

Cosmology in Science and Nanakian Philosophy**Devinder Singh Chahal****Institute for Understanding Sikhism, Laval, Quebec, Canada***ARTICLE INFO***Article history***RECEIVED:** 25-Mar-23**REVISED:** 28-Apr-23**ACCEPTED:** 12-May-23**PUBLISHED:** 30-Jun-23

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**ABSTRACT**

Since time immemorial, humans have wondered about the Universe, where it came from, and how it got to be the way it is today. The science of cosmology is advancing every day. Although some Sikh scientists and theologians have tried to represent cosmology in Sikhism, their interpretation of Bani (Words) from the Aad Guru Granth Sahib is based on creation by God. This article discusses cosmology in today's science compared with that found in the Nanakian Philosophy of the 15th century. Copernicus, a contemporary of Nanak, and Galileo were working on Astronomy through observations of Nature, the use of Mathematics, and the newly invented telescope in 1609 in Europe, while Nanak was studying Cosmology in South Asia just by observation of Nature and phenomena in the Universe happening under specific laws. Nanakian philosophy briefly provides the key similarities with today's Cosmology.

Keywords: Astrology, Science of Cosmology, Sikhism, Nanakian Philosophy, Religion and Science, Vedic

INTRODUCTION

Since time immemorial, humans have wondered what the Universe is, where it came from, and how it got to be the way it is today. The other question is whether the relationship between 'Religion and Science' is characterized by *conflict* or *concord*. The *theistic* religions: Christianity, Judaism, Islam, and theistic varieties of Hinduism and Buddhism, believe that there is an all-powerful, all-knowing, perfectly good immaterial person who has created the world, has created human beings 'in His own image,' and to whom we owe worship, obedience, and allegiance. On the other hand, Science deals with reasoning and experimentation to find the truth. The controversy between Religion and Science started when some religious concepts are found contrary to scientific facts during the period of the Renaissance (14th to 17th Century).

Most of the time, discussion on 'Religion and Science' is confined to Christianity, Judaism, Islam, and theistic

varieties of Hinduism and Buddhism, but Sikhism is rarely included in such discussions. It is so because Sikh scientists, theologians, and scholars have failed to portray 'Sikhi' as a distinct and independent philosophy from Hinduism or any other religion. Moreover, they have been unable to represent the originality and uniqueness of Nanakian Philosophy to the world's philosophers, scientists, and theologians.

The logical and scientific study of Bani in the AGGS (*Aad Guru Granth Sahib*, 1983) is becoming very popular with some Sikh scientists, theologians, and writers. For example, (Chahal, 1992, 2000, 2002, 2006, 2008, 2011, 2013, 2014), a Microbiologist, D. P. Singh (2018), and Virk (2012), Physicists, have covered cosmology during the last two to three decades. Now some theologians, without having any background in any Science, are also writing about Cosmology and Science. Many theologians consider Nanak as a mystic, spiritual, religious Guru, reformer, revolutionist, or socialist but never as a philosopher or a scientist. Then who is Nanak? That is

why I am not using any adjective before Nanak since he deserves all epithets.

On the other hand, many theologians doubt if there can be any science or scientific fact in the Bani in the Aad Guru Granth Sahib (AGGS) since there was no science at the time of Nanak (1469-1539). They are right to a great extent since what we call 'Science' today was studied as a 'Natural Philosophy' during the Renaissance (14th to 16th centuries) in Europe. Therefore, before the beginning of science and during the Renaissance, some scholars were prophesying their philosophy based on their keen observations of Nature and the Universal phenomena occurring in an orderly form. This philosophy is called **Natural Philosophy** which is defined as follows:

The study of nature and the physical universe before the advent of modern science. (Natural Philosophy, n.d.)

Nanak is at the top of the list of Natural Philosophers. who promulgated his philosophy based on his keen observation of Nature and the Universal phenomena occurring in orderly form and his keen observations of the behavior of humans without involving God. (Chahal, 2020)

This review discusses Cosmology in the Bani of Nanak, which is comparable to today's Cosmology.

