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Nebular hypothesis after an explosion of big bang: Theoretical approach

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Abstract: In this paper we summarized the planetary formation and its stages after the huge explosion of big bang and completely accepting the nebular hypothesis. This hypothesis is mostly accepted explanation for how the sun and the planets and solar system may have formed. About 13.8 billion years ago the universe was formed. The mostly accepted was "The Big Bang", that is the universe started out as a hot and dry mass. From the big bang to present world, there were lot of epochs crossed over it during time.

***Index Terms* - Nebula, Planetary, Stars, Solar system, Big Bang.**

1.INTRODUCTION

The Nebular hypothesis is the widely accepted explanation of how all things are formed in the solar system, such as the sun and the planets. When the solar system began to be created, all that was thought to be happy was a cold circulating cloud called the solar nebula. The nebula was the result of an uneven distribution of gas throughout the universe as gravity began to compress the gas to the center the rotational speed increased which caused the cloud to flatten, causing accretion disk matter to continue to accumulate increasing gravity. he pulled it in the middle and finally the gas heated due to increasing pressure as the weight continued to increase the gravitational force also increased and as a result the temperature continued to rise the hot gas ball formed between the growth disk forming a protostar also known as. the sun. When enough gas accumulated in the center of the protostar pressure the pressure generated enough heat to assemble the star-forming atoms without the matter of the star became clusters of gas dust and rocks that formed protoplanets. It continued to grow as they held material objects in their gravitational fields. Because the protoplanet planets are all made up of the same cloud of gas and dust that orbit the sun in the same direction and in the same plane. The nebular hypothesis also explains how the planets are organized to heat up and the solar winds caused by the sun emit very simple gases that emanate far from the rising solar system, so the planets of the earth are Mercury, Venus, Earth, Mars located near the sun. The gas giant Jupiter, Saturn, Uranus, and Neptune formed on the cool outer surface of the solar system. The solar system continued to evolve even after its initial formation as large asteroids crashed into the planets and the planets themselves split into layers as they gradually cooled. The abstract nebular hypothesis has been tested as a useful explanation for how the solar system forms, explaining why the planets and stars around us often orbit the same plane and sleep in the same plane. It also describes the arrangement of planets and rocky planets near the sun and distant gas giants.[12]

Our solar system was created about 4.5 billion years ago because of the dense cloud of gas between stars and dust. According to the theory, the cloud collapsed, possibly as a result of the shock of a nearby supernova (supernova) and formed a solar nebula. At the center, gravity is very active and eventually, the intermediate pressure is so great that hydrogen atoms begin to combine and form helium, releasing large amounts of energy, which causes the sun to rise. Remote disks also came together. These lumps collided and formed huge objects. Some of them became large enough for gravity to form circles, orbits, planets, and moons. Other small fragments left were asteroids, comets, meteoroids, and unusual moon moons.

2.PHYSICAL OBSERVATION OF STARS

Stars the word itself represent a celestial body and most important object of galaxy and whole universe. The balls o gas that grows dense and hot enough to sustain nuclear fusion in their core. They are ultimate source of all high radiation such as visible light, and also the means by which the lightweight raw material of the universe is transformed into heavier and more complex elements including those that make up our own bodies. Stars are born when an external influence triggers the collapse of an already dense cloud of interstellar medium. The process can be started by the shock wave from a nearby supernova, tides raised by a close encounter with an older star or passage through spiral density wave. There are more than 3000 stars can be seen in dark night with naked eye. The two differences between these stars is difference in luminous intensity and difference in color density. Depending on seeing the luminous star that is thousand light years away cannot be predictable it is most luminous star of universe.[1]
The most difficulties in properties of star is measuring stellar distance between them. Stellar distance is most important in finding distance between two celestial objects. Combining magnitude of brightness and stellar distance can reveal various properties of stars including inherent energy output, luminous and other physical properties. The difference in apparent displacement and direction of an object with respect to two reference point on same line is parallax. The parallax method is used in calculating most accurate stellar distance. It involves measuring the slight shift in the direction of nearby stars as earth moves from one side of its orbit to the other.

