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PROCESS THE FORMATION OF PLANET EARTH AND THE FORMATION OF THE SOLAR SYSTEM. ONE POSSIBILITY OF THE THRESHOLD THE EXISTENCE OF EXTRATERRESTRIAL LIFE REPRESENTS AN INCREASE IN THE DRAKE EQUATION.

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SUMMARY:

The objective of the article The goal is to conduct a study of the formation of planet Earth and the Solar System, for example, Kepler's laws and the Theory of General Relativity in the rotation and revolution of the planets and planet Earth, according to the angular momentum, center of mass, and center of gravity of the Solar System, as well as addressing, as an additional step, the threshold of existence of extraterrestrial life according to the thesis in the book "The First Three Minutes of the Universe". Steven Weinberg, in 1977, based his theory on the position of the Milky Way and the Solar System within it and the Universe, generating the hypothesis of the Threshold of Extraterrestrial Life. bacterial or more evolved than humans.

INTRODUCTION

This article aims to raise the question of the formation of the Earth and the planets. The Solar System, as a process of Earth's Magma and the Chemical Elements of the Planets in the process of their Rotation and Translation in the Solar System, as Isaac Newton deduced the Law of Universal Gravitation from Kepler's Laws, considering the existence of the Theory of General Relativity and the Graviton Particle of Quantum Mechanics, knowing that much must be discussed with the Theory of General Relativity and the Graviton Particle of Quantum Mechanics to define WHAT GRAVITY REALLY IS AND THE VERACITY OF THE THEORY OF GENERAL RELATIVITY,

as described in a brief presentation in the article referenced in [11], The possibility of analyzing the Conceptual Physics of the Truth or Falsity of the Theory of General Relativity in Conceptual Conceptions of Physics and Astrophysics, from a Philosophical or Theoretical

Mathematical Calculation point of view. According to the formation of Planet Earth and the Solar System, there is an increase in the Drake Equation, as the probability of EXTRATERRESTRIAL LIFE rises, raising the hypothesis of A THRESHOLD OF LIFE OUTSIDE OF EARTH, with the conditions of Angular Momentum, Center of Mass and Center of Gravity of the Solar System and the Milky Way, according to the Probability that can be analyzed with the Thesis in Steven Weinberg's Book in [9] The First Three Minutes of the Universe of 1977, in consideration of the ENTROPY OF THE UNIVERSE and the COSMIC BACKGROUND RADIATION OF THE UNIVERSE. This threshold

would be the possibility of analyzing the COLOR SPECTRUM of the OPTICAL PYROMETER of the NUCLEAR REACTIONS of STARS as in [12] An Introduction to Article Oppenheimer's going on The Massive Neutron Star Cores, and the Antichrist's Manipulation in History such as the Manipulation of Religions, Fables and Mythology, a brief introduction. In reproduction of explosions of Neutron Stars that generalize to other Stars, such as NUCLEAR FUSION reactions, of the SUN, concomitantly, with KEPLER'S LAWS on rotational and translational motion of Earth and the Planets and the Sun which culminated in Isaac Newton's Law of Universal Gravitation, with the conditions of the graviton particle from quantum mechanics and the theory of general relativity in the distortion of spacetime. Considering also the debris of dead stars in the fabric of spacetime, a condition to be considered in interstellar travel or cosmic probes, this debris... of stars ACCORDING TO Steven Weinberg's theory, like the inflation of the UNIVERSE, as well as the ENTROPY OF UNIVERSE, they would be abundant in the Universe according to the consideration from the beginning of THE SINGULARITY OF THE BIG BANG, raised in this article, like bacterial life or more evolved than human life.

This article aims to provide a philosophical approach to the conditions of the Theoretical Physics of the Formation of the Solar System and Planet Earth, enabling the construction of a didactic Epistemological Model for observations of... Current astronomical data, such as the optical pyrometer color spectrum, for example, are used in the analysis of stars, such as neutron stars, etc. as an example the heliocentric theory of Nicolaus Copernicus is one of the most famous examples used by Thomas Kuhn to illustrate the concept of a **paradigm shift**, as described in Kuhn's influential book The Structure of Scientific Revolutions.

Copernicus' Theory[3]

Before Copernicus, the dominant astronomical model was the **Ptolemaic system**, developed by Claudius Ptolemy. This model held that:

- Earth was stationary at the center of the universe (geocentrism).
- The Sun, Moon, planets, and stars revolved around Earth.
- Complex systems of epicycles were used to explain planetary motions.

In 1543, Copernicus published *De revolutionibus orbium coelestium* ("On the Revolutions of the Heavenly Spheres"), proposing that:

- The Sun is approximately at the center of the planetary system.
- Earth rotates daily on its axis.
- Earth and the other planets orbit the Sun.
- The apparent retrograde motion of planets results naturally from Earth's motion rather than requiring epicycles.

Although the Copernican model initially did not produce dramatically more accurate predictions than the Ptolemaic system, it offered a simpler and more coherent explanation of planetary motions.

Kuhn's Concept of a Paradigm

According to Kuhn, a **paradigm** is a framework shared by a scientific community that includes:

- Fundamental assumptions.
- Accepted theories.
- Experimental methods.
- Standards for solving scientific problems.

Scientists usually work within a paradigm, engaging in what Kuhn called **normal science**, solving puzzles rather than questioning the framework itself.

Why the Copernican Revolution Is a Paradigm Shift

Kuhn argued that science does not always progress gradually. Instead, periods of normal science are interrupted by scientific revolutions when accumulated anomalies undermine the existing paradigm.

The Copernican Revolution illustrates this process:

1. **Normal science:** Astronomers refined the Ptolemaic geocentric model.
2. **Anomalies:** Increasing observational difficulties required ever more complicated epicycles.
3. **New paradigm:** Copernicus proposed heliocentrism, fundamentally changing astronomy.
4. **Resistance:** Many scholars rejected heliocentrism because it conflicted with accepted

science, philosophy, and religious beliefs.

5. Scientific revolution: Observations by Galileo Galilei, the laws of planetary motion developed by Johannes Kepler, and the theory of universal gravitation formulated by Isaac Newton eventually established the heliocentric paradigm.

Characteristics of the Paradigm Shift

Ptolemaic Paradigm

Earth at the center

Earth stationary

Retrograde motion explained by epicycles
Increasing mathematical complexity

Copernican Paradigm

Sun near the center of the planetary system

Earth rotates and revolves around the Sun

Retrograde motion explained by Earth's relative motion
Simpler conceptual framework

Kuhn's Interpretation[3]

For Kuhn, the Copernican Revolution demonstrates that scientific change is not merely the accumulation of new facts. Instead, it involves a transformation in the conceptual framework through which scientists interpret observations.