METHODOLOGY

The latest scientific information about Cosmology was collected and compared with Nanakian Philosophy. The word 'Bani' is used for all phrases and stanzas of Nanak. 'Bani' has been used in singular and plural forms in the whole text.

There are many different meanings of each word of the AGGS in *Mahan Kosh* (K. Singh, 1981) and *the Punjabi-English Dictionary* (Joshi, S.S. and Gill, n.d.). Therefore, the most suitable meaning conveying the central theme of the phrase or stanza was used to interpret the Bani. Moreover, logic and scientific information were also applied while interpreting Bani. That is why my interpretation differs from the traditional interpretation of the *Farid Kot Vala Teeka* published in 1883. (Thind, n.d.)

Terms Defined

Cosmology

Cosmology is the scientific study of understanding the origin, evolution, and fate of the entire Universe (Cosmos).

It involves the formation of theories or hypotheses about the Universe that make specific predictions for phenomena that can be tested with observations. Depending on the outcome of the observations, theories will need to be abandoned, revised, or extended to accommodate the new data. The prevailing theory about the origin and evolution of our Universe is based on the so-called "Big Bang Theory." (*Cosmology*, n.d.)

Astronomy and Astrology

Astronomy studies the Sun, Moon, stars, planets, comets, galaxies, gas, dust, and other non-Earthly bodies and phenomena. Astronomy and astrology were historically associated, but astrology is not a science and is no longer recognized as having anything to do with astronomy. (Redd, 2012)

Nevertheless, many people believe that **Vedic Astrology** is accurate Science for telling people's destiny. (*Vedic Astrology*, n.d.) Thus, astrology in India and now in foreign countries is becoming important in the lives of the public. Many Indian TV channels carry some shows and ads about Vedic Astrology. Some newspapers in India and Western countries have daily Horoscopes. Many astrologers are exploiting Vedic Astrology by deceiving people for a living. (*Vedic Astrology*, n.d.) However, Nanak is against dependence upon Vedic Astrology for determining destiny.

Nanakian Philosophy

I have coined an academic term, "**Nanakian Philosophy**," for the philosophy of Nanak after his name as follows:

"A philosophy promulgated by Nanak embodied in his bani which has been incorporated in the Aad Guru Granth Sahib."

Modified from the Chapter, *Nanakian Philosophy- Defined* in the Ref. # (Chahal, 2008)

DISCUSSION

THE ORIGIN OF THE UNIVERSE

Although there are many theories about the Universe's origin (Cosmos), it was Georges Lemaître (1894-1966), a Belgian Cosmologist and Catholic priest, who boldly proposed that the Universe must have originated at

a finite point in time. If the universe is expanding, he reasoned, it was smaller in the past when all the matter in the universe was packed together in a highly dense state. Appealing to the new quantum theory of matter, Lemaître argued that the physical universe was initially a single particle—the “primeval atom,” which disintegrated in an explosion, giving rise to space and time and the expansion of the universe that continues to this day. This idea marked the birth of Big Bang cosmology. He is known as the Father of the Big Bang Theory. (*Georges Lemaître, Father of the Big Bang*, 2022)

According to the Big Bang Theory, widely accepted by many scientists, our Universe sprang from a **single point** (called the “primeval atom” by Lemaître) around 13.77 billion years ago. What is this point, and where does it come from? This point is called **Singularity** in Physical sciences. It is defined as the center of a black hole at which matter is crushed to an infinite density, the pull of gravity is infinitely strong, and the space-time curvature

becomes infinitely large. (KRUESI, 2012) (*Big Bang Theory - The Premise*, n.d.) (Fig. 1)

Ethan Siegel says science has finally settled many of the puzzles about the Big Bang Theory in the 20th century, with the cosmic microwave background providing the critical evidence. It’s true: the cosmic microwave background (CMB) radiation, which we’ve concluded is the leftover glow from the Big Bang itself, is key evidence. Here’s why it confirms the Big Bang and disfavors all other possible interpretations. (Siegel, n.d.)