The formula for calculating stellar distance are as follows: -

When D is the distance from the Earth and the sun (1AU), d is the star distance, and p is the parallax angle in arcseconds (“). One parsec (pc) is 206,265 AU, and the distance to parsecs is given by, $d(pc) = \frac{1}{(\rho('''))}$
The largest parallax known as Proxima Centauri, with 0.76 parallax”. The parallax angle is measured at a accuracy of 0.001 “. astronomers have found the parallax range in about 400 stars at about 1%. The distances to 7,000 stars are better known than 5% accuracy, and the distances to many stars within 200pc of the Sun are well determined. [2]

1.3TEMPERATURE OF STAR

The temperature of surface of stars is basically measured by its color observation. The color of the star is completely related to the temperature of the photosphere where the light- emitting layer explained by Wien’s law and provides the methods to determine its color naturally.

1.4 The size of stars

The size means the radius of star. The two properties that effect star luminosity is size and temperature. The stars which were hot are brighter than cool stars of same size naturally.[3] Large stars are brighter than small stars of the same temperature. Sometimes a large cool star is brighter than a small hot one. They are classified into five categories: -

1. Super giants

2. Bright giants

3. Giants

4. Subgiants

5. Main sequence dwarfs

The majority is of dwarf stars. Our sun is dwarf star, and if we wanted to describe it in astronomical nomenclature, we would call it a G2V star. Its spectral class is G2., and its luminosity class is V.

3. STUDY OF METEORITES AND THEORETICAL CALCULATIONS

Class	Color	Surface temperature (K)	Prominent absorption lines
O	Blue	> 25,000	Ionized helium lines; weak hydrogen Balmer lines; lines of multiply ionized atoms (O, N, C)
B	Blue	11,000–25,000	Neutral helium lines; strong hydrogen Balmer lines
A	Blue–white	7,000–11,000	Very strong hydrogen Balmer lines
F	White	6,000–7,500	Ionized calcium (CaII) lines; strong hydrogen Balmer lines
G	Yellow	5,000–6,000	Strong CaII lines; weak hydrogen Balmer lines; lines of neutral metals
K	Red–orange	3,500–5,000	Weak CaII lines; lines from molecules
M	Red	< 3,500	Lines of neutral elements; strong lines from molecules.

A meteoroid may be a solid piece of debris from the Associate in Nursing object, a type of comet, asteroid, or meteoroid, which emerges from space and is heavy as it passes through space to reach the surface of a planet or moon. it may be a rock falling from the Earth from a house. Most meteoroids disperse when they reach Earth's atmosphere. when the main object enters the atmosphere, many factors such as collisions, pressures, and the interaction of chemical compounds with the region's gases cause heat and energy loss. It then becomes a meteor and forms a fireball, also known as a meteor or falling star. When it is found in a large area of the body, the meteor becomes a meteorite. Some meteorites contain even tiny particles formed around other stars that existed before our Sun. because meteorites are the fossils of these celestial bodies, scientists rely on them to obtain information about the history of our system. Meteorite research has helped us to understand the origin of our system, yet the planets and asteroids have formed so the effects of meteorite pathways have changed the history of the earth and life on our planet. Few meteorites are large enough to form large craters. while others often strike at their own level and, in general, form a low a tiny hole. large meteoroids may invade the earth with an important part of its velocity (second cosmic velocity), producing a crater with a rapid impact. the type of crater can depend on the size, shape, degree of separation, and the incoming angle of the impactor. The potential for such collisions has the potential to cause widespread destruction.

All meteoroids return within our system. Many of them are fragments of asteroids that split back into the middle of the belt, between Mars and Jupiter. Such pieces revolve around the Sun for some time - usually years - before colliding with the Earth. Large meteorites: the most important have been found to weigh 60 tons, about twice the size of the Ahnighito meteorite in the middle of the chamber.[4] Most meteorites are stony meteorites, classified as chondrites and achondrites. Only about 6 percent of meteorites are iron meteorites or a combination of rock and iron, stony-iron meteorites. about 86 percent of chondrite meteorites are composed of tiny circular particles contained. These particles, or chondrules, are composed primarily of salt minerals that appear to contain them that have not been frozen while floating freely in the atmosphere.

