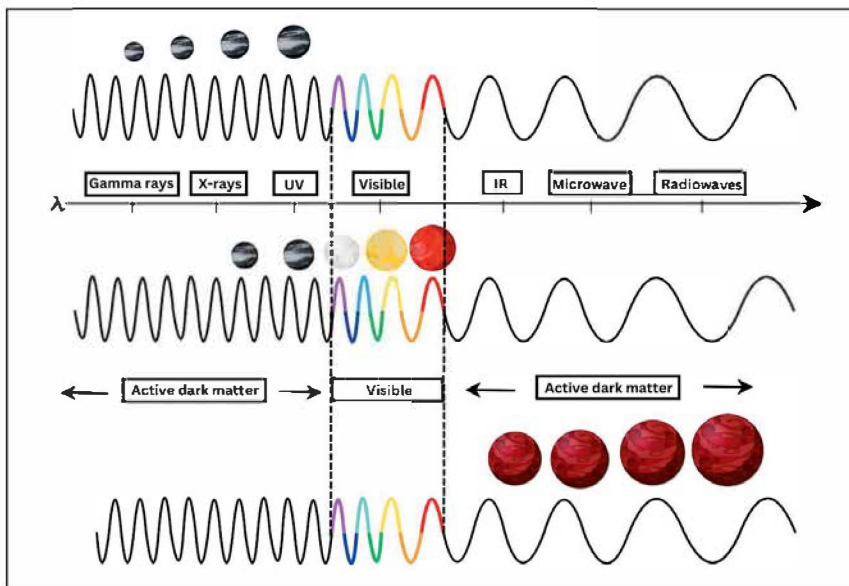
Fig-8.4: *Celestial bodies emitting wavelength less than 380 nm are either in the Gamma rays, X-rays or in the UV band, which cannot be seen; hence, we call it **'active dark matter'**, which can be detected by Spectroscopic methods, such as Gamma-Ray Spectroscopy, X-ray or UV Spectroscopy.*

Celestial bodies beyond the giant red band are in the Infrared, Microwave, or Radio Wave band of the spectrum: IR Spectroscopy, Microwave Spectroscopy, Radio Spectroscopy, etc, can detect this.

8-c.   What is the rate of increase of wavelength (λ) of the Sun?

8-c-i.   According to NUE Law and as mentioned in para 8-b above, the newborn Celestial bodies emit a specific λ_{MAX} depending upon the 'purpose' for which it is created.

8-c-ii.   The initial λ_{MAX} increases with time as per the Nu Constant. e.g. the Sun entered the violet band at = 380 nm of the visible spectrum has transited to the yellow band at = 595 nm. In a period of 4.46 bn years. Thus, in 4.46

billion years (*also considered the present age of the Sun*), the wavelength has increased by $\lambda_{INCREASED}$ = 215 nm.

Therefore, the average rate of increase (traverse) in wavelength (that is, the rate of traversing) is at the rate 20.93 mn years/nm or round off = 21 mn-yrs/nm.

8-d.   The Organic Model of the Universe: How did the Universe get into its conception, prenatal and postnatal stages?

8-d-i.   The Universe is expanding steadily and growing independently at the rate of a dynamic constant given by V' = Nu.D. $e^{r.t}$, where r = rate of increase, and t = period'. Nu is constant. Since the space-time fabric is expanding, that is, the distance D is stretching to D'. where D' = D. $e^{r.t}$

8-d-ii.   The increase of space-time fabric gives an organic character to the Universe.
The organic Universe is like a living body created by the natural system to undertake and serve certain specific purposes with predetermined activities.

8-d-iii.   For example, we can take any living body, be it an animal like Elephants, Lions, Deer, Dogs, Humans, Aquatic bodies, or Avifauna. To simplify, let's take an example of a human as a living body created by the Universe, similar to the Universe itself. We have already discussed in CHAPTER-7, para 7-d, how a human and the Universe are related. We work on the proposition, **"As is a Human, so is the Universe."**

8-d-iv.   Let's begin with an understanding of how a human is created.
A human is created from all the elements in the Earth via the mother's womb. The birth of a baby human is in two parts as follows:

Part-1: the pre-physical birth or the prenatal foetus in the pregnancy stage. and
Part 2 is the post-natal period, which is the physical birth of a newborn baby.

8-d-v. The first part, the pre-natal period, is nine months from conception (*initiated by the fusion of a sperm with the ovary*). Hereon, the time-bound foetus development programme gets initiated, which picks up all the ingredients required to create an embryo. This further progresses the development of body parts, brain, skin, eyes, ears and other organs. To complete the prenatal period of nine months, where the foetus is completely developed into a baby but still in the womb, all nourishment is supplied for its growth and development via the mother's umbilical cord.

No physical laws are applicable during this prenatal formation stage, from embryo to foetus.

8-d-vi. Similarly, the Universe also began possibly with the fusion of two parental biochemical elements, which could be similar to what is popularly known as the Big Bang theory. From hereon, the programme was initiated to develop the Universe from the fusion or, say, embryo state to a prenatal fully developed baby Universe.

No laws of physics, such as thermodynamics, magnetism, magnetic fields, gravitation, bio and chemicals, and other laws, were applicable at this prenatal formation stage. (See Fig 8.5 below).
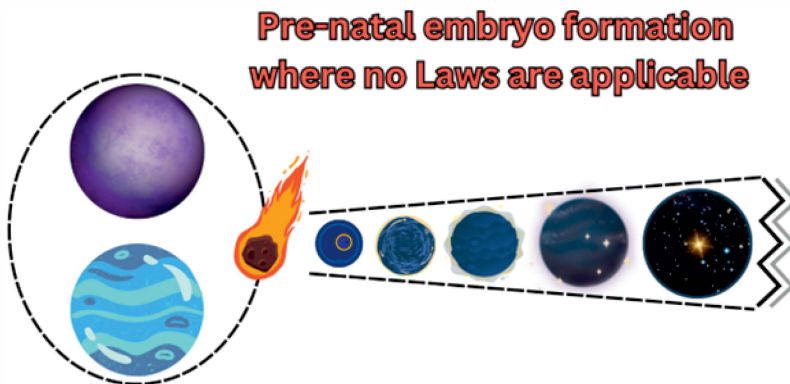
Fig: 8.5-A: Pre-natal period for the creation of the Universe or a new Celestial Body, starting from conception with a thud creating a programmed micro bundled 'dot' initiating the time-based organic growth programme. Accordingly, the progression of the 'conception' keeps developing until the final stage of pre-natal growth and formation of the Celestial Body in an assisted sustainable state is created.
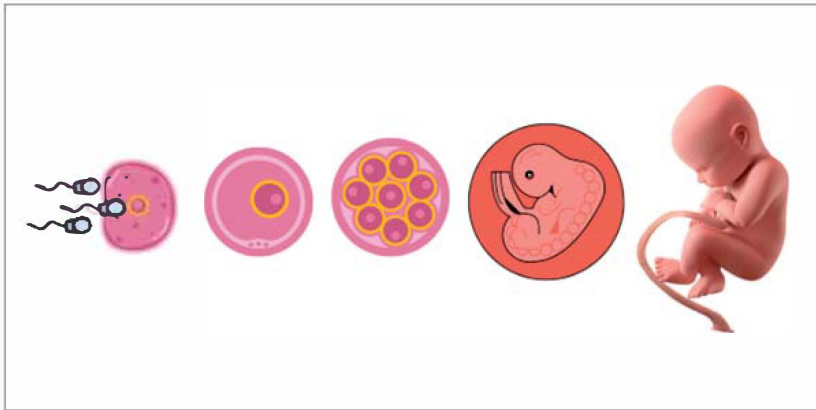
Fig 8.5-B: Compares a living Celestial creation and that of a human, from a pre-natal 'conception' to its fetal growth, where the laws of Physics, Astrophysics, Cosmology and others are not applicable.
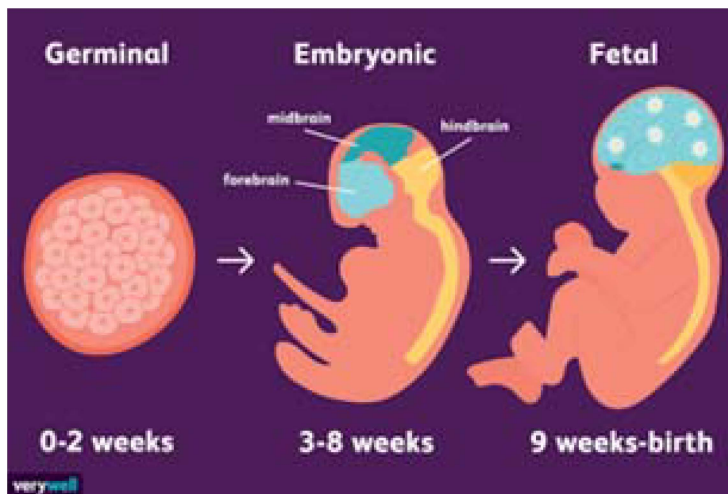
Fig 8.5-C: Conception to the prenatal stage

8-d-vii. Part-2:-

Postnatal birth is the physical birth of the newborn baby, which emerges from the mother's womb. The first cry starts breathing and connects the baby to the Universe. From then on, all the physical laws apply, e.g., the baby's body temperature, pressure, humidity, density, etc.

8-d-viii. From here on, another program is initiated, which is responsible for the systematic time bound regulated growth of the newborn baby from a baby to a kid, to a child to a teenager, to an adolescent with progressive physical and mental growth, skills and talent, and networking into the individual's community and the society.

8-d-ix. Similarly, The Universe was born as a fully developed baby Universe. From this point on, all the physical laws are applicable, such as the laws of thermodynamics, magnetism, magnetic fields, gravitation, luminosity, physics, chemistry, etc. Like an organic body, the Universe expands, maintaining its density and temperature as constants and a homogeneous-heterogeneous body system.

Post-natal birth of the Universe and its Organic growth
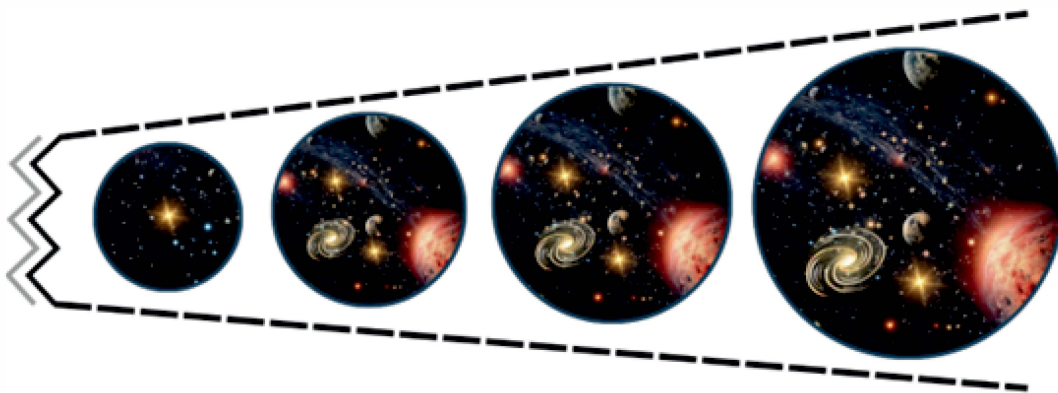
Fig 8.6: As seen in above fig, the post-natal period of a newborn Celestial Body, outside the cocoon, is launched in Space at a specific location compared to a human's birth outside the womb. The period for the Celestial body to grow from 'conception' to critical stage is unknown. However, the size of the growth is also part of the pre-programming initiated at the conception stage, where the size of growth has a limit (like that of humans), however, the ageing continues linearly like the humans, until its programmed age limit is attained.

Fig 8.7: *Human growth from a child to an adolescent to a senior citizen.*

8-d-x.   The NUE Universe Model is a living organic Universe.

It follows a similar pattern of "organic metabolic procreation" like all the living bodies in the Universe, such as the Galaxies, the Stars, their Satellites, and others.

For these reasons, the Universe has an accumulated population of billions of Galaxies, and in each Galaxy, there are billions of Stars and their respective satellites, their Moons, and others.