Timeline of the Universe

Based on scientific studies it is reported that the Universe is composed of protons, neutrons, electrons, and neutrinos. Protons and neutrons are bound together into nuclei, surrounded by a full complement of electrons. For example, Hydrogen is composed of one proton and one electron. Helium is composed of

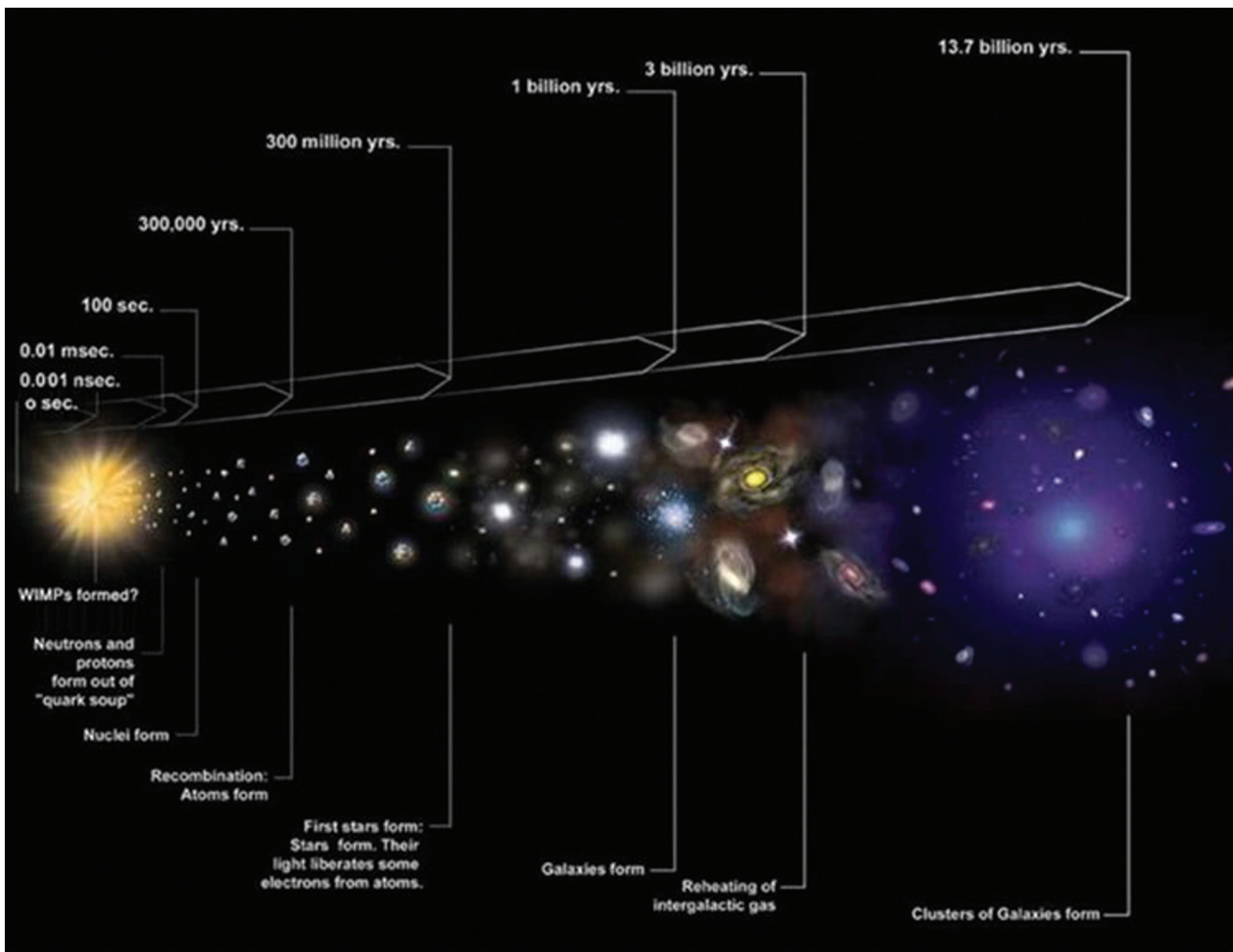


Figure 1. A visual history of the expanding Universe includes the hot, dense state known as the Big Bang and the subsequent growth and formation of structure.