Bonded types of chondrites additionally contain very less amounts of organic matter, as well as amino acids, as well as premolar grains. Chondrites are about 4.55 billion years old and are thought to represent the elements from the band that do not combine into larger bodies. Like a comet, granular asteroids are a variety of very old and very old objects within the system. Chondrites are "the building blocks of the planets". about 8% of achondrite meteorites (meaning they do not contain chondrules), their number is similar to that of the earth's crust. Many achondrites are also ancient rocks, and they are thought to represent the crustaceans of various planets. One large family of achondrites (HED meteorites) may have originated in the body of the Vesta Family parent, although this claim is disputed. Some are found in unknown asteroids.[13]

2 Small achondrite groups are special, as they are small and invisible from the belt. one from each cluster comes from the Moon and includes rocks almost identical to those restored to Earth by the Phoebus and Luna systems. the other group is from Mars and is the only extra-terrestrial object ever discovered by humans. about 5% of meteorites appear to be collapsing metal meteorites composed of iron-nickel alloys, such as kamacite and / or taenite. Many metal meteorites are thought to have originated in the processes of the ever-melting celestial body. like the planet, the iron ore parted with salt and sank in the centre of the planet, forming its core. when planetesimal solidified, it exploded in direct collision with another pantheistical. due to the low concentration of iron meteorite in various places such as Antarctica, wherever most of the meteoric falls are recovered, 'it is estimated that the proportion of collapse of iron-meteorite does not reach 5%. this may be explained by the bias of recovery; ordinary people are able to recognize and find more solid metals than many different types of meteoroids.[5] The magnitude of the iron meteorite compared to the total found in the Antarctic is 0.4%. Stony-iron meteorite represents 1%. is a combination of

iron-nickel steel and mineral silicate. One species, known as palliates, is thought to be found within the boundary area over the spinal cords wherever iron meteorites appeared.

4. ELEMENTS THAT FORM A PLANET

Billions of samples were collected from the surface of various planets and that too from distant places from a solo land. Special investigations with the help of space probes and rovers have helped us reach a stage where human knowledge has widened its horizons about the compositions of our planets, comets and asteroids. Classical solar bodies were divided into three categories on the basis of their constituents-

1. Those which have rocky material (zero pressure density~4 g/cm^3).
2. Those comprising a blend of ices and rocks ($\rho < 2$ g/cm^3).
3. Those which have composition slightly related to that of sun i.e. Hydrogen and Helium mixtures ($\rho < 0.2$ g/cm^3).

The ice-rock mixes are represented by the outer planets' satellites, comets, and potentially Pluto itself. The Jovian planets Jupiter, Saturn, Uranus, Neptune, and the Sun make up the nearly solar-composition bodies.
Planets and smaller bodies can be produced by a slow rise, low temperature of the condensate particles, initially by gravity contact ("adhesion," magnetic fields, electrostatic forces, etc.), but later by gravity after other protoplanets grow to the size of -multikilometer. Other growth patterns, such as special metal growth due to magnetic interactions, may result in differentiation between different thick segments, while increasing gravity is a completely democratic process where the apparent uniqueness of each character is irrelevant. Each element draws light to special waves in that atom. Astronomers can use these waves to determine the shape of an object by looking at its spectrum. Spectroscopy is a popular technique used by astronomers to determine the shape of stars, planets, and other objects.

The object spectrum can be very complex as it contains many components. Other factors, such as speed, may influence the placement of spectral lines, but not the distinction between lines from an object. Fortunately, computer modeling allows researchers to differentiate between different elements and combinations in a crowded environment, as well as to identify lines that appear to be removed as a result of movement. The crumbling nebula that gave birth to the Sun and the planets of the Solar System contained elements such as iron, silicon, and magnesium, which make up the majority of the solid planets, as well as carbon, oxygen, nitrogen, potassium, and other life-forms thus supporting elements [6]. Planets are made up of particles that strike and stay together as they orbit a star on a disk of gas and dust. Because the wind of the star blows their gases and is made up of heavy objects attracted to the gravitational pull of the star, the planets closest to the star are much stronger. The properties of newly discovered exoplanets TOI-700d and TOI-700c by TESS satellite. We found both planets are in orbital resonance and due to this they are in tidal locking with each other. We found their orbital resonance period as 7:3 and synodic period as 27.951 days [13].

4.1 FUNCTIONS OF A PLANETS

The planets provide the basic variables of the stars. The basic function of the planet is to support life — whether biotic or abiotic — whether plants or animals live on a particular planet if they do not exceed the carrying and have all the resources to take care of requirements it functions completely. The planets, which represent the natural functions found in all life forms, are the centers of the basic meaning of the star chart. They, like the organs and glands of your body, play a vital role in regulating the processes of nature, and their actions must be well coordinated and balanced in order to maintain good health and well-being. Similarly, the planets of astronomy are interconnected, and each has its own unique and important role to play in the context. The problem arises only when the symbolic role of the planet is blocked, suppressed, misdirected, or acted in a way that is contrary to the welfare of all. Saturn (the "great astrology" of astronomy "is" correct "and is as important as Jupiter (the" great advantage "of traditional astrology).