8-e.   The intrinsic characteristics of NUE (*Natural Universe Expansion*):

8-e-i.   The Universe expansion:

The baby Universe has been expanding at a continuous compounding rate since its birth and will continue until its end. Since expansion is an exponential function, the expansion rate is not linear but curved, showing accelerated expansion with time.
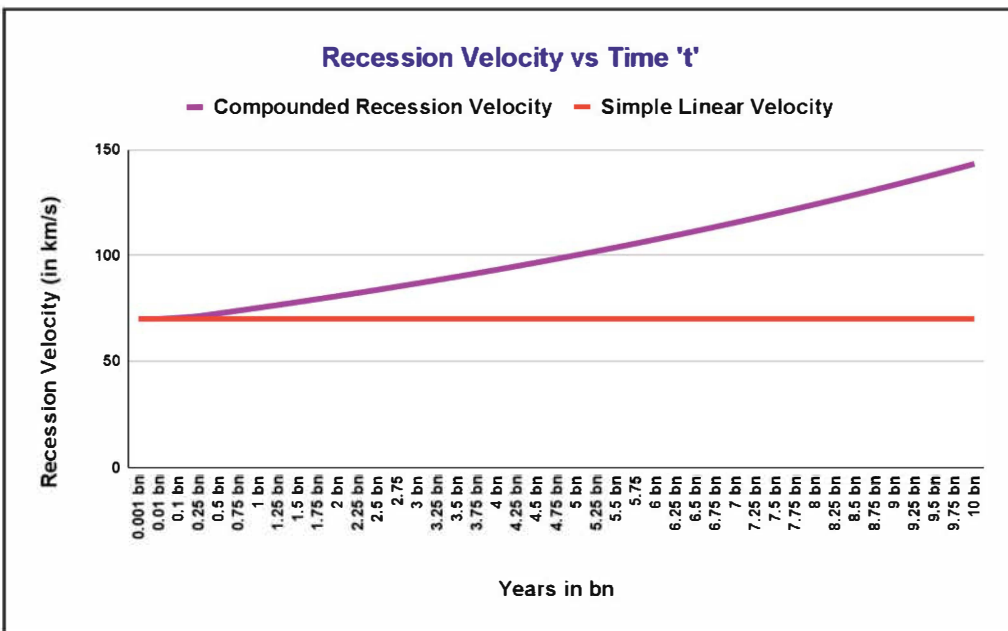
Graph- G-8.1: *It shows compounded recession velocity from birth to 10 bn years*

8-e-ii. The Universe accelerated expansion over a long period:

The expansion is graphically explained in the NUE LAW CHAPTER-2, para 2-s. Nu Constant gives the expansion. Nu = $\dfrac{V'}{D.e^{r.t}}$, where V' is the velocity of recession, D is the distance between the Observer and the targeted Celestial body (*Star, Galaxy, etc*), **r** is the rate of continuous compounded expansion (*expressed in decimal percentage*), **t** is the period in bn years. E is Euler constant = 2. 718.

8-e-iii. The graphical presentation:

We have Nu = $\dfrac{V'}{D.e^{r.t}}$, we derive the equation V' = $Nu. D. e^{r.t}$, We have

V' $\propto$ $D.e^{r.t}$. and D $\propto$ t.

These graphs, that is, Graphs G-3.2-A, G-3.2-B, G-3.3-A, and G-3.3-B, present an accelerated recession velocity.

The Graphs show that Starting from **t = 0** (*that is, the present time*) when $e^{r.t}$ is positive, it represents the future, whereas the negative $e^{-r.t}$ represents the past w.r.t the present **t = 0**. The graph shows the **V' α $D.e^{r.t}$**.

8-e-iv. When does the NU become a linear graph?

For now, **t = 0**, we have **V' = Nu. $D.e^{r.t}$ = Nu.$D.e^{0}$**

Therefore, at t = 0 (*present time*) = V' = Nu.D. Here, the graph becomes linear. We have calculated the period of this linearity to be up to 200 mn years. For details, see CHAPTER-2, para 2-s.

8-e-v. The present age of the Universe:

We get an accelerating curve from the past Starting point when we draw a graph of V' v/s 't' where t < 0 (*representing the past*).

We see Table T-3.2-Annex, which gives us a table of t α $D.e^{r.t}$. The reason being $e^{-r.t}$ where t = ∞ we have = $e^{-r.t}$ ∞ = 0.

This implies that Universe expansion was zero when t was – ∞ (*the past*). We can relate to the 'conceiving' or 'initiation' of the Universe for zero expansion time.

8-e-vi. The prenatal period and the birth of the baby Universe:

From Table T-3.2-Annex, we find the percentage rate of expansion in decimals w.r.t. the present at t = 91.75 bn years ago was 0.00009878620448 (*an irrational number*), but on a practical basis, we can take 91.75 bn years as a Start point when expansion was zero per cent w.r.t. the present.

Thus, 91.75 billion years ago would have been the Universe's birth time, which is its present age, and the period 91.75 billion years and the prior period to 91.75 billion years to – ∞, (*a point of initiation*) could have been the pre-embryonic, embryonic, foetus's and the prenatal period.

8-f.   The ambient Temperature of the Universe is constant:

8-f-i. The heat and temperature would be greater at positions with Stars and Galaxies. However, the overall temperature of the Universe is maintained constant at 2.725K.

8-f-ii. When the radial distance D increases, the Volume of the Universe increases. According to Charle's Law ($V = kT$), that is, the volume (V) α temperature (T). Thus, the Universe's temperature should increase proportionately. However, a counter-compensatory factor neutralised the temperature increase, as given in para 8-f-iii below. **Hence, the ambient temperature of the Universe remains constant.**

8-f-iii. The wavelength (λ) stretches as the Universe expands. The increase λ is inversely proportional to the temperature, that is, $\lambda \propto \dfrac{1}{T}$. The expansion and the stretching of wavelength are happening simultaneously to the same extent. Therefore, the increase in temperature because of the radial recession (*expansion*) and the decrease in temperature because of the increase in λ are counter-compensatory because the Nu constant simultaneously operates both the expansion factor and the increase in λ. Thus, this counter-compensatory factor helps maintain a uniform temperature in the Universe.
Details are also given in CHAPTER-5, Para 5-j.

8-f-iv. **Why is the ambient and constant temperature of the Universe essential?**
The ambient temperature of the Universe ought to remain constant for the system to be functional. Otherwise, a change in temperature affects the density and other parameters of the system, which can otherwise change the look, properties, and characteristics of the Universe.

8-f-v. Thus, maintaining the ambient temperature at 2.725 K as a constant is mandatory for the Universe system to function efficiently with near zero entropy, least resistance and maximum functional efficiency.

8-f-vi. **Comparison of ambient temperature with other living bodies:**
All living bodies maintain constant ambient temperature. For humans, it is 37°C; for dogs, it is between 37.5°C and 39.2°C (*depending upon the breed*); for cows, it is 38.2°C. Similarly, all living bodies have their specific constant ambient temperature. However, there could be some places in the body where the temperature could be higher than normal. Therefore,

the average body temperature is normal, especially during physical activity like heart throbbing, exercises, workouts, jogging, running, etc. All these variables are averaged within the tolerance limit.

8-f-vii. When the ambient temperature exceeds the tolerance limit, the body's organs start malfunctioning, causing fatal death. For humans, the tolerance limit is $37^{\circ}C \pm 4^{\circ}C$. A system is always designed for a specific ambient body temperature maintained within tolerance limits.

8-f-viii. The Universe is maintained at 2.725 K. While reducing the temperature further towards absolute zero is theoretically impossible due to the unattainability principle, approaching it would initiate phenomena like superconductivity, superfluidity, and Bose-Einstein condensation. At 0 Kelvin, a system would be in its ground state with zero entropy. Hence, the Universe is maintained at a constant temperature, and the possibility of further decrease is improbable.
The CMBR (Cosmic Microwave Background Radiation) emits radiation at λ_{MAX} = 1.06 mm in the microwave band of the EM spectrum.

8-f-ix. The human body emits radiations λ_{MAX} = 9.34 micrometres (μm). This wavelength falls within the infrared (IR) region of the electromagnetic spectrum. However, since the radiation is temperature sensitive, 9.34 μm at $37^{\circ}C$ equals approximately 1062.82 μm or 1.06 mm at 2.725 K (*derived from Weins Law*). This is the microwave range, where the peak wavelength of the Cosmic Microwave Background Radiation (CMBR) lies, and it is equivalent to the human emission wavelength at $37^{\circ}C$. Also see CHAPTER-7, para 7-d-iv.

8-f-x. **Inference:**

    A. The emission wavelength from the human body and the Universe is the same. Hence, we can say that humans and the Universe are the same and an extension of each other because both of them emit the same wavelength λ_{MAX} = 1.06 mm at equivalent temperatures, that is, when the body temperature is calculated either at 2.725 K, λ_{MAX} = 1.06 mm or $37^{\circ}C$ (*310 K*), λ_{MAX} = 9.34 micrometres (μm) for both the humans and the Universe.

B. Since the body temperature of a healthy person is constant at all ages, λ_{MAX} = 9.34 micrometres (µm) is continuous from an infant child to a super-senior citizen.

C. Since the Universe's ambient temperature of 2.725 K is constant and follows the same pattern as that of humans, it implies that this temperature has remained constant since the birth of the Universe until the present and will remain constant at all times because λ_{MAX} = 1.06 mm for the CMBR is constant.

8-g. Is the density of the Universe a fixed constant, or is it decreasing?

8-g-i. The density of the Universe ought to be constant. However, the individual Celestial bodies, Stars, and Galaxies have their respective densities. Still, the overall density of the Universe and that of individual Celestial bodies remain constant, although the expansion of the Universe is constantly happening.

8-g-ii. The density of the Universe ought to be constant for the system to be functional; otherwise, a change in density affects the character, appearance, and properties of matter and the body system.

8-g-iii. In an organic living body, when the size increases from birth, the expansion is uniform all over the body. Each body cell increases in size and mass but maintains its respective density as a constant. Thus, the density of the entire living body remains constant throughout its lifespan.

8-g-iv. Similarly, in the expanding Universe, the Universe body system undertakes continuous matter creation in every Celestial body (*Stars, planets, satellites, Galaxies, etc.*), and the principle of living matter is that the living matter creates and replicates its living matter. Once the density of the living bodies is maintained as a constant, the characteristics and the properties of the Universe and any Celestial body are always unchanged.

8-g-v. Thus, maintaining density as a constant is mandatory for the Universe system to function efficiently and effectively without changing its character, appearance or properties.

We know the Universe's body system maintains a constant density for all living bodies.

For example, Living bodies like humans (*1.07 g/cc*) have a density slightly higher than water's; therefore, they cannot naturally be afloat. Animals like dogs, cats, elephants, bulls, and cows can float because their density is slightly less than one (1g/cc), that is, the density of water. For more examples, see CHAPTER-2, para 2-h-vi.

8-h.   In an expanding Universe, does the Space-time stretch, or does it expand, maintaining constant density?

8-h-i.   The Space density:

Space is like a vacuum but not a complete vacuum. Therefore, as per NASA website[51], Space has a density = 9.9×10^{-30} *grams/cc* [= $9.9 \times 10^{-27} \, kg/m^3$].

8-h-ii.   The difference between stretching and expanding:

When a flat 2-D body stretches, e.g. paper, film, or a membrane, its surface area increases, but the mass remains constant. Therefore, their density decreases. Whereas, when a body is expanding, the mass also increases proportionately so that the body's density is maintained constant.

8-h-iii. Let us understand this with an example: The Earth currently has 78% of its surface area in seas and oceans. One billion years ago, according to the NUE Law, see Table T-3.2-Annex, the Earth was 0.9043 of the present size, that is, 0.9043 x 6371 = 5761.29 km radius, that is, the surface area was 417.16 mn km^2 as compared to 510.13 mn km^2 at present (for Earth's radius = 6371 km) that is an increase since one billion years ago = 122.29 %.

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[51] https://wmap.gsfc.nasa.gov/Universe/
uni_matter.html#:~:text=WMAP%20determined%20that%20the%20Universe,
5.9%20protons%20per%20cubic%20meter.

8-h-iv. When the Earth's surface area expanded, did the seas and oceans stretch or expand to the present level?

If the water were to stretch to occupy the increased surface area by 22.29%, the density of the water would decrease, and therefore, all the floating bodies would sink because of the decreased density of the water. Similarly, all aquatic bodies like fishes, whales, dolphins, turtles, etc., will also sink because they are all designed to sustain themselves in the water of a fixed density (*density = 1 grams/cc of fresh water, lakes, etc. and 1.035 grams/cc of seawater*).