The evidence itself did not immediately compel acceptance of heliocentrism. Rather, the scientific community gradually adopted a new way of understanding the cosmos because the heliocentric paradigm ultimately proved more fruitful for explaining observations and guiding future research.

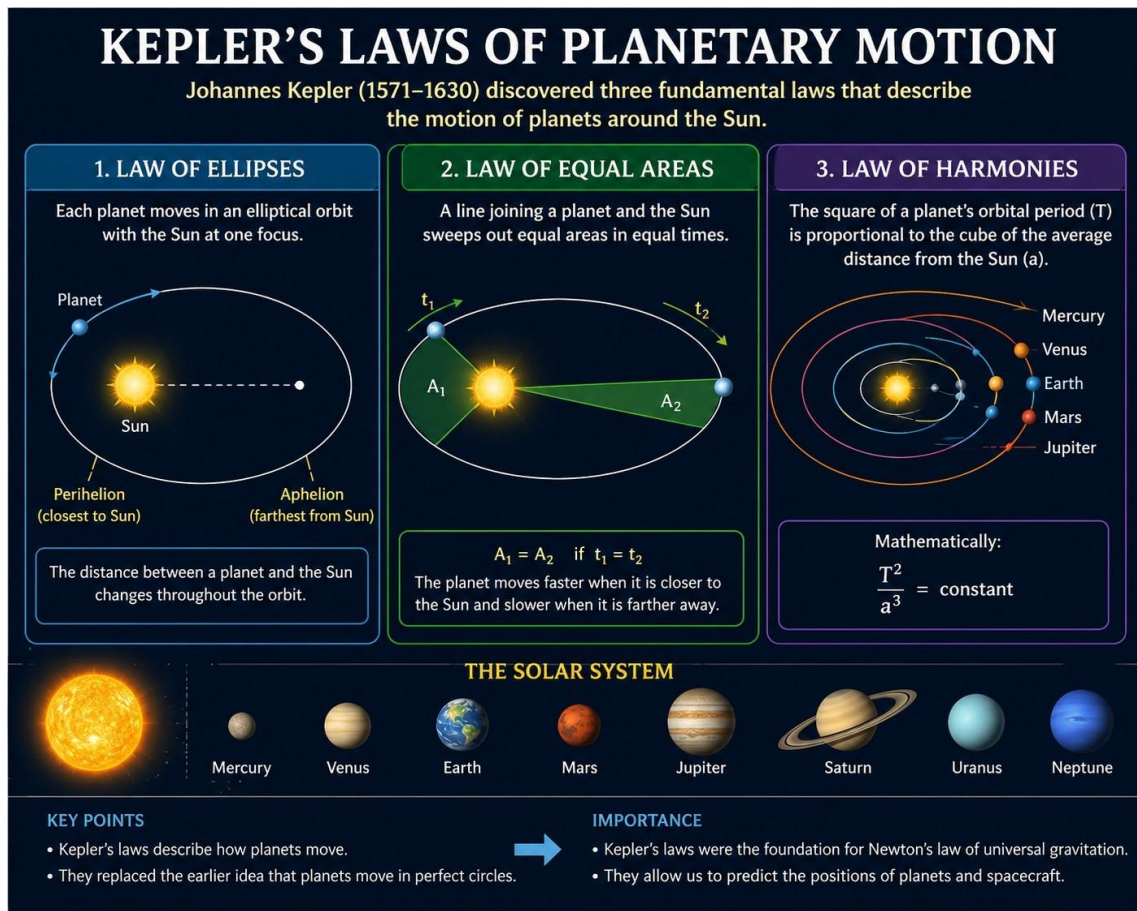
Conclusion

The Copernican Revolution is regarded as a classic example of Kuhn's theory of scientific revolutions. It illustrates how science advances through the replacement of one dominant paradigm by another, fundamentally changing how scientists understand nature. Rather than representing a simple correction of earlier ideas, the shift from geocentrism to heliocentrism transformed the basic assumptions, methods, and worldview of astronomy, becoming one of the clearest historical examples of a Kuhnian paradigm shift.

Theoretical Framework[1][2][4][5][6][7]:

Kepler's Laws and the Solar System

The **laws of planetary motion**, formulated by Johannes Kepler between 1609 and 1619, describe how planets move around the Sun. They were based on precise astronomical observations made by Tycho Brahe and later provided a foundation for Isaac Newton's theory of universal gravitation.



The Solar System

The Solar System consists of:

- The Sun, containing about **99.86%** of the system's total mass.
- Eight planets:
- Mercury
- Venus
- Earth
- Mars
- Jupiter
- Saturn
- Uranus
- Neptune
- Dwarf planets (such as Pluto).
- Natural satellites (moons).
- Asteroids.
- Comets.

- Meteoroids.
- Interplanetary dust and gas.

The Sun's gravity keeps all these objects in orbit.

Kepler's First Law: Law of Ellipses

Every planet moves in an **elliptical orbit**, with the **Sun located at one of the two foci** of the ellipse.

An ellipse differs from a circle because the distance between the planet and the Sun changes throughout the orbit.

Important terms:

- **Perihelion:** the point where a planet is closest to the Sun.
- **Aphelion:** the point where a planet is farthest from the Sun.

For example, Earth's orbit is nearly circular but is actually a slight ellipse.

Kepler's Second Law: Law of Equal Areas

A line joining a planet and the Sun sweeps out **equal areas during equal intervals of time**.

This means:

- A planet moves **faster** when it is near perihelion.
- A planet moves **slower** when it is near aphelion.

The planet's speed changes continuously so that equal areas are covered in equal times.

Kepler's Third Law: Harmonic Law

The square of a planet's orbital period is proportional to the cube of its average distance from the Sun.

Mathematically,

$$T^2 \propto a^3$$

or

$$\frac{T^2}{a^3} = \text{constant}$$

where:

- (T) = orbital period
- (a) = semi-major axis of the ellipse For planets orbiting the Sun, if:

- (T) is measured in years,
- (a) is measured in astronomical units (AU),

then

$$T^2 = a^3$$

Examples

Planet	Distance (AU)	Period (years)
Mercury	0.39	0.24
Venus	0.72	0.62
Earth	1.00	1.00
Mars	1.52	1.88
Jupiter	5.20	11.86
Saturn	9.58	29.46
Uranus	19.2	84.0
Neptune	30.1	164.8

These values closely satisfy Kepler's third law.

Newton's Explanation

Kepler described **how** planets move but did not explain **why**.

Newton showed that Kepler's laws follow naturally from the law of universal gravitation:

$$F = G \frac{Mm}{r^2}$$

Where:

- (F) = gravitational force,
- (G) = gravitational constant,
- (M) = mass of the Sun,
- (m) = mass of the planet,
- (r) = distance between their centers.