Planets are not considered to be the cause or control of astrological symbols; they do not make "things happen." In other words, although the human heart is regarded as an analogue of the Sun's biology in astrology, the Sun does not cause the heart to beat – the same way it does not control a planet's rotation or revolution. The planets represent the will of the gods and their direct influence on human affairs by ancient astrologers.[7] Planets could represent basic drives or desires in a coma, or energy flow controls that reflect levels of experience, according to modern astronomers. They manifest themselves in the twelve signs of the zodiac and in the twelve houses in various ways. Elements are another way the planets are connected. Because Earth is the only planet known to host life, understanding planetary habitability is partially an extrapolation of Earth's conditions.
The source of energy is the absolute necessity of life, and the concept of planetary life suggests that a few other geophysical, geochemical, and astrophysical conditions must be met before the starry body can sustain life. Habitats and biosignatures should be examined in the context of the planet and its environment. The study looks at body composition, orbital parameters, air, and possible chemical interactions when measuring their resilience.

5. FOUR STAGES OF TERRESTRIAL PLANET

After becoming the planets, it will undergo four stages of formation: Differentiation, Cratering, Flooding, Surface Evolution. These four stages will be elaborated in this paper.

5.1 DIFFERENTIATION:

Once the planet starts to melt the differentiation occurs. The elements are separated based on physical and chemical consequences which include the body's self-gravitation. During this differentiation, Elements with high density fall into the core, the fewer density forms the mantle, and the light materials will be in the crust. Iron is very rich in density, apparently forming the core of the planet. Hence, the siderophile is concentrated on Earth's Core. However, Heavy elements like chalcophile elements bind with sulfur forming compounds which do not sink with the core and remain close to the Earth's surface. However, Some of the chalcophile elements of Zinc, Copper may mix to some degree with Fe in Earth's Core.[8]

While scrutinizing the Earth, the zone is composed of exorbitant dense Fe- rich metallic elements in the core, The mantle constitutes Mg and silicate materials. The Crust is made up of Aluminum, Calcium, Sodium, Potassium. Granites are more adequate in the earth's upper crust. Though the materials are separated into zones by density still they are chemically bonded. The ratio of radioactive elements is high in protoplanets; later it was reduced by radioactive decay. The melted parts of protoplanets comprise heating, impacts, Gravitational pressure. The melted zone has a high chance for the highly concentrated materials to fall into the core. The Partial melting of rock produces the magma in the earth's mantle. The non-stable elements in the minerals will be extracted during the melt. The dissolved ones start to crystallize at distinct temperatures and pressure after the reach of magma above a certain depth which leads to the elimination of various particles from the melt.

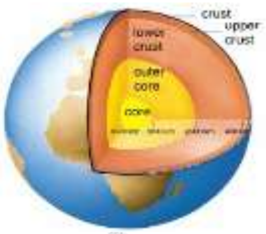

Figure 1.1: Layers of Earth's, sorted by the density of the elements.

5.2 CRATERING

When an asteroid or Meteorite hits the surface of the planets or moon due to the shock waves through the ground the object will be recrystallized by leaving a circular cavity on the surface and some of the rocks will be thrown out of the crater which is known as ejecta. Larger the velocity, The Larger the impact craters. There are different kinds of craters: simple, complex, impact basins, etc. The impact basins have a greater impression on the surfaces. Simple craters are bowl-shaped depressions that will be surrounded by ejecta. Simple craters are widely used by scientists to study the craters. Complex craters have greater depth and the upliftment of central park. The ratio of complex craters is 1:15. As said before, Impact craters have large impacts on the surface. This impact crater spreads more than 300 kilometers on the surface. The darker circular areas on the moon are impact basins.[9]

As the Moon lacks water, atmosphere, plants and tectonic processes, The craters will not vanish on the Moon's surface. That's why the moon still has the footprint of astronauts on its surface. On the other hand, Earth has an atmosphere that could disintegrate the objects before smashing onto the surface. Once the craters formed on the Earth, they will be erased by the erosion and tectonic activities. Therefore, due to this the moon surface has not been modified.

5.3 FLOODING

The tremendous boiling liquid located beneath the surface of the Earth is known as Magma. It is generally present in the lower part of the crust and upper part of the mantle. When the planet's crust cracks, the magma starts to flow out and this is known as Lava.