Therefore, water cannot stretch to occupy a larger surface; instead, the water quantity has to increase by adding more water and its mass to maintain the density constant.

8-h-v.
Thus, to keep the density of water as a fixed constant, expansion in the surface area of the seas and oceans is simultaneously adding more water, that is, adding more water mass to the increased volume of water, and therefore, the entire aquatic life will survive, and everything floating on it will continue to float at all times.

8-h-vi. To summarise:

The space-time of space is not stretching but expanding as per NUE Law, maintaining the density of space as a fixed constant at = 9.9×10^{-30} grams/cc [= 9.9×10^{-27} kg/m^3].

8-j. Is the Organic Model of the Universe an Open, Isolated, or Closed System?

8-j-i.
According to the laws of thermodynamics, the NUE Universe is an **Open system** where energy from external sources is pumped into it to sustain its activities. Since entropy does not allow 100% efficiency for a system, that is, it implies that the Universe cannot be entirely self-sustainable.

8-j-ii.
The Universe consumes energy and matter from external sources and removes debris and the gases (*stellar waste matter*) of collapsed and exploding Celestial bodies (*supernovas, etc.*). that is, matter is also being

removed from within to outside the Universe, possibly through the black hole as an exit route.

8-j-iii.   Only an 'Open system' can draw energy and matter from outside the Universe and remove stellar waste matter to outside the Universe, as shown in Fig 8.2 and Fig 8.3.

8-k.   What is the cause of recession in an expanding Universe?

8-k-i   M = V.D--(A)
(*where V is the volume, D is the density, and M is the mass of the Universe*)
Therefore, for a constant density, when V, the volume of the Universe increases by the natural expansion from V to V+ΔV, Mass also gets created and increased to M+ΔM.

8-k-ii.   Thus, an increase in M = M+ΔM is caused by increased volume. Simultaneously, the radius of the Celestial body also increases by k x $(r + \Delta r)^3$ (*where k is constant* = $\frac{4}{3}\pi D$), where Δr is a small increase in the radius r of the Universe --- (B)
Thus, D(V+ΔV) = (M+ΔM), where D the density is constant. ------------ (C)
or equation (C) = (M+ΔM) = $kD \times (r + \Delta r)^3$ ----------------------------------- (D)
The Volume is increasing because the radial distance increases at the rate of Nu constant--- (E)
The surface area of the Universe in all its layers is also increasing at the rate $4\pi.(r + \Delta r)^2$ --- (F)

8-k-iii.   Thus, as seen in equations (D) & (E) above, the increase in the mass of the Principal Celestial body caused by the increased volume (*because of the Universe's expansion*) pushes the circumference of the Universe outwards at the rate of V'. Since V' has an exponential factor, $D.e^{r.t}$, the recession of the circumference is accelerating. Thus, all Celestial bodies (*Galaxies, Stars, etc.*) are positioned at an accelerating speed at whatever distance D is from the observer recess, depending on how old they are and the distance D is from the observer.

8-k-iv. We have seen in the Earth-Moon recession that the Earth's mass increases, pushing space outwards. Therefore, the Moon, being placed in Space, also gets pushed out by 3.8 cm/year.

8-k-v. **What is the role of 'dark energy' in expanding the Universe?**

Since the recession is caused by the increase in mass in the principal Celestial body, for example, given in para 8-m-iv above, the Moon's recession is caused by the increase in Earth's mass, which consequently causes the expansion of the Universe, eliminating the hypothesised mysterious presence of dark energy.

8-l. Why is the NUE Universe considered to be a Closed Spherical?

8-l-i. Is the Universe spherical?

For the Universe to be stable and functional, it ought to be globular (*spherical*) in shape and spin around its pseudo-axis. (*We know a popular example of a top, when spins at a specific rate are upright and stable*).

Even a small increase in the radius r of a sphere where r = r +Δr, the sphere's geometry causes expansion uniformly all over the sphere, increasing its radial distance and curvature (*circumference*) outwards and, as per para 8-m-ii = (F), enlarging the surface area of the Universe.

8-l-ii. From para 8-m = (C), (D), and (E) above, we find the increase in the volume of the Universe caused by its expansion increases the mass of all the Celestial bodies in the Universe. This increased mass in each of the Celestial bodies acts at the centre of the Universe as a cumulative point mass, which increases the radius of the Universe. The increased radius pushes forward the curvature of the Universe in all its layers and also simultaneously increases the surface area in all its layers. **See Fig-8.8 below**, which is presented in the 3D and 2D format.

8-l-iii. It is an observed reality that all the Celestial bodies recess outwards at an accelerated speed and increase the distance between them, like the popular example of dots on a balloon.

This phenomenon is possible only in a spherical Universe.

8-l-iv. **The exponential factor also increases the rate of mass creation exponentially, thus accelerating the Universe's expansion over long periods.**

Universe centre
Mass of all Celestial bodies acting at the centre

3D graphic   **2D graphic**
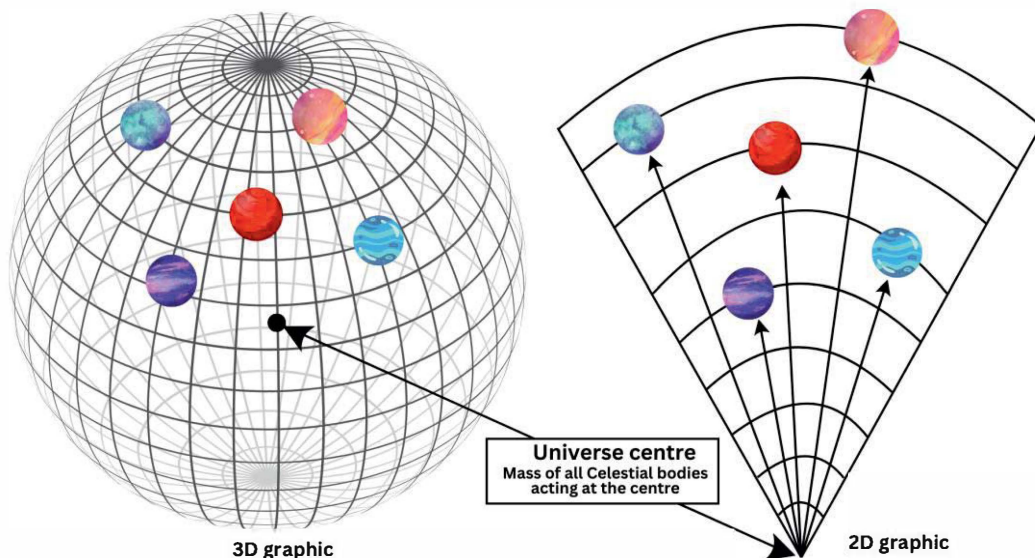
Fig 8.8: A presentation in the 3D and 2D models to show the expansion because of a cumulative increase in mass in all the Celestial bodies in the Universe. The cumulative mass acts at its centre, which causes the radial increase of the Universe and, hence, the surface area (curvature) increases in all its layers. The exponential factor in the Nu constant causes the accelerated recession of the Celestial bodies.

8-m.   Why NUE law supports a spherical closed Universe:

8-m-i. Mass is continuously created in the Celestial bodies all over the Universe. The increasing mass acts at the centre of the Universe, which increases its radius, which is responsible for increasing the volume of the Universe. Thus, all the Stars and Galaxies appear to be moving away from each other, like the popular example of the dots on the balloon moving away as the volume of the balloon increases. See Fig 2.1a, 2.1b, 2.1c reproduced below as follows:

Fig-2.1a, 2.1-b, & 2.1-c. *An analogy of an expanding Universe: As the balloon expands, the intermediate distance between the dots also increases proportionately, and so do the dots' diameters.*

8-m-ii. According to the NUE law, the increase in mass is continuously compounded with time, so the Universe's volumetric expansion causes Cosmic acceleration.

8-m-iii. Matter and energy are pumped into the Universe from outside it, and debris and waste generated inside the Universe are thrown outside it.

8-m-iv. Since the density and temperature of the Universe are maintained as a fixed constant, irrespective of its expansion, the Universe can keep expanding at all times without the problem of finite volume and the eventual problem of collapse, burst, or great crunch until and however other parameters, like the speed of light or its natural ageing, cause the end of the Universe.

8-m-v. The motion of Celestial bodies like Stars or Galaxies also revolves around their centre (*the principal Celestial body or a pseudo centre like a black hole, etc.*). As noted on the NASA website[52], the Milky Way Galaxy has over 100 million black holes. These act as a pseudo centre around which several Stars revolve in the cumulatively mass multiplication factor of the Stars acting at the centre of the pseudo centre, making it highly active, powerful and energetic.

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[52] https://science.nasa.gov/Universe /black-holes/types/

8-m-vi. Why is the pseudo-centre of the revolving Stars active, energetic, powerful and violent?

The mass of all the revolving Stars is focused at the centre of the circle in which they are revolving. Thus, the centre is loaded with the convergence of a huge mass equivalent to all the Stars' total multiplication factor. However, since the centre has negligible volume; hence, the density of the centre is nearly approaching infinity, which causes such a pseudo-centre to be highly active, energetic, violent and powerful enough, that gravity becomes so strong (*because of gravity $\propto$ to a multiplication factor of all masses*) that it can suck anything around it and that even light can not escape through it as in case of Neutron Stars etc. This pseudo-centre could thus be a black hole.

Fig 8.9: When all rays of the Sun get converged and focus at the centre, which has zero volume, the centre becomes so energetic and rises in temperature that it is capable of any substrate like paper to burn, or even heating a liquid, etc.

8-m-vii. The net Gravitational effect of Stars moving asymetrically at near different radii from the centre.

$$F_{NET} = \sum_{i=1}^{n} F_i = \sum_{m=1}^{n} \frac{G\, mi.M}{ri^2} . \hat{ri}, \text{ where } i = \text{mass } m_1,$$

$m_2, m_3 .... m_n$ at a radial distance $r_1, r_2, r_3 ... r_n$. Where all masses move asymmetrically around the centre.

8-m-viii.   Why pseudo centres display energetic and violent behaviour.

The net gravitational force acting at the centre is so massive that it acts as a black hole with intense **energetic and violent behaviour**. It can have extremely strong magnetic fields, rapid rotation, and intense radiation, including X-rays and gamma rays. Black holes release vast energy through gravitational waves and electromagnetic radiation, observed as gamma-ray bursts.
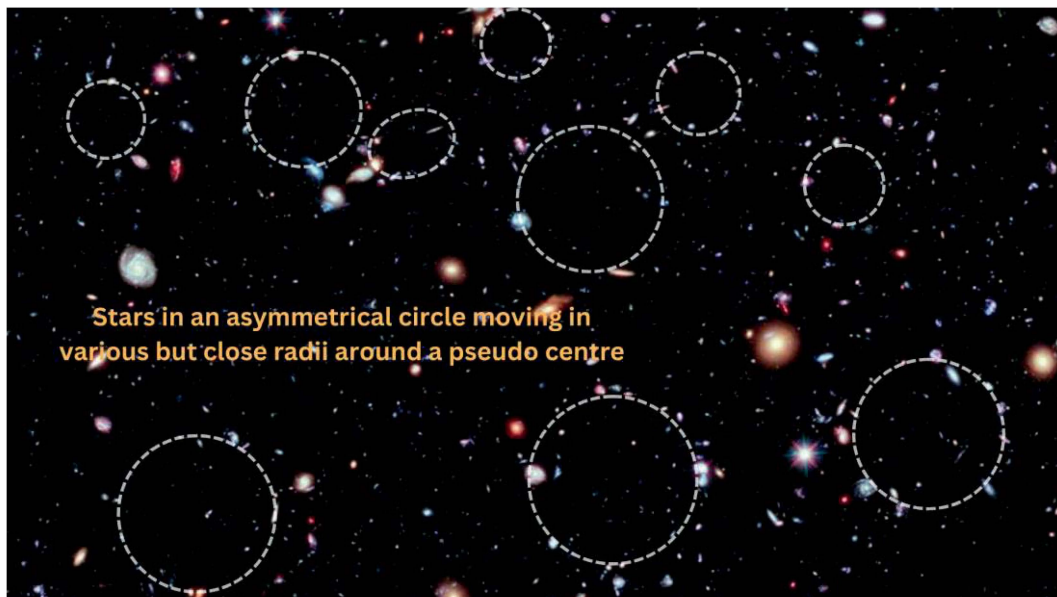
Fig 8.10: Looking closely, we find Stars in an asymmetrical circle moving in various but close radii around a pseudo centre, equivalent to a black hole, Neutron Star, etc.