(Credit: NASA/CXC/M. Weiss)

two protons, two neutrons, and two electrons. (Fig. 2) Carbon comprises six protons, six neutrons, and six electrons. Heavier elements, such as iron, lead, and uranium, contain even large numbers of protons, neutrons, and electrons.

All material made up of protons, neutrons, and electrons is called “baryonic matter.” About thirty years ago, the Universe was composed of only “baryonic matter.” Some evidence suggests that there is something in the Universe that we can not see by current means. (*What Is the Universe Made Of*, n.d.)

The Wilkinson Microwave Anisotropy Probe (WMAP) measures the relative density of baryonic and non-baryonic matter to an accuracy more significant than a few percent of the overall density. It is also able to determine some of the properties of non-baryonic matter. The breakdown of the total density of the universe is as follows: (fig. 3)

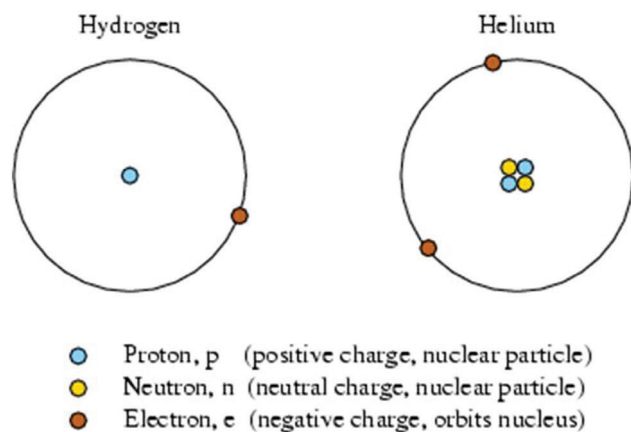


Figure 2. Formation of atoms: Hydrogen with one proton and one electron. Helium with two protons, two Neutrons in the nucleus, and two electrons surround the nucleus.

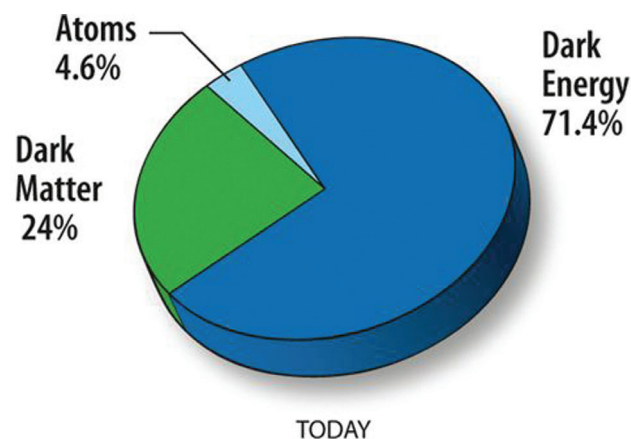


Figure 3. Composition of the Universe.

Credit: https://map.gsfc.nasa.gov/universe/uni_matter.html

- **4.6% Atoms.** Our Universe.
- **24% Cold Dark Matter.** Dark matter is likely composed of one or more species of sub-atomic particles that interact very weakly with ordinary matter.
- **71.4% Dark Energy.**
- Fast-moving **neutrinos** do not play a significant role in the evolution of structure in the Universe. (*What Is the Universe Made Of*, n.d.)

Cosmology, According to Nanakian Philosophy

According to Big Bang Theory, our Universe sprang into existence from a single point, Singularity, around 13.77 billion years ago. Nanak has represented this Singularity as ONE (ੴ) in a logo, ੴ. This logo stands for the Eternal Entity (commonly called God).

Understanding of logo, ੴ, the Eternal Entity

The Logo, ੴ, has been dissembled as follows:

ੴ

ੴ + ੴ + ੴ

ੴ = (One). It is from Numerals but in science, it is a Physical ONE like the SINGULARITY. Some scientists consider SINGULARITY as NOTHINGNESS. But for Nanak Nothingness is ਸੁੰਨ (sunn) or ਨਿਰਗੁਣ (nigun) state.

ੴ = (open Oora). It is from Gurmukhi Alphabet, but here it is an abbreviation of ਓਹ (Oh – That).