Gravity provides the centripetal force that keeps planets in elliptical orbits.

Importance

Kepler's laws:

- Demonstrated that planetary orbits are elliptical rather than perfectly circular.
- Replaced earlier geocentric and circular-orbit models with a more accurate description

of planetary motion.

- Formed the basis of celestial mechanics.
- Helped lead to Newton's law of gravitation.
- Continue to be used for calculating the motion of planets, moons, asteroids, comets, and artificial satellites.

Together, Kepler's laws and Newton's theory provide the classical description of the motions of objects throughout the Solar System.

Earth's Rotation, Revolution, Equinoxes, Solstices, and the Seasons

The **Earth's rotation** and **revolution (translation)** together with the **23.44° tilt of Earth's rotational axis**, produce the cycle of **day and night** ~~these seasons~~ ~~the equinoxes~~ and ~~the solstices~~.

1. Earth's Rotation

Rotation is the spinning of Earth about its own axis.

- Rotation period:
- **23 hours, 56 minutes, 4 seconds**(sidereal day)
- Approximately **24 hours**(solar day)
- Direction:
- **West to east**
- Angular velocity:
- Approximately **15° per hour**

Effects of Rotation

- Day and night
- Apparent daily motion of the Sun, Moon, and stars
- Time zones
- Coriolis effect (influences winds and ocean currents)
- Slight equatorial bulge due to centrifugal force

2. Earth's Revolution (Translation)

Earth revolves around the Sun in an **elliptical orbit**.

Main characteristics:

- Orbital period:
- **365.2422 days**

- Average distance from the Sun:
- **149.6 million km² (1 AU)**
- Average orbital speed:
- **29.78 km/s**
- Orbit:
- Elliptical, following Johannes Kepler's First Law. Earth reaches:
- **Perihelion**(closest to the Sun): early January
- **Aphelion**(farthest from the Sun): early July

The difference in distance is only about **3%** so it is **not** the primary cause of the seasons.

3. Earth's Axial Tilt

The Earth's axis is tilted by approximately **23.44°** relative to the plane of its orbit around the Sun.

This tilt remains nearly constant in direction throughout the year, always pointing approximately toward the Polaris.

The axial tilt is the **main cause of the seasons**.

4. The Seasons

As Earth revolves around the Sun, each hemisphere receives different amounts of solar energy.

Northern Hemisphere

- Spring
- Summer
- Autumn (Fall)
- Winter

Southern Hemisphere

The seasons occur at the opposite times:

- Northern summer = Southern winter
 - Northern winter = Southern summer
- The seasons result from:
- Changing Sun angle
 - Changing length of daylight
 - Changing intensity of solar radiation

5. Equinoxes

During an **equinox**, Earth's axis is not tilted toward or away from the Sun.

Characteristics:

- Nearly equal day and night (about 12 hours each)
- Sun is directly above the Equator There are two equinoxes each year:

March Equinox

Around **March 20–21**

- Northern Hemisphere: Spring begins
- Southern Hemisphere: Autumn begins

September Equinox

Around **September 22–23**

- Northern Hemisphere: Autumn begins
- Southern Hemisphere: Spring begins

6. Solstices

THE **solstice** occurs when Earth's axis is tilted most toward or away from the Sun.

June Solstice

Around **June 20–21**

Northern Hemisphere:

- Summer begins
- Longest day
- Highest noon Sun Southern Hemisphere:
- Winter begins
- Shortest day

December Solstice

Around **December 21–22**

Northern Hemisphere:

- Winter begins
- Shortest day Southern Hemisphere:
- Summer begins
- Longest day

7. Annual Cycle

Event	Approximate Date	Northern Hemisphere	Southern Hemisphere
March Equinox	March 20–21	Spring begins	Autumn begins
June Solstice	June 20–21	Summer begins	Winter begins
September Equinox	September 22–23	Autumn begins	Spring begins
December Solstice	December 21–22	Winter begins	Summer begins

8. Why the Seasons Occur

The seasons are **not** caused by Earth's varying distance from the Sun.

Instead, they result from:

1. Earth's **23.44° axial tilt**.
2. Earth's **annual revolution** around the Sun.
3. The changing angle at which sunlight strikes Earth's surface.
4. The changing duration of daylight throughout the year. During summer in a hemisphere:
 - The Sun appears higher in the sky.
 - Sunlight is more direct.
 - The days are longer.
 - More solar energy reaches the surface. During winter:
 - The Sun appears lower in the sky.
 - Sunlight arrives at a shallower angle.
 - Days are shorter.
 - Less solar energy reaches the surface.

Summary

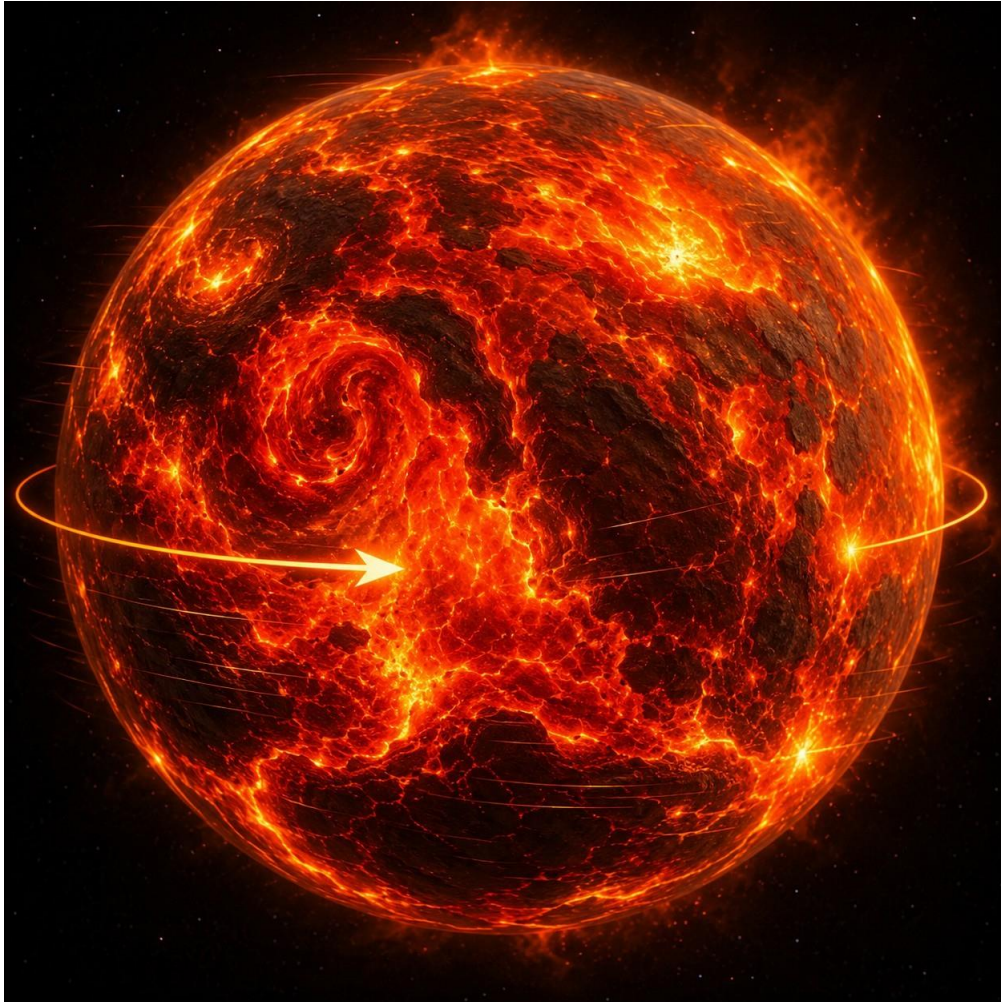
Motion/Event	Period	Main Effect
Rotation	~24 hours	Day and night
Revolution	365.2422 days	Annual orbit around the Sun
Axial Tilt	23.44°	Causes the seasons
Equinoxes	Twice per year	Nearly equal day and night
Solstices	Twice per year	Longest and shortest days