8-n.   Is the Universe rotating?

8-n-i.   When the Celestial bodies, Stars and Galaxies have a net resultant spinning motion in a particular direction (*clockwise or anti-clockwise*), it also causes the outer Universe body to spin in the direction of the net resultant spin of all the Celestial bodies, Stars, Galaxies present in the Universe. Thus, the Universe must rotate around its pseudo-axis to stay stable in perpetuity.

8-n-ii.   Visualize an electric hand mixer (Fig 8.11) or a mixer (Fig 8.12) whose outer bowl is free to rotate on a pivot. When the liquid in the bowl is stirred around, the bowl also starts slowly spinning on its pivot in the direction of the liquid in motion. Similarly, the sum total of all the motions of the Galaxies are stirring the Space in a net resultant motion which could be clockwise or anti-clockwise causing the Universe to also rotate in that direction. The rotation of a spherical body at a particular rotational speed makes it stable, like a top when spins at a particular rate is stable and upright. *See Fig 8.14 and Fig 8.15 below.*

Fig 8.11 Electric hand mixer   *Fig 8.12: Electric mixer having a bowl free to rotate on a pivot*

Fig 8.13: A bowl free to rotate on a pivot, when a liquid in it is stirred to rotate, the bowl will also start rotating in the direction of the stirring liquid.

8-n-iii. Any Celestial body or balloon that has to independently remain upright, stable, and functional in a specific coordinate ought to have a rotational motion like a spinning top, constant density, constant temperature, pressure, and gravitational equilibrium. All these features indicate a **spherical or closed Universe** (*referring to the curvature of the Universe*) that is in a rotational motion and does not stand pegged somewhere in isolation.

Fig 8.14: A non-rotating or slow rotating top is unstable and needs a support to be upright
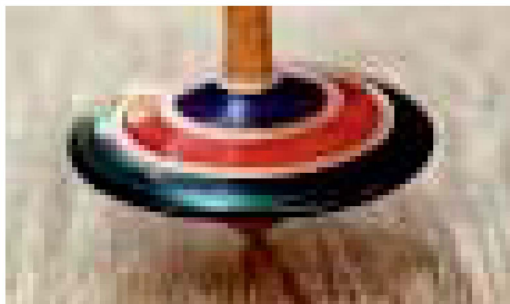
Fig 8.15: A rotating top at a particular speed is stable and upright

8-p. The NUE Law provides the Universe with the shape of Closed Spherical positive curvature, which can expand endlessly.

8-p-i. The present knowledge and the shape of the Universe.

The NASA website[53] claims that the **Universe is flat,** with only a 0.4% to 0.5% margin of error. NASA suggests that the Universe is infinite in extent. If the density of the Universe exactly equals the critical density, then the geometry of the Universe is "flat" with zero curvature, like a sheet of paper. If so, the Universe has no bounds and will expand forever, but NASA predicts that **"the rate of expansion will gradually approach zero after an infinite amount of time".**

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[53] https://wmap.gsfc.nasa.gov/Universe /uni_shape.html

8-p-ii. Wilkinson Microwave Anisotropy Probe (WMAP) determined that the Universe is flat, from which it follows that the mean energy density in the Universe is equal to the critical density (*within a 0.5% margin of error*). This is equivalent to a mass density of $\mathbf{9.9 \times 10^{-30}}$ *grams/cc* $[= \mathbf{9.9 \times 10^{-27}}\ \mathbf{kg/m^3}]$
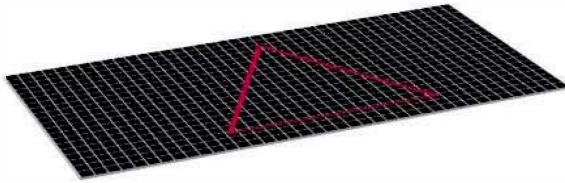
Fig 8.16-A Geometry of flat Universe   *Fig 8.16-B Geometry of close Universe*

8-p-iii. The NUE Law contradicts the idea of a flat Universe.

The idea of the Flat Universe is based on the following two points:-
1. The density of the Universe is approximately the same as the critical density
2. The microwave radiation spots*(?)

[What are microwave radiation spots?

NASA website mentions that if the Universe were flat, the brightest microwave background fluctuations (or "spots") would be about 1º across. If the Universe were open, the spots would be less than 1º across. If the Universe were closed, the brightest spots would be greater than 1º across.]

8-q.   Critical Study of the Flat Universe Model presented by NASA.

8-q-i.   Why flat Universe Model by NASA?

From the in-depth study of the Flat Universe Model, the sole purpose of presenting a Flat Universe is to provide a model of infinite expansion. The flatness refers to the geometry of Space being Euclidean, that is, a geometry where the total of the inner angles of the triangle = 180º.

8-q-ii.   Why the dark energy and dark matter?

The critical part of the energy and mass density is the hypothesised mysterious dark energy, which is propounded to account for the

observed acceleration in the expansion. In contrast, dark matter is being hypothesised to explain the velocities of Stars at the Galaxy's edge for speeds that do not follow the gravitational laws*. The observations of Stars' speeds at the Galaxy's edge appear to be constant or even faster than the calculated speeds. To cover up this observational paradox, the dark matter concept has been introduced to explain it.

By the law of gravitation, we have $RV^2 = mG$, where m is the mass of the Galaxy at the centre, R is the distance from the centre to the Star, and V is the velocity of the Star revolving around the centre of the Galaxy.

8-q-iii. Why the NUE Model does not need the 'dark energy' and 'dark matter' concept?

The NUE Model of the Universe does not need the hitherto dark energy concept because the expansion and acceleration of the Universe are due to the mass creation in the Principal Celestial Body. The acceleration is due to the exponential Euler's constant given by $V' = Nu. D. e^{r.t}$, where r is the expansion rate and t is the period. The detailed calculations are given in the Table T-3.2-Annex.

8-q-iv. Dark matter, which is hypothesised to explain the anomalous speed of Stars towards the edge of the Galaxy, is explained by Stars locally revolving around the pseudo centre, which are like either Neutron Stars or black holes. *This is explained above in para 8-m-vi.*

8-q-v. Thus, the NUE Model does not need all this dark energy and dark matter to present its Universe's Model and shape.

8-q-vi. The NUE Model also presents the Universe as indefinitely and infinitely expanding on a time scale given by $V' = Nu. D. e^{r.t}$ where, $t = \infty$, the equation $D. e^{\infty}$ = undefined. However, in this model, the Universe can expand infinitely with a spherical curvature that has a constant density and temperature.

8-q-vii. The shortcomings of a Flat Universe Model:

If the Universe is flat like a sheet of paper, then expansion in one region can continue to expand linearly in that direction. **It is difficult to apprehend how it would expand uniformly all over the sheet of paper and in all directions simultaneously.**

8-q-viii. What is confusing is that if the expansion has to affect all parts of the Universe equally and simultaneously, then it is only possible through a closed spherical model of the Universe.

8-q-ix. **Is it correct to accept NASA's infinite expansion of the Flat Universe Model, ending with a zero expansion rate?**

The NASA website* mentions that the Flat Universe would have no bounds and expand forever, and "the rate of expansion will gradually approach zero after an infinite amount of time".

The NUE Model explains the accelerated velocity of expansion by the equation = V' = $Nu.D.e^{r.t}$, an exponential equation whose representative graph is CHAPTER-3, Graph G-3.1-A and G-3.1-B. The Graphs show an acceleration mode compared to the Hubble's Constant.

The observations that the recession is at an acceleration mode for the far off Galaxies tallies with the equation V' = $Nu.D.e^{r.t}$,

V' = $Nu.D.e^{r.t}$, in this equation, when t = ∞, the equation $D.e^{r.t}$ = $D.e^{r.\infty}$ = $D.e^{\infty}$ = an undefined state*.

The equation implies that the expansion rate at infinity (t = ∞) is undefined.

*https://wmap.gsfc.nasa.gov/universe/uni_fate.html#:~:text=Measurements%20from%20WMAP,flat%20and%20will%20expand%20forever.
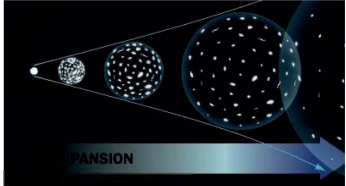
8-q-x. **The following Table explains the LOU*-NUE Closed Universe Model compared to the Flat Universe.**

*LOU = Living Organic Universe

Table 8.1. Comparison between a Flat Universe and a Closed Universe.

Sr. No.	Particulars	Flat Universe, presented by NASA	Closed Universe, presented by NUE Law and LOU Model
1	**Density**	It keeps decreasing as the Universe expands	Density is constant
2	**Temperature**	Keeps decreasing	Temperature is constant

Sr. No.	Particulars	Flat Universe, presented by NASA	Closed Universe, presented by NUE Law and LOU Model
3	The curvature of the Universe	Nearlv zero	Positive curvature keeps increasing infinitely.
4	Expansion feature	A flat Universe predicts its continuous and infinite expanding feature where the expansion rate when t = ∞ is zero.	The spherical Universe will continue to expand infinitely since the density and temperature of the Universe are constant at all times, and t = ∞ the rate of expansion is undefined. (*see para 8-q-ix*)
5	Homogeneity	Homogeneous when viewed on larger scales but heterogeneous in some regions	Homogeneous when viewed on larger scales but heterogeneous in some regions
6	Isotropy	Isotropic when viewed on larger scales but anisotropic in some regions	Isotropic when viewed on larger scales but anisotropic in some regions
7	Mass creation	NIL	Mass is continuously created in all the Celestial Bodies. (*for mass creation on Earth, see para 8-r-i below*)
8	Cosmic acceleration	Explained by hypothesised dark energy	Acceleration caused by Nu Constant and the creation of mass in Celestial bodies: V' = $Nu.D.e^{r.t}$. The rate of expansion with distant Galaxies causes acceleration.

Sr. No.	Particulars	Flat Universe, presented by NASA	Closed Universe, presented by NUE Law and LOU Model
9	**Anamolus velocities of Stars at the edge of the Galaxy**	No explanation is available; hence, the dark matter concept was introduced.	Millions of black holes spread all over the Galaxy, and the Stars revolving around these black holes in asymmetrical radii move at speeds which correlate to the centric black hole at speeds defined by the gravitational laws, RV^2 = constant. Thus, there is no need for the dark matter concept to be hypothesised. *For more details, see para 8-m-vi above.*
10	**Expansion given by**	Big Bang and Hubble's Constant	NUE Law and Nu Constant
11	**Expansion/ Stretching**	Stretching (*decreases density*)	Expansion (*Constant density*)
12	**Cosmic Microwave Radiation Spots**	Observed to be nearly 1^O across in the Cosmic Microwave Radiation Spots, which indicates a Flat Universe	NUE Law Universe Model provides a Close Universe that can keep expanding infinitely.
13	**Linear / Non-linear recession / expansion of the Universe.**	 H_O = linear expansion	 Nu = A non-linear accelerated recession for distant Galaxies/Stars of a Closed spherical Universe with a positive curvature.

8-r-i. The creation of new matter in the Living Organic Universe model?

Continuous matter creation happens in every Celestial body proportionate to an increase in its volume, triggered by the increase in the radius of a Celestial body at the rate of Nu Constant. When calculating the past, that is, [- t], or for future [+ t], we have the Table T-3.2 Annexe.

Examples with mathematical calculations are given in CHAPTER-2, para 2-u and CHAPTER-3, para 3-p.

Thus, a Celestial body's increase in mass is proportional to its rise in volume, which ensures that its density remains constant at all times. The constant density sustains its features and characteristics.

8-r-ii. How is mass created in the Organic Universe Model?

We know that energy is depleting in the Universe due to the expanding wavelength. Energy is maximum in the Violet range and gradually decreases with redshifts towards the Red Band of the EM Spectrum. It implies that the wavelength is increasing, and simultaneously the energy is depleting as per the following equation.

$$E = h\nu = \frac{hc}{\lambda}$$ **Therefore, Eλ= constant (hc).**

Thus, as λ the wavelength increases, the energy of the system depletes.

The matter and energy consumed by the LOU Open Universe System* are replenished through external sources**, and the Universe's internal waste is removed from it and disposed of outside the Universe.

For details, see para 8–j above.