Once the magma flows to the earth surface, we call it Lava. This lava flooding will fill the craters. While considering the earth, water vapor reaches the atmosphere which in turn falls as rain. This will fill the craters by establishing the oceans, lakes, ponds, etc. However, Lava flooding happens more on other planets compared to the water vapor process. On these planets, where the effects of lava flooding are more observable.

5.4 SURFACE EVOLUTION

The rearmost stage of a terrestrial planet is surface evolution. Tectonic plates, the solid outer crust separated by plates generally called the lithosphere. These Tectonic plates are the major reason for the evolution of planets. This contributes to the continental drift. Even today, these tectonic plates are slowly moving around the earth's surface. The igneous rocks, once the magma bursts and flows as Lava, these lavas melt and form igneous rock.[10] These rocks are evidential for the surface evolution that started to happen nearly 4.3 billion years ago. Long ago, there was only one vast land or continent named Pangea. Due to these tectonic plate movements, it breaks apart leading to the formation of Gondwana and Laurasia. Antarctica, India, Madagascar, New Zealand are later separated from Gondwana. Million years ago, India was a part of South Africa due to the movement of tectonic plates, it separated from Madagascar and joined with Asia. Due to the collision of Indian and Eurasian plates uplifted the Himalayan Mountains. Even today, India is moving towards Asia by 4 cm/year which will give a rise to Himalayan Mountain. This process can't be seen as it is moving slowly. It is also believed that in future India can split up from Asia if that happens India will be an island. Apart from India, The African continent will split into two within ten to five billion which will create a new ocean.

6. PHYSICAL PROPERTIES OF THE PLANETS

The four planets closest to the sun—Mercury, Venus, Earth, and Mars—are called terrestrial rocks.

6.1 MERCURY

Mercury is the smallest planet in our solar system and is also close to the sun. Mercury is the fastest planet, orbiting the sun every 88 days. It is 43,108,850 (last degree of wandering) km distance from sun. Mercury is just 3,032 miles wide at the equator. Mercury is known as the Terrestrial planet, which has a solid metal core, a rocky outcrop, and a solid crust. However, the dwarf planet cooled rapidly, shrinking sufficiently during the first billion years or more to prevent magma from escaping the outer layer and eliminating geologic activity such as volcanoes over mercury.

As explained by Kepler's laws of planetary motion (All the planets orbits the Sun in elliptical orbits, with the Sun as one of the focal points.),. The two places in the equator of Mercury where this wandering takes place during the day are called Hot poles. As the upper Sun stays there, it heats them to 800 ° F, 430 ° C). Two areas of the equator 90 ° from the hot poles, called Warm poles of mercury, are never equally hot. Near Mercury's north and south rotating poles, low temperatures are much colder, below about 200 K (−100 ° F, −70 ° C), when illuminated by bright sunlight. Extreme temperatures drop to 90 K (−300 ° F, −180 ° C) during the long Mercury night before sunrise. Mercury has no moon. [11]

Mercury temperatures are very dangerous among the planets of the earth, but the night sky of the planet would be even colder if Mercury kept one face toward the Sun and the other one in perpetual darkness. Mercury’s magnetic field, although only 1 percent is as powerful as Earth.

6.2 VENUS

Venus is the 2nd planet near the sun. Venus is used to refer to the celestial oddball. Although its stones are a shade of Gray, and its atmosphere provides a terrific orange glow to the area. Venus has no moon. Venus turns its axis in the opposite direction throughout our heavenly family. One day on Venus lasts 243 days on earth — longer than the year of Venus and, which lasts 225 days on Earth. And because the planet revolves around the other side of its orbit, 117 days of earth passes between each rising and setting sun.

Venus has the largest atmosphere in the world. Its gas envelope is made up of more than 96 percent CO2 and 3.5 percent of cellular nitrogen. Subsequent values of other gases are present, including carbon monoxide, sulphur dioxide, water vapor, argon, and helium. Atmospheric pressure in the Venus region varies with altitude; at the height of the centre of the planet of about 95 bars, or 95 times the atmosphere. The whole earth is dry and rocky. Because there is no sea level in the literal sense. The atmosphere of Venus is made up mainly of carbon dioxide, and dense clouds of sulfuric acid completely cover it.