Together, Earth's **rotation**, **revolution** and **axial tilt** explain the daily cycle of daylight and darkness as well as the yearly progression of the seasons, equinoxes, and solstices.

Formation of Molecules, Hydrocarbons, and Earth's Magma in the Early Earth

The Earth formed about **4.54 billion years ago** from the gas and dust of the **solar nebula**.

During its earliest history, the planet was extremely hot, covered by a global or near-global **magma ocean**, and underwent major chemical and geological changes that led to the formation of rocks, oceans, and the first organic molecules.



Earth Before

1. Formation of the Earth

The process began when gravity caused dust and gas in the solar nebula to collide and stick together.

The stages were:

1. Dust grains condensed from the solar nebula.
2. Dust particles formed kilometer-sized planetesimals.
3. Planetesimals collided to form planetary embryos.
4. Continuous impacts produced the young Earth.
5. The energy of impacts, radioactive decay, and gravitational compression melted much of

the planet.

This created a **magma ocean** extending hundreds of kilometers deep.

2. The Magma Ocean

The early Earth was largely molten.

The magma consisted mainly of silicate minerals rich in:

- Oxygen (O)
- Silicon (Si)
- Magnesium (Mg)
- Iron (Fe)
- Aluminum (Al)
- Calcium (Ca)

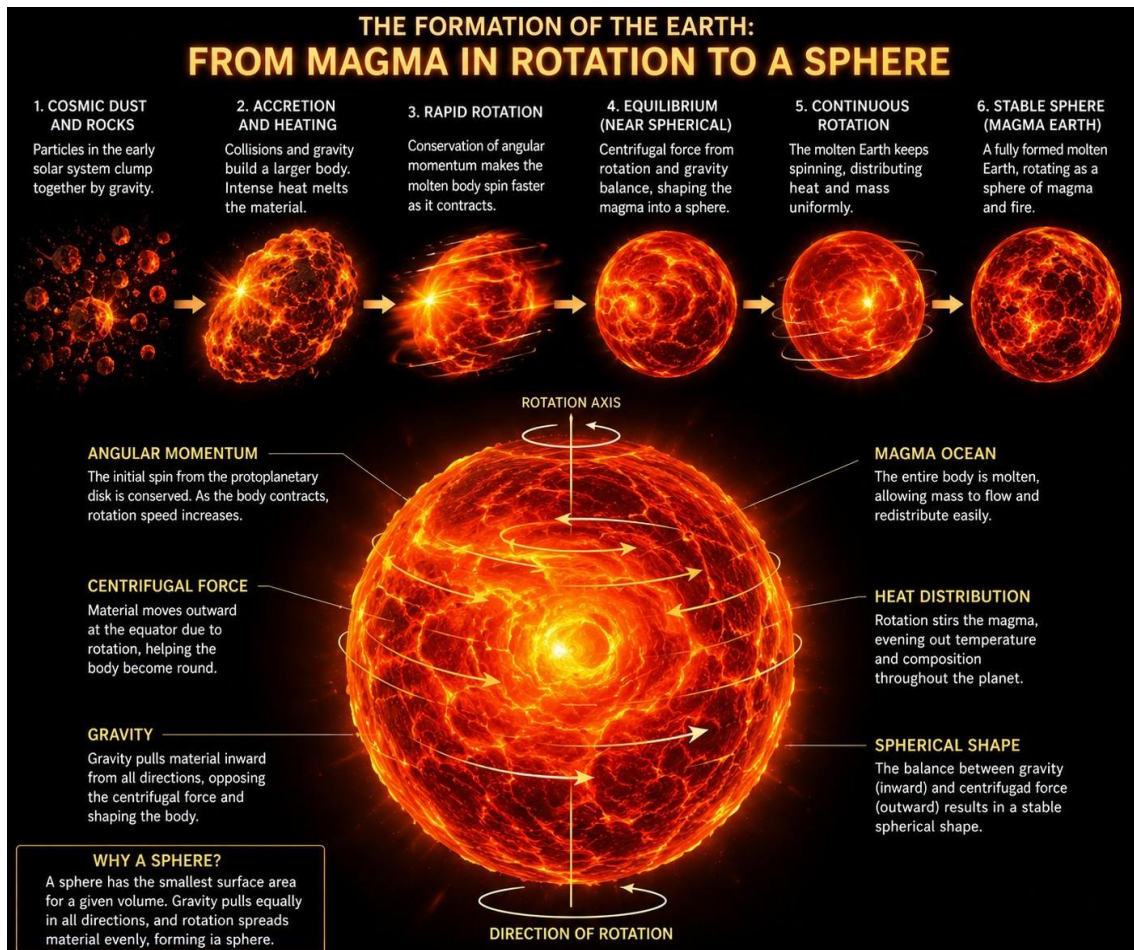
As the magma slowly cooled:

- Heavy iron and nickel sank to form Earth's core.
- Lighter silicate rocks formed the mantle.
- The first crust solidified at the surface.

This process is known as **planetary differentiation**.

3. Formation of the Primitive Atmosphere

Volcanic eruptions released gases trapped inside the mantle, a process called **volcanic outgassing**.



The early atmosphere likely contained:

- Water vapor (H_2O)
- Carbon dioxide (CO_2)
- Nitrogen (N_2)
- Hydrogen (H_2)
- Carbon monoxide (CO)
- Methane (CH_4)
- Ammonia (NH_3)
- Sulfur compounds

There was essentially **no free oxygen (O_2)**.