**See Fig 8.3*

8-s.   Table T-8.2: Difference between Steady State Theory, Big Bang Theory & the LOU-NUE MODEL of the Universe:

Particulars	Steady State Theory	Big Bang Theory	The LOU-NUE Universe Model
1. Density of the Universe	The density is constant where the mass gets created	The density declines as the Universe expands.	The density is constant. The continuous creation of matter happens in Space and in every Celestial body proportionate to an increase in its radius at the rate Nu constant. It ensures that the density of each Celestial body and Space remains constant at all times.
2. Creation of Matter	Continuous matter creation happens somewhere in the Universe, which ensures that the density of the Universe is constant.	The expanding Universe causes matter to dilute over time, which leads to a decrease in density.	To maintain its constant density, the continuous radial expansion of the Celestial body causes the creation of a mass of matter in every Celestial body and Space to proportionate to an increase in its radius at the rate Nu constant. This ensures that the density of each Celestial body and Space remains constant at all times to maintain its features and characteristics and, cumulatively, that of the Universe.

Particulars	Steady State Theory	Big Bang Theory	The LOU-NUE Universe Model
3. Age of the Universe	Agelessness, that is, there is no beginning or end.	The Hubble's Constant gives the fixed age of the Universe as 13.86 bn years.	The Living Organic Universe has a prenatal development and formation period. After the Birth of the baby Universe, the living Universe began its journey with natural expansion as per NUE Law where $V' = Nu.D.e^{r.t}$. This is a continuously compounded rate of expansion r over a period of time t. Being an exponential equation, theoretically, t extends from minus infinity to plus infinity, making its lifespan infinite. However, practically, the age is calculated at 171.57 bn years, as shown in CHAPTER-3, para 3-m.
4. Rate of Expansion (r)	The rate of expansion is constant	Here, the velocity of recession (V) is given by V = H_O.D, where H_O is Hubble's constant and D is the distance of the Galaxy viewed from the Earth. This is a linear rate equation where $H_O = \frac{V}{D}$	Expansion/recession is accelerated over long distances and periods based on $V' = Nu.D'$, where $D' = D.e^{r.t}$. The exponential factor is responsible for the accelerated expansion of D* over a period of time t. However, in the short run, when t = 0 (*present time*), the recession is linear, comparable with Hubble's Constant (H_O), as a special case. *viewing distance from Earth to targeted Galaxy in deep space*

Particulars	Steady State Theory	Big Bang Theory	The LOU-NUE Universe Model
5. Why Universe is expanding?	Not known	Not known	The expansion process is natural and intrinsic to all living organic bodies. The Universe, also 'living and organic', is expanding naturally at a regulated rate as per the NUE Law. Because the Universe is expanding, mass is being created in every Celestial body and Space. The mass increase acts at the centre of the Universe, which in turn increases its curvature by the gravitational law = $(m + \Delta m) = (R + \Delta R)\frac{v^2}{G}$, where ΔR is the increase in the curvature of the Universe.
6. How does the mass get created?	Mass increases in high-density regions of the Universe. Since this does not match the observations, the Theory is challenged.	Mass doesn't get created.	Mass creation happens as follows: The increase in the radius of a Celestial body causes its increase in volume. The constant density causes the mass of the Celestial body to increase proportionately. If D is the density of the Celestial body and r its radius. With time t, the Nu constant increases the radius r to (r+Δr). This increases the volume of the Celestial body $(V+\Delta V) = \frac{4}{3}\pi r^3 + \frac{4}{3}\pi\Delta r^3$ $= \frac{4}{3}\pi(r^3 + \Delta r^3)$. Increase in mass $(m+\Delta m) = D.\frac{4}{3}\pi(r^3 + \Delta r^3)$.

Particulars	Steady State Theory	Big Bang Theory	The LOU-NUE Universe Model
7. Is replenishment of energy and matter from external sources required?	Not known: It needs to be mentioned in the Theory. All the required energy is created within the Universe System itself.	Not known: There is no mention of energy and matter anywhere in the Big Bang Theory. All the energy and matter are theorised to be present at the point of singularity. The singularity continues to push and expand the Universe, create radiation, form Stars, Galaxies, black holes, active and inactive dark matter, and generate huge amounts of heat energy thrown into Space.	Yes, energy and matter are continuously feeding into the Universe. There are two reasons: 1. According to the Living Organic Universe model, like all living bodies, they draw energy and other matter through breathing and intake of food. Similarly, energy must be drawn into the Universe from outside it to feed energy and matter and replenish the loss of key ingredients in the Universe's composition during supernovas and other fatal crashes. Energy is required to sustain multiple motions, activities, luminosity, and heat of Stars, Galaxies, and black holes. Energy is also required to increase mass to balance the increase in volume due to the expanding Universe. 2. If all the energy needed is generated within the Universe, it would violate the laws of thermodynamics. Hence, for a dynamic system, however efficient it may be, it needs energy replenishment from outside the System to sustain it.
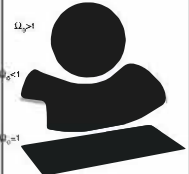
Particulars	Steady State Theory	Big Bang Theory	The LOU-NUE Universe Model
8. Age of Celestial bodies, Stars and Galaxies	The Universe is ageless, implying no beginning and end point; longevity is perpetuated. Older and young Stars and Galaxies should be present in space	All Celestial bodies, Stars, and Galaxies age with time	In the NUE Living Organic Universe Model, Galaxies are like the vital organs of the Universe system; their ageing is based on the ageing of the Universe. The life of a Galaxy or a visible Star does not begin when it enters the violet zone of the visible spectrum and does not end when it exits from the edge of the red band of the EM spectrum. The lives of the Galaxies and the respective Stars began with the birth of the baby Universe, grew on a time scale, and will continue to age until the end of the Universe. On the scale of the Universe, a Star is like an equivalent of an energy-activated cell (bio-cell). However, as the Universe expands, old Stars die out, and new Stars and Celestial bodies are created within Galaxies and other places as part of the Universe's metabolic progression. These latest additions are made through the Universe's procreation process among the adult Celestial bodies, Stars, Galaxies, etc.

Particulars	Steady State Theory	Big Bang Theory	The LOU-NUE Universe Model
9. The g factor that is acceleration due to gravity	Does not address g	Does not address g	According to the NUE Law and the LOU Model of the Universe, the mass of all Celestial bodies in the Universe is increasing w.r.t. time. Therefore, g is not a fixed constant but a variable one, which for Earth 4.5 bn years ago was 15.437 m/s^2, which at present is 9.82 m/s^2 and in future, in a few bn years it would decrease further. Thus g is in inverse proportion to time t, that is, t ∝ 1/g. (***for details see CHAPTER-4, para 4-f-iv***).
10. The Sphere of Influence (*SOI*) of Celestial Bodies and Earth.	The Steady State Theory is silent on the SOI.	The Big Bang Theory is silent on the SOI.	Since the NUE Law implies that the mass of the Celestial bodies keeps increasing with time. Thus, the radius of SOI also keeps on increasing with time. (***for details see CHAPTER-4, para 4-g***)
11. Cosmic Microwave Background (CMB) Radiation	There is no mention of it in the Steady State Theory.	The Big Bang Theory predicts CMBR should exist with temperature continuously decreasing from an initially hot Universe, but	The organic Universe, like every living body, including plants, animals, and humans, has an intrinsic energy field radiating energy and emanating it outside the physical body (*also called as Aura*). This energy field within the human body has radiation in the microwave

Particulars	Steady State Theory	Big Bang Theory	The LOU-NUE Universe Model
		with time, it cools down to the present temperature of about 2.725 K	region emitting λ_{MAX} = 9.34 micrometres (µm) at body temperature 37ºC (T=310K). The Universe also has a similar intrinsic energy field, CMBR, in the microwave band of the EM spectrum, λ_{MAX} = 1.06 mm. Applying Wein's Law, we get the human body radiation emission λ_{MAX} = 9.34 micrometre at 37º C, equivalent to the Universe CMBR λ_{MAX} = 1.06 mm at 2.725 K. **This also proves the NUE proposition: "As is the Human, so is the Universe".**
12. Homogene ity of the Universe	Does not fully adhere to homogeneity over time. While it posits that the Universe is in a Steady State with a constant average density, it requires the continuous creation of matter to maintain this density. This	On sufficiently large scales, the Universe should appear homogeneous, meaning that the distribution of matter and energy is roughly the same everywhere.	Comparing the Universe to human anatomy, we have the hardware bony segment, which has structures made of bones that form the skull, spine, thorax, hips, thighs, legs, feet, hands, etc. On the other hand, we find muscles, tissues, veins, arteries, and the nervous system, and then we see the various organs like the Heart, liver, kidney, intestines, skin, etc. When viewed by endoscopy from inside the

Particulars	Steady State Theory	Big Bang Theory	The LOU-NUE Universe Model
	ongoing creation means that the Universe only evolves towards greater homogeneity over time.		human body, we find the space and structures **Heterogeneous,** but these, too, expand homogeneously. The human body's composition is a **homogeneous** content of bio and chemical integration in sync with the software system, which drives the activities of the entire human body system.* Similarly, the Universe appears heterogeneous in certain regions where structures and clusters are located. Still, the overall bio-chemical composition of the Universe is homogeneous because the gravitation laws, Physical laws, Einstein's Relativity, the E-M spectrum, Doppler's effect, wavelength stretching, temperature of Space = 2.725 K, laws of luminosity, thermodynamics, etc are common features applicable on the Earth and to the Universe as a whole. For an active Universe, the overall energy is a constant. When consumed, it is replenished from internal/external sources. **For more details, see CHAPTER-2, para 2-n.**

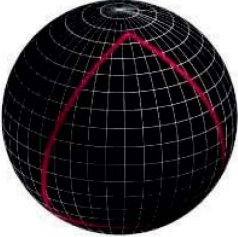| Particulars	Steady State Theory	Big Bang Theory	The LOU-NUE Universe Model
13. Isotropy of the Universe	The continuous creation of matter is expected to occur uniformly throughout the Universe, leading to a distribution of matter that appears isotropic on large scales.	On sufficiently large scales, the Universe should appear isotropic, meaning there should be no preferred direction in space.	Mass creation proportionately happens in every Celestial body in the 'Living Organic Universe' model. Thus, isotropic uniformity is maintained everywhere, even in places where there are visible structures and cluster formations in Space. Hence, the overall composition of the Universe and its isotropic condition are unaffected. The Isotropic feature of the Universe confirms the shape of the Universe to be spherical. The anisotropic feature is that depending on the distance D, the expansion of the Universe is exponential and non-linear in far-off Galaxies and Stars. Hence, the isotropic feature is challenged, but where the expansion is linear in nearer-located Galaxies and Stars, the Universe in those regions is isotropic. Just like The Universe is a homogenous-heterogenous hybrid model, similarly, the Universe is also an isotropic-anisotropic model. **For more details, see CHAPTER-2, para 2-m**

Particulars	Steady State Theory	Big Bang Theory	The LOU-NUE Universe Model
14. Type of Universe: "Open Universe[54]", "Flat Universe"[55], or "Closed Universe[56]". $\Omega_o > 1$ $\Omega_o < 1$ $\Omega_o = 1$	The steady-state theory doesn't directly predict the Universe's curvature (*flat, open, or closed*). However, the theory had implications that leaned towards **a flat Universe**. Although the theory wasn't concerned with curvature, the idea of the constant creation of new matter implied a Universe that would tend	As seen on the NASA website[57], the simplest version of the inflationary theory, an extension of the Big Bang theory, predicts that the Universe's density is very close to the **critical density** and its geometry **is flat**, like a sheet of paper.	For the Universe to be stable and functional, it should be spherical and spin around its axis. **Applying General Relativity:** The Universe has a vast number of Celestial bodies, each with massive masses. The total mass of all these Celestial bodies acts at the centre as a point mass. Thus, when the mass of the Universe increases acting at its centre, its volume increases, maintaining its constant density (*as per NUE Law*). This increases the radius of the Universe and its curvature (*because $\Delta m \propto \Delta r^3 \propto$ increases the circumference curvature by $2\pi r$*). The higher the increase in mass, the greater the curvature increases,

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[54] An open Universe is one that is curved but does not fold back onto itself. This type of Universe will expand forever because there is not enough mass for gravity to stop it.