6.3 EARTH

The Earth is the 3rd planet from the Sun at an altitude of 3,959 miles, and the Earth is the fifth largest planet in our solar system. Earth is the only planet that holds life in the Solar system and has liquid water. The earth's atmosphere is made up of 78 percent nitrogen, 21 percent oxygen, and one percent of other gases such as carbon dioxide, water vapor, and argon. Global average temperature is about 57 degrees Fahrenheit (13.8889degree C). Earth's atmosphere not only provides nourishing life but also protects it: It is so thick that most meteors burn out before collision, and their gases — like ozone — block ultraviolet light, which damages DNA to reach the surface. The earth is about 8,000 miles (13,000 km) wide. The Earth takes 23.934 hours to complete its orbit and 365.26 days to complete the orbit of our solar system - our days and years on Earth. According to NASA its distance from the Sun is 92,956,050 miles (149,598,262 km). EARTH has only one known moon. [3]
More than 90 percent of the earth's weight is made up of iron, oxygen, silicon, and magnesium, elements that can form crystalline minerals known as silicates.

6.4 MARS

MARS known as red planet.it has an area of about 2,106 miles. Gravity is about 37.5 percent of the Earth's surface. rotates on its axis every 24 hours on Earth. Its orbital axis is tilted 25.2 degrees relative to a plane of orbiting planets. The two-month-old planets, Phobos and Deimos, have a direct distance from the Sun to 227,943,824 km. Its turnaround time is 686.98 days earth wide. The mass of Mars is 6.417 × 1023 kg. little water is available, the atmosphere is close to full of water, and ice clouds are common. MARS contains Carbon dioxide that makes up 95.3 percent of the atmosphere by weight.

CONCLUSION

As we have known clearly that nebular hypothesis is the cosmological theory that was mostly accepted one. It explains clearly about the formation of planetary systems, and it was all formed from the dust and gas. After the big bang a lot of cosmological events has been happened. As we are living in the earth currently and this all events have been started and formulated step by step and with the new origins from the stellar to planetary. Cosmology is the vast area that gives more interesting concepts and theories that into deep. It has no end and keep on going infinite Finally accepting the Nebular hypothesis and the massive explosion after the big bang.

REFERENCES

[1] Salvati, Flavio. Fundamentals of Astronomy. *A Guide for Olympiads*. N.p., Autopubblicato, 2020.

[2] Sparrow, Giles. *Astronomy in Minutes: 200 Key Concepts Explained in an Instant*. United Kingdom, Quercus Publishing, 2015.

[3] Science with a Next-generation Very Large Array. United States, *Astronomical Society of the Pacific*, 2018.

[4] Whipple FL. *The Theory of Micro-Meteorites*: Part II. In Heterothermal Atmospheres. *Proc Natl Acad Sci U S A*. 1951;37(1):19-30. doi:10.1073/pnas.37.1.19

[5] Steigerwald, Bill; Jones, Nancy; Furukawa, Yoshihiro (18 November 2019*). "First Detection of Sugars in Meteorites Gives Clues to Origin of Life". NASA*. Retrieved 18 November 2019

[6] Bolton S. J. 2010 *Proc. IAU Symp. 269, The Juno Mission* (Cambridge: Cambridge Univ. Press) 92

[7] Mulders, Gijs D., Ilaria Pascucci, and Dániel Apai. *"A stellar-mass-dependent drop-in planet occurrence rates." The Astrophysical Journal* 798.2 (2015): 112.

[8] Cox, Larry P., and John S. Lewis. "Numerical simulation of the final stages of terrestrial planet formation." *Icarus* 44.3 (1980): 706-721.

[9] Quintana, E. V., Lissauer, J. J., Chambers, J. E., & Duncan, M. J. (2002). Terrestrial planet formation in the α Centauri system. *The Astrophysical Journal*, *576*(2), 982.

[10] Jacobson, Seth A., and Kevin J. Walsh. *Earth and terrestrial planet formation*. John Wiley & Sons Inc, 2015.

[11] Baraffe, Isabelle, Gilles Chabrier, and Travis Barman. "The physical properties of extra-solar planets." *Reports on Progress in Physics* 73.1 (2009): 016901.

[12] Kokubo, Eiichiro, and Shigeru Ida. "Formation of protoplanet systems and diversity of planetary systems." *The Astrophysical Journal* 581.1 (2002): 666.

[13] Herndon, J. Marvin. "Solar System processes underlying planetary formation, geodynamics, and the georeactor." *Neutrino Geophysics: Proceedings of Neutrino Sciences 2005*. Springer, New York, NY, 2006. 53-89.

[14] Akash Sharma, Ankit Kumar Mishra. "An Investigational Study on Orbital resonance in TOI-700c and TOI-700d exoplanets''. *Transactions on Innovations in Science & Technology* 5.2 (2021): 306-308.