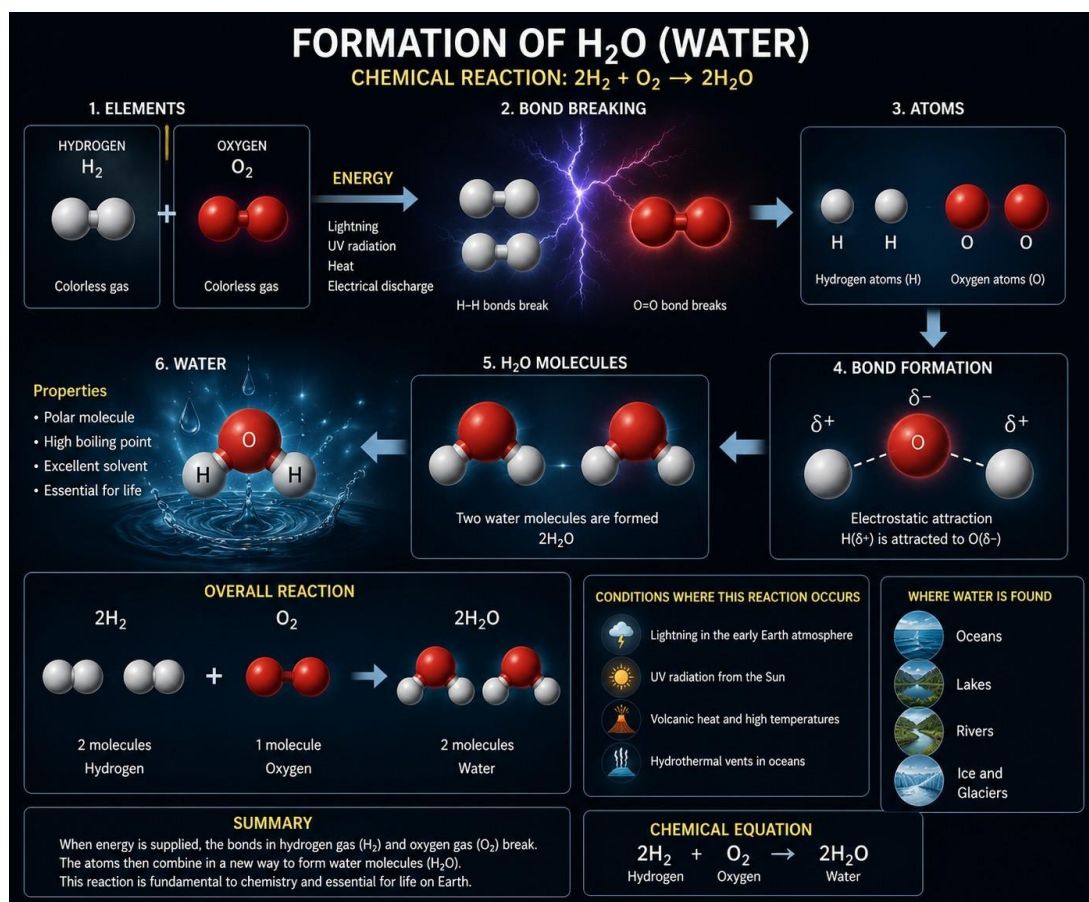
4. Formation of Water

As Earth cooled below 100°C :

- Water vapor condensed.
- Rain fell for millions of years.

- Oceans gradually accumulated.

Some water may also have been delivered by water-rich asteroids and comets.



5. Formation of Molecules

Atoms combined through chemical reactions to form simple molecules such as:

- H_2
- O_2 (later in Earth's history)
- H_2O
- CO_2
- CO
- NH_3
- CH_4
- H_2S

Energy sources driving these reactions included:

- Lightning
- Ultraviolet radiation from the young Sun
- Volcanic heat

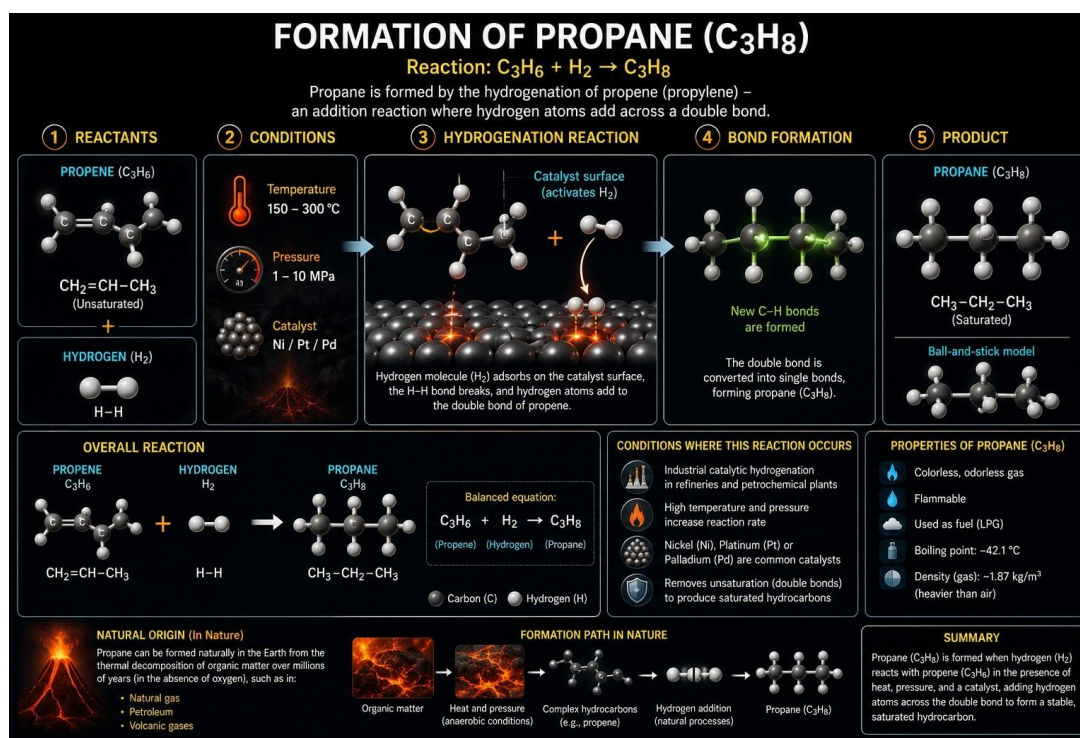
- Hydrothermal vents
- Meteorite impacts

6. Formation of Hydrocarbons

Hydrocarbons are compounds made only of **carbon and hydrogen**.