[55] A flat Universe has zero curvature, meaning that space is flat like a sheet of paper. This means that if you were to travel in a straight line, you would continue in a straight line forever. A flat Universe is also infinite, meaning that it has no boundaries

[56] Definitions of closed Universe. (according to the cosmology) a Universe that is spatially closed and in which there is sufficient matter to halt the expansion that began with the big bang;

[57] https://map.gsfc.nasa.gov/Universe/uni_shape.html#:~:text=The%20simplest%20version%20of%20the,like%20a%20sheet%20of%20paper.

Particulars	Steady State Theory	Big Bang Theory	The LOU-NUE Universe Model
	towards critical density and, therefore, a flat geometry.		which is only possible if the Universe has a spherical body shape. In a Living Organic Universe, the circumference and surface area can metabolically keep increasing in perpetuity. **For more details, see para 8-1 above.**

Why do we say the biochemical composition is homogeneous? If we perform pathology tests by taking a few CCs of blood, we learn the presence of all the elements and their parameters in the entire body's blood. Similarly, a small quantity of urine and stool testing provides full information on the body's wellness. A biopsy of a tissue gives a report of the local conditions of the body, whether skin, liver, kidney, lymph nodes, cancer cell growth, etc.

The Earth's Expansion and the Tectonic Theory.

CHAPTER-9; Abstract :

"The Earth's Expansion and the Tectonic Theory" explores the widely accepted Tectonic theory, which suggests that the Earth's surface is divided into large plates that have shifted over millions of years. The theory explains how the continents, once part of a super continent called Pangaea, have drifted apart. This movement, known as continental drift, is supported by evidence such as the puzzle-like fit of continents, identical rocks on different continents, and similar fossils found across now-separated landmasses.

The Chapter then contrasts this with the LOU-NUE Law, which posits that the Earth, like the Universe, is expanding over time. According to NUE Law, the Earth's radius has increased continuously, as mathematical equations based on the Nu Constant show. This law provides a way to calculate the Earth's past size and future growth, with examples showing the Earth's circumference 250 million and 1 billion years ago, demonstrating a significant increase in size.

The LOU-NUE Law challenges the tectonic theory by suggesting that the Earth's expansion, rather than tectonic plate movement, is responsible for the separation of continents. Supporting evidence includes slowing Earth's rotation, expansion-related phenomena like earthquakes and landslides, and calculations derived from the Earth-IVIoon recession rate.

The Chapter concludes that the LOU-NUE Expansion Theory offers a more comprehensive explanation of Earth's expansion, which causes the space between the continents to increase rather than the continents drifting away like an unanchored ship as propounded by the tectonic theory.

NOTE: This Chapter presents the tectonic theory in detail from para 9-a to 9-d. From para 9-e onwards, the LOU-NUE Law presentation explains, with examples and mathematical equations, to explain, how LOU-NUE expansion supersedes the Tectonic Theory.

9-a.   The present knowledge of the Tectonic Theory and its details.

9-a-i.   The <u>plate tectonics</u> theory concerns the movement of the large plates that make up the Earth's crust. Plate tectonics has changed the face of the Earth over several million years, and how it continues to change.

9-a-ii. Looking at the globe (*see Figs 9.1 & 9.2*), the east coast of South America fits quite well, almost like a puzzle, into the west coast of Africa. North America can be rotated slightly and fit comfortably next to Europe and Asia.

Fig 9.1: All Earth's continents were once combined the continents in one supercontinent drifted apart.

Fig. 9.2: Pangaea. Over millions of years, drifted apart.

9-a-iii. This is evident that all these continents were joined at one point. This giant landmass, known as a supercontinent, was called Pangea. Pangaea means "All Lands," which describes how all the continents were joined together.
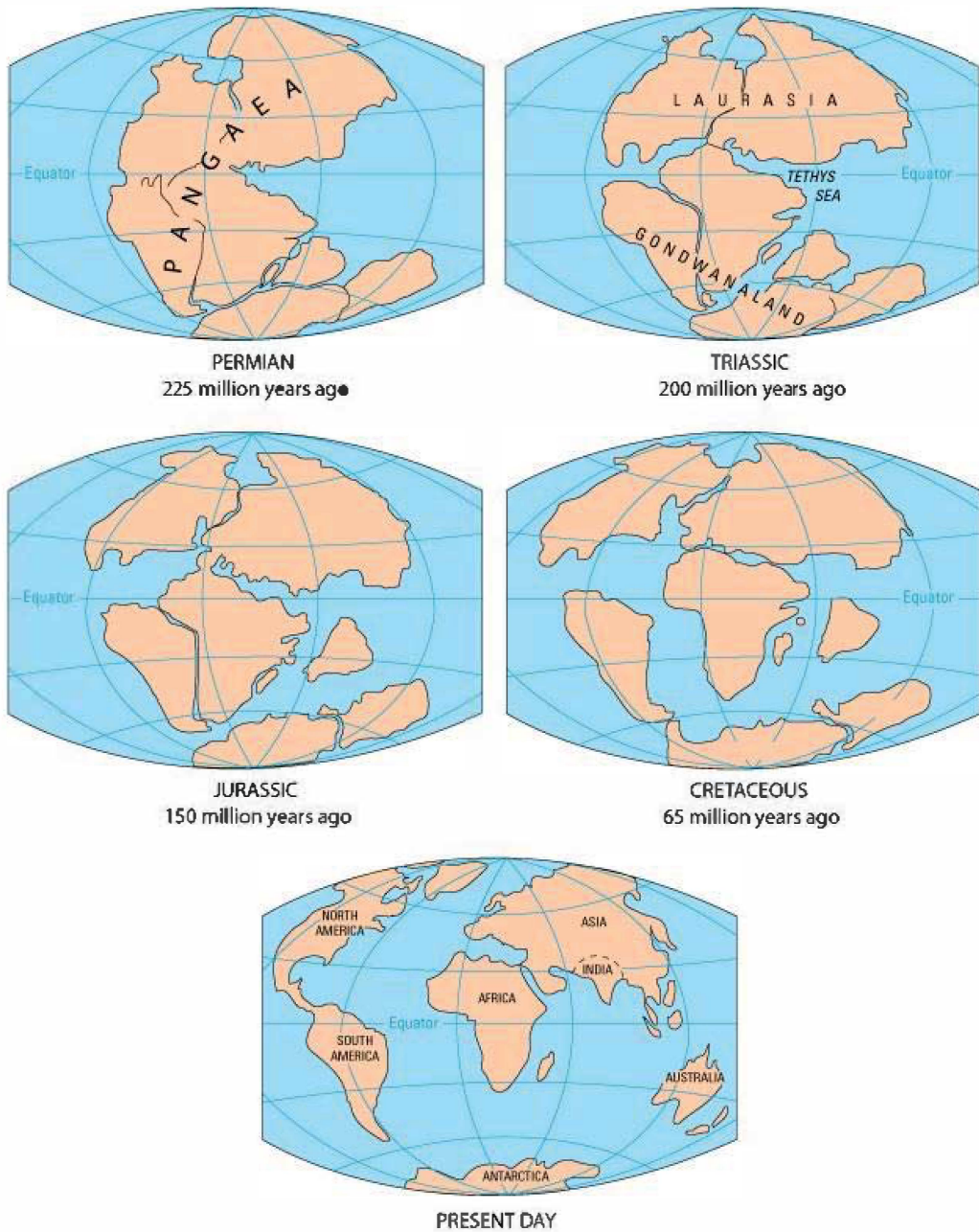
Fig: 9.3: The gradual drifting of continents: Source: Kious, Jacquelyne; Tilling, Robert I.; Kiger, Martha, Russel, Jane [Public domain]

9-a-iv. Pangea existed 240 million years ago, and about 200 million years ago, it began to break apart. Over millions of years, these pieces became the continents we know today.

9-a-v. Earth's outer shell (*lithosphere*) is divided into several plates that glide over the Earth's rocky inner layer above the softcore (*mantle*)

9-a-vi. Before 250 million years ago, a gigantic continent called Pangaea slowly broke apart and spread out to form the continents we know today. All of Earth's Continents were once combined in one Supercontinent, Pangaea. Over millions of years, the Continents drifted apart.

9-b. Scientists have found many kinds of evidence supporting the tectonic theory.

The following are a few of them:-:

9-b-i. The shapes of continents fit together like a puzzle. Just look at the East Coast. It's almost a perfect fit for South America and the west coast of Africa!

9-b-ii. Identical rocks have been found on different continents. These rocks formed millions of years ago before the continents separated. They formed from the same. minerals and under the same conditions.

9-b-iii. Fossils of the same kind of dinosaur, Mesosaurus, have been found in South America and Africa. These dinosaurs roamed Earth before the two continents broke apart.

9-c.   Earth's layers:
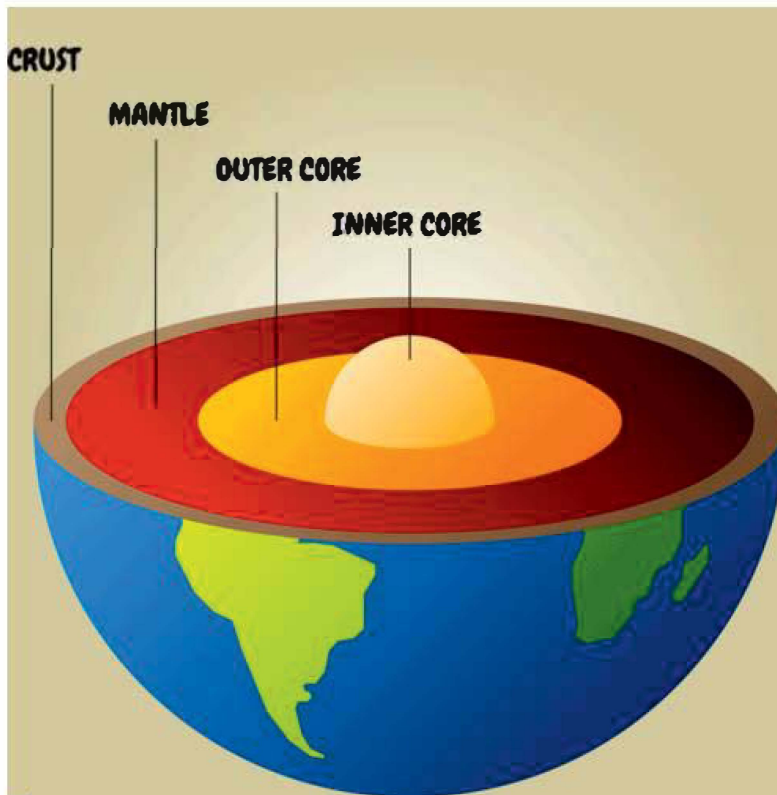
Fig.9.4: Earth's interior is made of different layers

9-c-i.   Earth's inner layers: A peek inside our planet.

We live on Earth's **crust**, a layer of rock about 30 km thick. Earth's crust and some of the layer below, the mantle, is broken up into large pieces called **tectonic plates.**

9-c-ii.   The **mantle** is a thick layer of rock just under the crust. It's firm and hard like other rock, but it's flowing slowly, about as slowly as the fingernails grow.

9-c-iii. The **outer core** is a liquid layer, made mostly of iron and nickel, that moves around the inner core. This motion causes Earth to act like a giant magnet.

9-c-iv. The **inner core** is a solid ball made almost entirely of two metals, iron and nickel. It's hotter here than on the surface of the Sun.

9-d.   Earth's layers work together.

Under your feet, Earth's different layers move and interact constantly. All the layers work together in a system, each playing an important role.

Here's just one way they all work together:

9-d-i. Intense heat flowing out of the core and into the mantle makes the mantle flow in circles.

9-d-ii. The motion of the mantle causes the plates to move.

9-d-iii. The moving plates create volcanoes.

9-d-iv. The volcanoes release gases into the atmosphere.

9-d-v. The atmosphere acts like a giant blanket, keeping the planet warm. This makes life on Earth possible!

9-d-vi. The movement of the plates causes volcanoes and earthquakes and forms mountains and continents. Early in Earth's history, water vapour from volcanoes helped form our oceans.

Fig: 9.5: *Movement of the plates causes volcanoes*

Fig-9.6: *Early in Earth's history, water vapour. and earthquakes form mountains and continents. from volcanoes helped form our oceans*

9-e.   The Theory of Earth's Expansion and the LOU-NUE Law:

9-e-i.   The NUE Law relates to the natural expansion of the Universe, where the Earth is an integral part of it. Hence, the NUE Law also applies to expanding the space around the Earth and the Earth itself.