Examples include:

- Methane (CH_4)
- Ethane (C_2H_6)
- Propane (C_3H_8)



On the early Earth, hydrocarbons could form through:

- Reactions in volcanic gases.
- High-temperature reactions in hydrothermal systems.
- Chemical reactions involving carbon monoxide, carbon dioxide, hydrogen, and mineral catalysts.
- Delivery by carbon-rich meteorites.

Hydrocarbons served as building blocks for more complex organic compounds.

7. Formation of Organic Molecules

Simple molecules reacted to produce increasingly complex compounds.

Possible products included:

- Amino acids
- Organic acids
- Alcohols
- Sugars
- Nitrogen-containing compounds
- Fatty acids

Experiments such as the famous Miller–Urey experiment demonstrated that amino acids can form from simple gases under conditions intended to simulate aspects of the early Earth's environment.

8. From Chemistry to Life

Scientists hypothesize that organic molecules accumulated in oceans, lakes, or hydrothermal environments.

Over millions of years:

1. Organic molecules were formed.
2. Larger polymers developed.
3. Self-replicating molecules emerged.
4. Primitive cell-like structures appeared.
5. The earliest microorganisms evolved.

The precise pathway from chemistry to biology remains an active area of research.

Summary		
Stage	Main Process	Products
Solar nebula	Condensation of gas and dust	Planetesimals
Planet formation	Accretion	Young Earth
Magma Ocean	Global melting	Molten silicate Earth
Differentiation	Separation by density	Core, mantle, crust

Volcanic outgassing

Release of gases Primitive atmosphere

Cooling Condensation of water Oceans

Chemical evolution Formation of simple molecules H_2O , CO_2 , CH_4 , NH_3 Organic chemistry

Synthesis of hydrocarbons and Amino acids and other organic biomolecules compounds

In summary, the early Earth evolved from a molten planet into one with a solid crust, oceans, and a chemically active atmosphere. The combination of volcanic activity, water, energy sources, and simple molecules enabled the formation of hydrocarbons and other organic compounds that may have contributed to the emergence of life.

The Seas, Earth's Rotation, and the Moon's Rotation

The Earth's seas are closely connected to the movements of both the **Earth** and the **Moon**.

The most important effect is the **tides**, which results primarily from the Moon's gravity, with a smaller contribution from the Sun.

1. Earth's Rotation

Earth rotates once every **24 hours**(approximately).

As Earth spins, different regions move through the tidal bulges produced by the Moon's gravitational pull.

This causes most coastal locations to experience:

- Two high tides
- Two low tides

during a lunar day of about **24 hours and 50 minutes**.

2. The Moon's Revolution Around Earth

The Moon orbits Earth approximately every:

- **27.3 days**(sidereal month)
- **29.5 days**from one full Moon to the next (synodic month)

As the Moon moves around Earth, its gravitational pull shifts the positions of the tidal bulges.

3. Why Does the Moon Always Show the Same Face?

The Moon rotates on its own axis **once every 27.3 days**, exactly the same time it takes to orbit Earth.

This is called **synchronous rotation** or **tidal locking**. Because the Moon's rotation period equals its orbital period:

- The same hemisphere of the Moon always faces Earth.
- We never directly see the Moon's far side from Earth.

4. Formation of Tides

The Moon's gravity pulls more strongly on the side of Earth closer to it than on the far side.

This difference in gravitational force produces two tidal bulges:

- One on the side facing the Moon.

- One on the opposite side.

As Earth rotates through these bulges, coastlines experience alternating high and low tides.

5. Spring Tides

Spring tides occur during:

- New Moon
- Full Moon At these times:
- The Sun, Earth, and Moon are nearly aligned.
- The gravitational effects of the Sun and Moon reinforce each other.
- High tides are higher than average.
- Low tides are lower than average.

6. Neap Tides

Neap tides occur during:

- First Quarter Moon
- Third (Last) Quarter Moon At these times:
- The Sun and Moon are approximately at right angles relative to Earth.
- Their tidal forces partially cancel.
- The tidal range is smaller than average.

7. Earth's Rotation Is Gradually Slowing

The Moon's gravitational pull creates friction between the oceans and the seafloor, known as **tidal friction**. This causes:

- Earth's rotation to slow very gradually (the length of a day increases by about **1.7 milliseconds per century**).
- The Moon to slowly move away from Earth at about **3.8 cm per year**.

This transfer of angular momentum between Earth and the Moon is a consequence of the conservation of angular momentum.

Summary

Process	Period	Main Effect
Earth's rotation	~24 hours	Day and night; movement through tidal bulges
Moon's rotation	27.3 days	Same side of the Moon always faces Earth
Moon's revolution	27.3 days	Changes the position of tidal bulges
Spring tides	New and Full Moon	Largest tidal range Neap tides First and

Third Quarter Smallest tidal range

Conclusion

The Earth's seas are influenced primarily by the Moon's gravity. As Earth rotates, coastlines pass through tidal bulges, producing the regular cycle of high and low tides. The Moon's synchronous rotation causes it to keep the same face toward Earth, while its orbit continuously changes the direction of the tidal forces. Together, Earth's rotation, the Moon's orbit, and gravitational interactions between the Earth, Moon, and Sun govern the behavior of the oceans and the timing and magnitude of the tides.

Discussion

Why Do Rotation and Revolution (Translation) Happen?

The Earth's **rotation** (spinning on its axis) and **revolution** (orbiting the Sun, sometimes called translation) are natural consequences of two fundamental principles of physics:

1. **Conservation of angular momentum**
2. **Gravity**

1. Why Does the Earth Rotate?

About **4.6 billion years ago**, the Solar System formed from a large cloud of gas and dust called the **solar nebula**.

Initially, this cloud had a very small amount of rotation. As gravity caused the cloud to collapse:

- The cloud became smaller.
- Its rotation speed increased.
- This follows the **conservation of angular momentum**, similar to an ice skater who spins faster by pulling in their arms.

As dust and rocks collided and merged to form Earth, the young planet inherited this rotation. Once Earth began spinning, there was almost no friction in space to stop it, so it continues to rotate today.

2. Conservation of Angular Momentum

Angular momentum is

$$L = I\omega$$

where

- (L) = angular momentum
- (I) = moment of inertia
- (ω) = angular velocity

If no external torque acts on a system,

$$L = \text{constant}$$

Therefore, when the collapsing nebula became smaller, its rotation rate increased while conserving angular momentum.

3. Why Does the Earth Revolve Around the Sun?

The Earth formed within the rotating disk of gas and dust surrounding the young Sun.

As Earth formed, it already possessed sideways (tangential) motion. At the same time, the Sun's gravity pulled Earth inward.

These two effects combine:

- Gravity continuously pulls Earth toward the Sun.
- Earth's tangential velocity continually carries it forward.

Instead of falling into the Sun, Earth continually "falls around" it, producing an orbit. This is the same principle that keeps artificial satellites orbiting Earth.