9-e-ii.   The equation gives the velocity of recession of Earth's radius:
$V' = Nu.\,D.\,e^{r.t}$. where **V′** is the recession velocity of the Earth's curvature per year, **D** is the radius of the Earth, **r** is the compounded rate of continuous expansion, **t** is the period, and **Nu is the constant** = **3.8 cm/year/ 3,78,000 km** (= *98.2889 km/s/Mpc*). The Nu equation is exponential, and therefore, the expansion of the Earth is not linear but exponential in its increase in size, that is, the rate of continuously compounded expansion **r** w.r.t. time **t.**

9-e-iii. Using the Nu equation, we can also work out the size of the Earth 250 million years ago, or even 1 billion years ago, or for longer or shorter periods.

9-f.   Example-1: What is the increased circumference of the Earth since 250 mn years ago to now:

9-f-i.   The present Circumference of the Earth is as follows:
The mean radius of the Earth = 6371 km.
Therefore, The circumference = $2\pi r$ = 2 x 3.142 x 6371 = **40,035.364 km --(A)**

9-f-ii. The Earth was smaller 250 million years ago (*that is, t = 250 mn years or 0.25 bn years*). We referred to **Table-T-3.2-Annexe** (https://arf-research.com/ arf.pdf). This table gives the calculations of shrinkage of the length of the radius of the Earth up to 100 bn years ago and beyond.

9-f-iii. From ready reckoner, for 250 mn years ago, the length of the Earth's radius = 0.9751835482 of the present radius = 6371 km x 0.9751835482 = 6212.89 km. Therefore, Circumference of the Earth 250 mn years ago = **2πr** = 2 x 3.142 x 6212.89 = **39,041.80 km -- (B)**

9-f-iv. Increase (that is, expansion of the Earth) in the circumference w.r.t. the Earth 250 mn years ago = **2.54 % -- (C)**

9-g. Example-2: Increase in the Earth's Circumference, one bn years ago to now:

9-g-i. To calculate the increase in Circumference from period one bn years ago, we refer to **Table-T-3.2-Annexe** for period **t** = – 1 bn years ago.
The length of the shrunk radius is 0.9043685764 of the present radius
= 6371 km x 0.9043685764 = **5761.73 km.**

9-g-ii. The Circumfrence of the Earth 1 bn years ago was = 2πr
= 2 x 3.142 x 5761.73 = **36,206.71 km** --- **(D)**

9-g-iii. The percentage expansion is 10.58% of the circumference, since one bn years ago --**(E)**.

9-h. How do we calculate the Earth's increase in circumference when the west coast of Africa and the east coast of South America were closest to each other, forming a supercontinent?

9-h-i. We see the World Map and find the city Ponda Nadai in Brazil, located at = 0°03'00" S, 49°23'00" W, on the East coast of South America.-------**(A)**
In Africa, in Gabon (*country*),
we have the Equator west point Africa at 0°00'00" N, 9°20'00" E.-----**(B)**
The total drift between the above two coasts =
(A) - (B) = 58°43'00" **[*49°23'00" W - (–) 9°20'00" E*]**

9-h-ii. How do we calculate 58°43'00" = how much drift in km?
From 9-f-(A) above, we have the present circumference of the Earth = 40,035.364 km. A 360° circumference covers this distance.
Thus, 1° of the circumference of Earth = 111.21 km.
Calculating 58°43'00" = in decimals = 58.717°
Total length of circumference drifted = 58.717° x 111.21 = 6529.92 km.
To find period **t** when the circumference of the Earth was 6529.92 km less.
that is, the Earth's Circumference was (40,035.364) - (6529.92) = 33,505.444 km.

that is, radius r was r = $\dfrac{33505.444}{2\pi}$ = **5331.87 km.**

The shrinkage in Earth's radius is = $\dfrac{5331.87}{6371}$ = 0.8369

From Table T-3.2-Annexe, we find t = 1.75 bn years it took two continents to drift apart = 58.717º x 111.21 = 6529.92 km. (*that is, the two continents from the city Ponda Nadai in Brazil, located at = 0º03'00" S, 49º23'00" W, on the East coast of South America to the city Kobekobe Gabon (country) in West Africa, at 0º00'00", 9º20'00" E.)*

9-j.   Summary and the Conclusion of Tectonic theory and its comparison with the LOU-NUE Law theory:

9-j-i.   The Tectonic Theory states that the movement of the large plates that make up the Earth's crust has changed the face of the Earth over the past 250 million years and that it is continuing the change. The idea of continental drift was the forerunner of the Theory of Plate Tectonics.

9-j-ii.   See Fig. 9.3 above; the shifting of the Tectonic Plates is causing the drift of the continents. If this were true, then it implies that the Earth's total surface area and volume have remained constant and unchanged since its beginning. In the Tectonic Model, the South American continent is afloat on the tectonic plates underneath the Atlantic Ocean like a massive ship-continent, slowly drifting away westward in a clockwise direction. However, on the East side of Africa, the Australian continent appears to drift towards the East in an anticlockwise direction.

9-j-iii.   Fig 9.3 above is an artist's impression and a visual of the Scientist who proposed the Tectonic theory. The graphic shows the position of continents 250 million years ago and their gradual drift to what they appear on world maps today.

9-j-iv.   The NUE Law states that the Earth was smaller in the beginning, and its radius, circumference, and surface area increased over a period of time, **t** as per the Nu Constant. That means all these continents, seas, and oceans existed initially but in a highly compact form. As in Fig. 9.8

below, when the Earth expanded with time, all the continents expanded in size proportionately, and so did the seas, oceans, and freshwater lakes. An example of a balloon with dots is given in Fig. 9.7 below. when the balloon expands, the dots and the distance between the dots also increase.
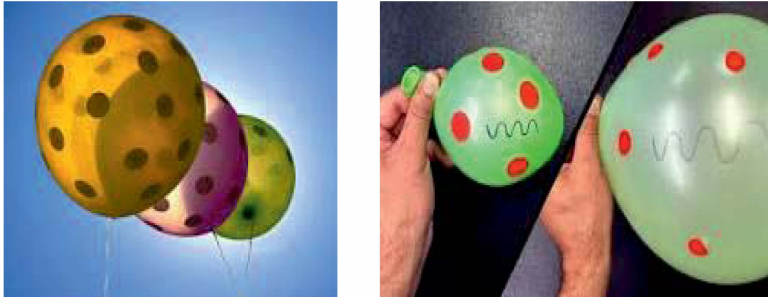
Fig-9.7: *The expanding balloon is a related example. When the balloon enlarges, the dots on it also enlarge; as dots, the distance bet. them.*

9-j-v.   The expansion of the Earth, as mentioned in 9-j-iv, also causes the land area to increase proportionately along with seas, oceans, and freshwater lakes, keeping the density of ocean water and freshwater lakes as a fixed constant, that is, at the rate of 1.035 grams/cc for seas/ocean water and freshwater at the rate of 1 grams/cc.

Fig-9.8: *When Earth was small, it was compact, where all continents were closer and had a proportionately smaller surface area. As the Earth expands with time and as per the Nu Constant, the surface area enlarges, and the continents and the seas increase proportionately.*

9-k. The following questions and queries need to be answered by the supporters of the Tectonic theory.

9-k-i. How are the widening gaps between the Tectonic plates causing the drifting of continents to fill up and close underneath the Earth's surface?

9-k-ii. Are Tectonic Plates stretching like elastic bands or like plastics, or are they on rigid rocks on which they glide?

9-k-iii. What is causing the slow and gradual mobility of the Tectonic plates? The surface underneath the mantle supports the mobility; what friction is being countered for shifting plates? It implies that the Earth's rocky mobile layer, a source of earthquakes and volcanoes, could get unstable and cause level differences, causing a challenge to the stability of the Continents fastened to it.

9-k-iv. Is the drift only longitudinal, or is it also latitudinal? The Theory does not provide a uniform drifting rate in all directions. No such land masses visible in a latitudinal direction drifted in the jigsaw puzzle shape, like the one we see between the African and American continents.

9-k-v. The Tectonic Theory states that all the continents were together as a giant land mass known as Pangaea. What was before 250 mn years ago is not stated in the theory, nor is the reason why the continents Started drifting apart only about 250 million years ago, whereas the Earth is 4.5 bn years old.

9-k-vi. A comparative study of the Plate Tectonic Theory and LOU-NUE Law Earth's expansion theory.

Table T-9.1:

Sr. No.	Particulars	Plate Tectonic Theory	LOU-NUE's LAW and the Expansion Theory
1	Earth Expansion	No Expansion	Yes, the Universe is expanding, and Earth, being an integral part of it, is also expanding proportionately. The Earth was smaller in the past and has become its present size due to its radial expansion, given by the NUE Law and the Nu Constant. For calculations, see para 9-f, g & h.
2	Calculation of Rate of Expansion	No drifting rate can be calculated, nor can the direction of the drifting continents. The drift on the present World map is observational only. In an attempt to give technical reasons to justify the observations, a theory is created to explain the drift with an imaginary Tectonic plate hypothesis resting on the Earth's mantle, on which the continents are placed and happen to drift at random rates and directions.	The expansion rate can be calculated and predicted using the Nu constant. It causes radial expansion on a continuously compounded rate w.r.t. time t. The decrease in radius for the past period t also gives us the reduced circumference, volume, and mass of planet Earth. See the example in para 9-f & 9-g above. The expansion takes place in all directions and places in latitudes and logitudes.

Sr. No.	Particulars	Plate Tectonic Theory	LOU-NUE's LAW and the Expansion Theory
3	**Size of Earth**	The Tectonic theory considers the Earth's spherical size (*radius of Earth*) to be the same as in the past 250 million years ago or when the Earth was created, 4.5 billion years ago.	According to the LOU-NUE Expansion Theory, the Earth's size has increased with time. It was smaller in the past 250 million years ago and much smaller when created 4.5 billion years ago, which has expanded to its present size, with a the mean radius of 6371 km. See fig. 9.8 above.
4	**How is expansion happening?**	According to the Tectonic Theory, the seas, oceans, and Continents are constant and have remained the same size, whereas the continents drift like a ship in the seas without an anchor, displacing the seas and oceans it passes through. The drifting is random because it is clockwise (*Africa-America drift*) and anticlockwise (*Africa-Australia drift*). The size of the continents (*that is, their surface area*) does not change, but they happen to glide away on Tectonic plates.	According to LOU-NUE LAW, the Continents and the Seas/Oceans are increasing in size and area with time at the rate Nu Constant. Hence, the continents are enlarged in their surface area, increasing the distance between different continents. The increased surface area of the Earth also increases the size of the seas, oceans and the continents proportionately. Therefore, in Tectonic Theory, what is considered to be the continent's drifting, is in reality, a progressive time based expansion of the Earth. See Fig-9.8 above.

9-l. Is there any proof of how the Earth is physically expanding?

9-l-i. The increase in the radius of the Earth at the rate of Nu Constant is causing the Earth's expansion in its surface area, volume, and mass, maintaining Earth's density as a fixed constant.

9-l-ii. The expansion is observed through multiple sources, such as earthquakes, volcanoes, and Landslides (*when a mountain's surface area at a particular place widens, causing loose Earth matter and stones to fall off their verticle and roll down as landslides*). Earth's surface shows cracks and wide gaps (*on the road and land areas*) where wide gaps of several centimetres are seen regularly at different places in a region to sustain the overall shape of the Earth in its spherical form. *See Fig 9.9 below.*

Fig. 9.9: The wide gaps caused by tearing apart roads, floors of the houses, etc.

9-l-iii. Earthquakes, Volcanoes, and landslides occur globally per annum at various places all over the Earth's surface, indicating Earth's expansion.

    1. Earthquakes: The National Earthquake Information Center[58] now locates about 20,000 earthquakes around the globe each year, or approximately 55 per day.

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[58] USGS (.gov) https://www.usgs.gov › faqs › why-are-we-having-so-ma...