4. Gravity Provides the Centripetal Force

According to Isaac Newton, the gravitational force between the Sun and Earth is

$$F = G \frac{Mm}{r^2}$$

where

- (M) = mass of the Sun
- (m) = mass of Earth
- (r) = distance between them
- (G) = gravitational constant

This gravitational force acts as the **centripetal force** that keeps Earth in orbit.

5. Why Doesn't Earth Fall Into the Sun?

Imagine throwing a ball horizontally.

- A slow ball falls quickly.
- A faster ball travels farther before hitting the ground.
- If it moves fast enough, Earth's surface curves away beneath it. The same idea applies to Earth around the Sun.

Earth's orbital speed is about

29.8 km/s

At this speed, gravity continually bends Earth's path into an ellipse instead of allowing it to escape or fall directly into the Sun.

6. Why Doesn't Earth's Rotation Stop?

Earth rotates because there is very little friction in space.

Small effects gradually slow Earth's rotation:

- Tidal interactions with the Moon.
- Tidal interactions with the Sun.
- Redistribution of Earth's mass.

As a result, Earth's day lengthens by about **1.7 milliseconds per century**.

7. Kepler's Laws

Johannes Kepler discovered that planets move in elliptical orbits:

- **First Law:** Planets orbit the Sun in ellipses.
- **Second Law:** Equal areas are swept out in equal times.
- **Third Law:** More distant planets take longer to complete an orbit. Newton later showed that these laws arise naturally from gravity.

Summary

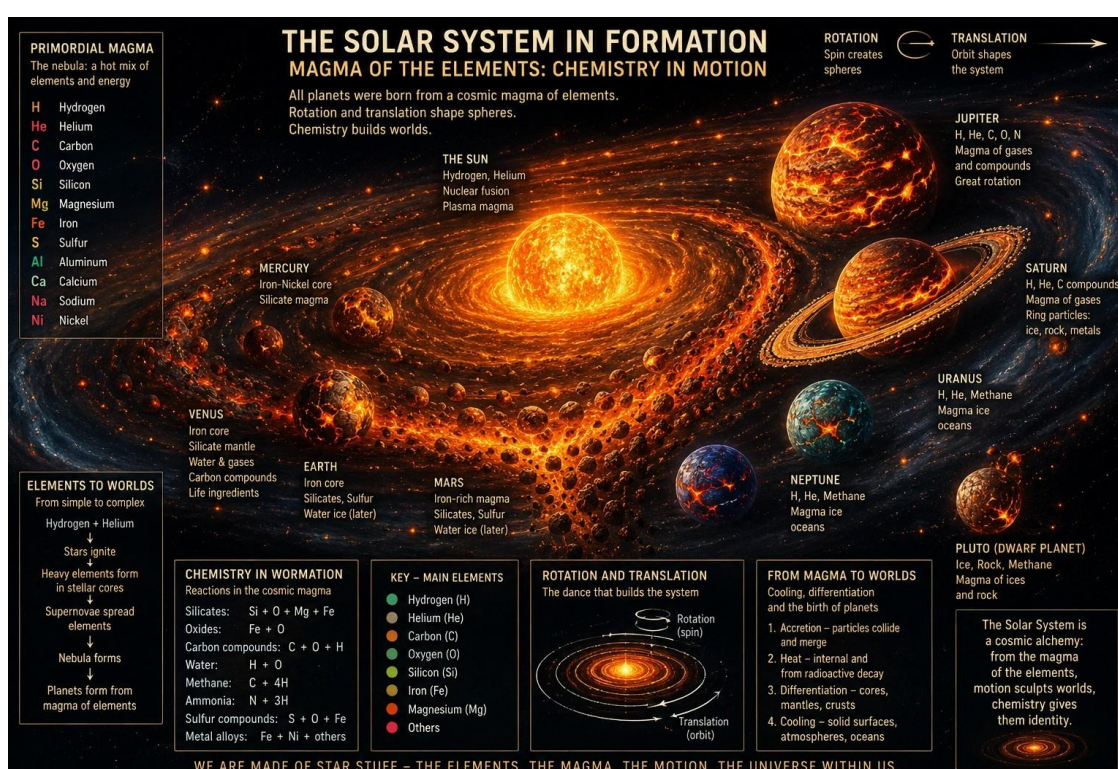
Motion	Cause	Physical Principle
Earth's rotation	Inherited from the rotating solar nebula	Conservation of angular momentum
Earth's revolution	Initial sideways motion plus the Sun's gravity	Gravity and inertia
Elliptical orbit	Balance of inertia and gravity	Newton's law of gravitation and

Kepler's

laws

Conclusion

Earth rotates because it inherited angular momentum from the rotating cloud of gas and dust that formed the Solar System. It revolves around the Sun because its forward motion (inertia) is continuously redirected by the Sun's gravitational pull. Together, these principles explain Earth's daily rotation, yearly revolution, and the stable orbits of planets throughout the Solar System.



Limiar da Vida, o Sistema Solar Solar como o Limiar da Vida e a Possibilidade de Vida ExtraTerrestre nesse Limiar da Via Lactea, O Sistema Solar Como Um Exemplo, a Galaxia como Limiar da Vida no Universo:

The universe is estimated to be approximately 13.8 billion years old. Scientists determine this age by combining measurements of the universe's expansion rate and analyzing the Cosmic Microwave Background—the oldest leftover light from the Big Bang. The Milky Way is a spiral-shaped galaxy in the universe. It spans roughly 100,000 light-years across. Our Solar System sits in one of its outer arms, about 26,000 light-years from the bright center. The universe is mostly empty space. Our galaxy zooms through it at high speeds. The Milky Way

does not float alone. It belongs to a small family of galaxies called the Local Group. This group contains about 50 galaxies. The two largest members are the Milky Way and the Andromeda Galaxy. They act like siblings in a small town. The Local Group is just one neighborhood in a massive city. This city is called a supercluster. Our supercluster is known as Laniakea. It holds about 100,000 galaxies. These galaxies are all pulled toward a central point of gravity called the Great Attractor. To understand how big this is, think of a group of houses as a neighborhood. Think of many neighborhoods as a city. The supercluster is like a giant country in our vast universe[8][9].

Laniakea is just a tiny speck in the observable universe. The observable universe is the part we can see with telescopes. It is about 93 billion light-years across and holds over two trillion galaxies. Interestingly, scientists have found that galaxies are not spread out perfectly. They form a giant web. The Milky Way sits inside a massive, quiet bubble in this web called the KBC Void. This means we live in a relatively empty part of the super-large universe[8]. **So, a threshold of extraterrestrial life.** It is defined by the formation conditions of the Solar System and the PLANET EARTH. **with the conditions of the weather and the ANGULAR MOMENTUM from the position of the solar system and the Milky Way since from the Singularity of the Universe.** Under these conditions of Life and in the Solar System, Just as chemical elements on Saturn, Uranus, and Neptune, and water on planet Earth, demonstrate that given the conditions of time in the universe and the angular momentum of the solar system and the Milky Way, the possibility exists, defining...a threshold for extraterrestrial life under these conditions. The possibility of finding extraterrestrial life is becoming increasingly apparent to humanity, particularly in the vicinity of the Solar System and the Milky Way.

The inference from this question can be analyzed and followed in theses, such as in the book, *The First Three Minutes* by Astrophysicist Steven Weinberg in [9]. Weinberg describes the emergence of the universe... In the present day, the questioning *From the Threshold of Extraterrestrial Life*, This article raises the question of the formation of planetary spheres due to their rotation and revolution systems, along with angular momentum, in addition to... The age of the universe and the position of the solar system in relation to the Milky Way, and its position in the Universe. Increasing in the Drake Equation that the probability depends on how the Solar System was formed, including its system. Rotation and Translation with its Momentum ANGULAR, The Drake Equation then depends on the probability of the Solar System and the Milky Way in their positions in the Universe, of angular momentum, of the center of gravity and of the center of mass, for example, the areas of Kepler's equations and the

possibility of life on Earth in light of Translation around the Sun, and the size of the same in nuclear reactions of Helium and Hydrogen to generate energy and Light with Ultraviolet rays and the Magnetosphere. The probability of extraterrestrial life is practically 100% due to the sheer size of the universe. However, finding *intelligent or technological life* is very rare. Scientists calculate these odds using the **Drake Equation**, which multiple factors like star formation and habitable planets.

Therefore, to infer in the equation of Drake should take Steven Weinberg's thesis into consideration and consider angular momentum. The center of gravity and the center of mass of the Solar System and the Milky Way in the Universe. These conditions, the article infers, constitute a Threshold of Extraterrestrial Life, therefore life would be possible in the vicinity of the Solar System and the Milky Way. Another important consideration would be the entropy of the universe, knowing that entropy The Universe governs Temperature of the Universe, then the SUN is considered, with NUCLEAR FUSION, under the conditions of background radiation of the universe. in [10], it is known that THE ENTROPY OF THE UNIVERSE defined the conditions of the UNIVERSE AT THE PRESENT MOMENT, what the universe is today in [10], then THE SUN, as a NUCLEAR FUSION STAR, brings the inference OF ENTROPY CONDITIONS AND OF NUCLEAR FUSION STARS to generate life on a PLANET analogous to the planet Earth. Therefore, considering the entropy of the universe, the cosmic radiation background of the universe and the Thesis of Steven Weinberg in [9], on how the Universe Developed since the singularity of the Big Bang, one should take considering the SUN as a STAR in NUCLEAR FUSION, in order to consider the entropy of the universe concomitantly WITH THE AGE OF STARS AND STAR EXPLOSIONS IN EACH POINT OF UNIVERSE, also interesting for the Study of Dark Energy and the Fabric of Space-Time in [11][12].

Given that in [12] THE OPTICAL PYROMETER makes the SPECTRUM OF COLORS OF STAR RADIATION in order to reproduce in atomic weapons analogous explosions in stars, according to the color spectrum of stars in the optical pyrometer. What can be studied in computer simulations, making the probability of LIFE EXTRATERRESTRIAL TO BE FOUND MORE REASONABLE, for example, A SPECTRUM OF COLORS By simulating a star explosion, these spectra on the optical pyrometer would translate...the magnitude From the explosion and nuclear reactions in stars, according to nuclear physics, a system analogous to the Solar System could be found, or depending on the pyrometer. OPTICAL, a SYSTEM A more evolved star could be found, this probability would be measured in a computer system according to nuclear physics and the optical color pyrometer in [12] with simulations of

atomic explosions and reactions in stars. Therefore, the probability of extraterrestrial life would be more accurate and precise when analyzed using data from telescopes, according to the inference of nuclear physics.

The Sun is powered by nuclear fusion, a process where four hydrogen nuclei (protons) smash together to form a single helium nucleus. Driven by the Sun's extreme gravity and a core temperature of 15 million degrees Celsius, this reaction converts a tiny amount of mass into immense bursts of heat and light, as described by Einstein's equation ($E = mc^2$). The Sun demonstrates the possibility of analyzing and inferring about stars in the Universe, considering light-years. The journey of light to the Solar System of stars and according to the color spectrum of the optical pyrometer, taking into account Steven Weinberg's thesis in [9] with the timeline of the universe and the ENTROPY OF THE UNIVERSE and in accordance with the cosmic background radiation of the UNIVERSE. A basic experiment, The cosmic microwave background (CMB) is the heat left over from the Big Bang. It fills the entire universe. It acts like an echo of the universe's birth. It is invisible to the human eye because it is very cold—just 2.725 degrees above absolute zero. Old analog cathode-ray tube (CRT) TVs displayed static or "snow" when not tuned to a channel. About 1% of this white noise is **Cosmic Microwave Background (CMB)** radiation. This is the leftover heat and light from the **big Bang**. You were literally watching the universe's birth. Think of the early universe as a hot, glowing oven. It expanded and cooled over 13.8 billion years. The original visible light stretched into invisible microwaves. These microwaves fill all of space. Your old TV's antenna picked up these ancient waves, converting them into the static you saw. As well as the consideration of Dark Energy, as well as the waste from the beginning of the Big Bang Singularity, as the moment of the Universe's Inflation, these debris from the deaths and explosions of stars, which would raise questions about interstellar travel, such as the position in the Fabric of Space-Time Distortion, these debris and the position of the Solar System, as well as the journeys of probes in the Universe and the Milky Way.

CONCLUSION

Therefore, it can be concluded what Isaac Newton inferred: What we know is a drop; what we don't know is an ocean. "We see what Physics brings in terms of possibilities for the Philosophical Thought of Sciences and the Theoretical Calculus of Physics and Mathematics, such as the possibility of the Threshold of Extraterrestrial Life, with considerations for analyzing the Color Spectrum of the Optical Pyrometer to understand Star Systems Distant from Earth, with the intention of..." To analyze the celestial bodies of these star systems, In

order to create a Theoretical Epistemological System of Physics, to facilitate the understanding of the concepts involved, as in the entire Cosmology of the Solar System and the Milky Way and in its vicinity to discover bacterial life or life more evolved than human life, according to the bibliographic references, hypotheses were raised about what could become a scientific research in Cosmology and Astrophysics of the Solar System, the Milky Way and the Universe, considering the Arrow of Time, the Entropy of the Universe and the Cosmic Microwave Background Radiation.

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