2. **Volcanoes:** There are more than 1500 active volcanoes on Earth[59]. Around 50–70 volcanoes erupt every year.
3. **Landslides:** The average annual number of significant earthquake-triggered landslides is around **1,30,000.**

Fig 9.10-A, B & C: *When mountains expand there is an Earthquake like tremour, widening the expansion gap. This tremour-widening losens the mountain soil and those which fall off the vertical slide down with force of gravity carrying massive boulders, roll down with momentum and carrying with its force, the trees and another matters, imapcted by the rolling down of the boulders.*

9-l-iv.   Expansion indicators:

A recent glacier burst in Uttarakhand (India) was a huge disaster that killed 26 persons at least. These happen due to the Earth's expansion, where the water went up and flew down like it happens in a flush tank. Wide cracks indicate that the Earth is expanding in those places. It could also happen under the water in lakes, seas and oceans, but it cannot be felt because the water gets absorbed into the cracks. Still, the water surface looks uniformly the same, as if nothing has happened except causing rough seas, ocean turbulence, rogue waves, monster waves, high surging tides and waves. *See Fig. 9.11 below.*

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[59] BGS - British Geological Survey https://www.bgs.ac.uk › ... › Earth hazards

Fig: 9.11: The observed gaps in the Earth's surface can only be caused by the lateral expansion of the Earth's surface in a particular region.

9-l-v. The proof of Earth's expansion calculated from the slowing down of the Earth's rotation period:

We checked on the NASA website[60], which states that the Earth has slowed by 47/1000 seconds (**0.047 s**) in 3,200 years. The method used to determine this is the eclipses scribbled on the oxen's shoulder in the Chinese town, which shows the eclipses in those years 1226 B.C., 1198 B.C., 1172 B.C., 1163 B.C. and 1161 B.C. The value of 0.047 seconds arrived at is very approximate because the accuracy of the scribbled data is a big question mark. Calculating such a precise micro-figure of 0.047 seconds, the difference in seconds requires accurate clocks like atomic clocks to measure it.

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[60] https://www.jpl.nasa.gov/news/earths-rotation-slows-down

9-l-vi. The ARF[61] calculations and comments:

The Scientists at ARF have calculated this difference mathematically based on the LOU-NUE Law and the compounded rate of continuous expansion of the Earth since 3200 years ago. The calculations are as follows:

1. The present Equitorial radius of the Earth = 6378.137 km, the Earth's rotational velocity = V = 1674 km/h, = The rotation period **T** = 23 h 56m 34.006254 sec (= *23.942779515 hours*) --------------------------------------**(A)**

2. To know the shrinkage of the radius 3200 years ago, we refer to Table-T-3.2-Annexe. The shrinkage is 0.9999996783. Therefore, the radius 3200 years ago was 6378.137 x 0.9999996783 = 6378.1349482 Therefore,

   the period of rotation T $= \dfrac{2\pi r}{V*} = \dfrac{2 \times 3.142 \times 6378.1349482}{1674} =$

   23.942771813 --**(B)**

   According to NUE Law the ratios remains constant in an expanding Universe

3. The difference in rotation time between the present and the period 3200 years ago is (A) - (B) = (*23.942779515 hours*) - (*23.942771813 hours*) = **0.0277 sec.** --- **(C)**

   Thus, the quantum of Earth's rotation slowdown is 0.0277 sec in

   3200 years or $= \dfrac{0.0277}{3200} =$ **8.656 μ.s/yr.** --------------------------------- **(D)**

9-l-vii. Why is the quantum of slowdown calculated in 9-l-vi, above, more accurate than the one determined by NASA scientists at 47/1000 s/3200 yrs.

Ans: The slowing down of Earth's rotation in 3200 years = 0.0277 s = or = 8.656 μ.s/yr is most accurate because it is mathematically calculated and derived from the NUE Law and Nu constant. The Nu Constant is derived from the Earth-Moon recession at the rate 3.8 cm/yr/3,78000 km. This is the most accurately measured data by the laser ranging system by NASA.

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[61] ARF:- Astrogenesis Research Foundation which is conducting the Research and Study of the Cosmos.

9-l-viii. How is the Earth's rotational slowdown related to its expansion?

When we say the rotation of the Earth is slowing down, **it implies that the period of rotation (T) is increasing at the rate 8.656 µ.s/yr** as in para 9-l-vi.(D) above. -- **(E)**

We have the formula= $V = \frac{2.\pi.r}{T}$ where V is the velocity of the Earth's rotation, r is the radius of the Earth, and T is the period of rotation.

Since V, the velocity of rotation is a ratio, as per the NUE Law, the ratios are constant; hence, the velocity of Earth's rotation is always a fixed constant at any point in time, in the past, present or future.

We have $V = \frac{2.\pi.r}{T}$ or $T = \frac{2.\pi.r}{V}$ or $\Delta T = \Delta r \frac{2.\pi}{V}$ ------------------------------ **(F)**

Thus, $T \propto r$. and $= \Delta T \propto \Delta r$

Therefore, when T increases to T + ΔT, the radius of the Earth r = r + Δr, that is the radius of the Earth also increases proportionately.

When the Earth's radius increases, it triggers an increase in all its dimensions: its circumference, surface area, volume, and mass, all of which increase proportionately at the Earth's constant density.

9-l-ix. Conclusion:

When the Earth's rotation slows, its radius increases proportionately.

9-l-x. How much is the increase in the radius per year of the Earth when the Earth's rotation slows down at the rate 8.656 µ.s/yr?

The velocity of Earth's Rotation* = 1674 km/hr.Cos(θ), where θ is the latitude of the Earth. At the equator, θ = 0, hence Cos(θ) = 1. Hence the velocity of rotation of the Earth at equator **= 1674 km/hr** = 0.465km/s = **0.465×10^6 mm/s** --- **(G)**

*Data taken from NASA website: https://eclipse2017.nasa.gov/shadow-speed-and-earths-rotation

From (E) above, we have the following:-

$$\Delta r = \frac{\Delta T.V}{2.\pi} = \frac{8.656 \times 10^{-6} s \times 0.465 \times 10^6 mm/s}{2.\pi} = 0.64 \text{ mm} = \Delta r.$$

Thus, Δr = 0.64 mm. --- **(H)**

From (E) and (H) above, we have ΔT = 8.656 µ.s/yr,

Thus, Δr = 0.64 mm/yr. --- **(J)**

(J) exactly tallies Δr = 0.64 mm/yr. Δr is calculated from the laser ranging system of Earth-Moon recession at the rate 3.8 cm/yr/ 3,78,000 km giving the Earth's radial expansion = Δr = 0.64 mm/yr.

9-l-xi. **From the NASA website, we learn that the Earth's rotation is slowing down because of the lunar tidal friction. But what has the 'LOU-NUE Law' to say about it?**

9-l-xi-1. Authentic websites like NASA* mention that Earth's rotation has been slowing mainly due to lunar tidal friction, in which the moon's gravitational effect on the Earth's oceans pulls water away from the poles.

9-l-xi-2. *NASA reports that When Earth was formed 4.6 billion years ago, its day would have been roughly six hours long. By 620 million years ago, this had increased to 21.9 hours. Today, the average day is 24 hours long but is increasing by about 1.7 milliseconds every century.
*https://climate.nasa.gov/news/2469/10-interesting-things-about-earth

9-l-xi-3. However, The NUE Law causes the Earth to increase at the rate 0.64 mm/yr radially. This results in the slowing down of the Earth's rotation period T. that is, the increase of T to (T+ΔT) is because of the increase in the radius of the Earth from = r to (r +Δr).

Conclusion:
From 9-l-xi-3 we conclude that the Earth's slowing down is because of the Earth's radial increase by Δr/yr because of the NUE Law. Therefore, there is no need to hypothesise lunar tidal friction as a reason for the Earth's slowing down.

9-l-xii. **Can we calculate the Earth's expansion directly from Nu Constant?**
The Earth's mean radius is 6371 km.
Nu Constant is 98.2889 km/s/Mpc or 3.8cm/year/3,78,000 km.

Thus, for 6371 km, the Earth's expansion is = $\dfrac{6371\ km \times 3.8\ cm}{3,78,000\ km}$ = 0.064 cm / year = **0.64 mm/year.** --- **(K)**

Conclusion:

From (H) and (K) above, we find Earth's expansion calculated from Earth's slowing down, and from the Nu Constant, it is the same.

9-m. How does it prove that the LOU-NUE's Expansion Theory is correct, authentic, indisputable and overrides the Tectonic Theory?

9-m-i. NASA's mentioning in 9-l-xi above that the day was longer in the beginning as of the present period also proves that the radius of Earth at that time was much smaller as compared to the present size of the Earth radius = 6371 km

9-m-ii. **NASA's report that the Earth's rotation is slowing down also substantiates that the NUE Law and the Earth's Expansion Theory are correct. This contrasts with the Tectonic theory, which states that the Earth's size has remained unchanged, and the drifting of the continents is due to the Tectonic Theory.**

Table T-9.2: The Table below shows that the Earth is slowing down with time, so the number of days per year will increase. It will increase to 370 days after 70 million years and 486 days in 900 million years*.

Conversely, in para 9-l-xi, NASA reports that When Earth was formed 4.6 billion years ago, its day would have been roughly six hours long. By 620 million years ago, this had increased to 21.9 hours. Today, the average day is 24 hours long but is increasing by about 1.7 milliseconds every century**.

*data taken from NASA website: https://spacemath.gsfc.nasa.gov/Grade35/6Page58.pdf

Age of Earth (*in years*)	Days per year
0	365
70 million	370
220 million	372
290 million	383
340 million	398
380 million	399
395 million	405
410 million	410
430 million	413
440 million	421
510 million	424
900 million	486

(NB: 1.7 milliseconds/century = 17×10^{-6} s/yr = 0.0544 s/3200 years. The other NASA website has given 0.047 s/3200 years.

This implies that NASA's websites give different data because these are based on some ancient observations of the eclipse and their scribblings. For details, see para 9-l-v above.)

9-n.   Conclusion:

The LOU-NUE Expansion Theory proves that it overrides the Tectonic Theory:

9-n-i.   The NUE Law presents a smaller Earth when it was formed and gradually expanded to what it is today. The Earth's size will keep increasing with time.

9-n-ii   The Earth's smaller size is also inferred from its rotation slowing down as time passes. This implies that in the past, the day was shorter than it is today and that it will be longer in a few million years, as mentioned in Table T-9.2 above. The NASA website and its reporting in 9-l-xi above also support this.

Acronyms:

ARF = Astrogenesis Research Foundation

NUE = Natural Universe Expansion

H_O = Hubble's Constant

R_{C-C} = Radial distance Centre to Centre

R_{S-S} = Radial distance Surface to Surface

r_S = Radius of Sun

r_E = Radius of Earth

r_M = Radius of Moon

m_S = Mass of Sun

m_E = Mass of Earth

m_M = Mass of Moon

LOU = Living Organic Universe

LCDM = Lambda Cold Dark Matter

EM spectrum = Electromagnetic Spectrum

SS = Steady State Theory

BB = Big Bang Theory

QSSC = Quasi Steady State Cosmology

CMBR = Cosmic Microwave Background Radiation

HR diagram = Hertzsprung–Russell diagram

CBs = Celestial Bodies

V' = V' is a modified velocity given by Nu Constant and not a derivative of velocity.

D' = D' = D.er.t and not a derivative of distance D.

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"NATURAL UNIVERSE EXPANSION" (NUE)

The Revolutionary Theory That Challenges Hubble's Law.

Presenting New Model Of The "LIVING ORGANIC UNIVERSE" And Its Dynamics.

A significant flaw of Hubble's Law is determining the Universe's fixed age of 14.86 billion years, which is incorrect for the dynamic ageing Universe. The research introduces the Law of Natural Universal Expansion (NUE) as a solution to its flaws. The NUE Law is a mathematical framework to resolve these inconsistencies.

The NUE Law presents a comprehensive and accurate model for understanding the Universe's expansion. It addresses the shortcomings of Hubble's Law and challenges the reliance on dark energy concepts. The NUE Law is a practical alternative to current Cosmological models, offering a more dynamic view of the Universe's continuous expansion and acceleration in deep space.

One of the most significant discoveries of this research study is that the Universe CMBR is equivalent to that of the human body's emission, and it helps evolve the "Living Organic Universe" (LOU) Model System.

By introducing the Living Organic Universe (LOU) Model and the NUE Law, the research resolves most of the ambiguities and flaws of the Big Bang theory, the Steady State Theory, dark matter, dark energy, and others.

The NUE Law and the Universe expansion helps supersede the Tectonic Plate Theory,

Cosmologists, Astrophysics, Space Scientists, Astronomers, Space explorers, Research Institutions, and persons interested in knowing the realms of the Universe will find this research a fascinating study in analysing the content in further verifying the proposed theory and their explanations.