ੴ = The extended end of ੴ (open Oora) is from geometry representing INFINITE (amount of Energy).

ੴ = (open Oora) and its extended end (ੴ) are qualifiers words for ੴ (One) in ੴ, indicating That the One is Infinite (amount of energy).

Einstein quotes about ‘Energy’ as follows:

“Energy cannot be created or destroyed; it can only be changed from one form to another.”

It means the ‘Energy’ existed forever.

Therefore, ੴ can be pronounced as ਇਕੁ ਓ ਬੇਅੰਤ (Ek Oh Beant) in Punjabi and as ‘That the One and Only is Infinite’ in English. It means ‘One’ in ੴ is infinite amount of energy.

Note: Geometry is the branch of mathematics that deals measurement and relationships of points, lines, angles, and figures. During Nanak's time, there was no sign of 'infinity.' John Wallis developed the infinity sign (∞) in 1655 more than 100 years after Nanak (1469-1539). Therefore, Nanak can only use the extended end of open *Oora* (ਓ) to represent 'Infinity.'

The cosmology of Nanakian Philosophy starts with the **One** (ੴ) in **ੴ**, which represents an infinite amount of energy.

Therefore, the **One** (ੴ) in **ੴ** is similar to Singularity or Nothingness in Physical Sciences. The 'Nothingness' is called **ਸੁੰਨ** (*Sunn*) or **ਨਿਰਗੁਨ** (*Nirgun*) state by Nanak. The **One** (ੴ) in **ੴ** is also called '*Jyot*' (energy) by Nanak. (Chahal, 2011, 2021)

Is It Big Bang

Nanak explains the origin of the Universe as follows:

ਕੀਤਾ ਪਸਾਉ¹ ਏਕੋ² ਕਵਾਉ³ ॥

Kītā pasā^o eko kavā^o.

ਤਿਸ ਤੇ ਹੋਏ ਲਖ⁴ ਦਰੀਆਉ⁵ ॥

Tis tē ho^e lakh dārī^o.

ਅਗਗਸ, ਜਪੁ 16, ਪੰਨਾ 3.

Most writers translate it as follows: (Thind, n.d.)

You created the vast expanse of the Universe with One Word.

Hundreds of thousands of rivers began to flow.

AGGS, Jap 16, p 3.

Using present-day science and the methodology of Nanak (Chahal, 2003), remembering that he would express his philosophy allegorically, metaphorically, and symbolically, therefore, my interpretation will be quite different from that of all other writers:

The Universe exploded from One² source of energy (Singularity)³ and started to expand¹; after that, many⁴ things⁵ appeared.

The above phrase of Nanak indicates the One (Singularity, Nothingness- **ਸੁੰਨ**-*Sunn*, the **ਨਿਰਗੁਨ** -*Nirgun* state) has given rise to everything means **ਸਰਗੁਨ** (*Sargun*) state, the Nature/Universe. This explanation is similar to the second part of the famous quote of Einstein: "*Energy cannot be created or destroyed; it can only be changed from one form to another.*"

Note:

ਪਸਾਉ¹ (*pasao*) means to expand.

ਕਵਾਉ² (*kavao*) does not mean sound, word, or note, as many Sikh scientists and theologians consider. It means 'energy' as explained by Guru Arjun as follows:

The word, **ਦਰੀਆਉ**³ (*dariao*), in the above phrase of Guru Nanak, has been explained with a new word, **ਸਭਿ** (*sabh* - everything), and **ਕਵਾਉ** (*kavao*) with another term, **ਕਵਾਵੈ** (*kavavai* - energy) by Guru Arjun:

ਏਕ¹ ਕਵਾਵੈ² ਤੇ ਸਭਿ³ ਹੋਆ⁴ ॥੧॥

Ēk kavāvai tē sabh ho^ā. ||1||

From One¹ source of energy² (Singularity) everything³ was created⁴.

AGGS, M 5, p 1003.

Note: **ਏਕ¹ ਕਵਾਵੈ²** (*ek kavavai*) in the above phrase is the same as **ਏਕੋ ਕਵਾਉ²** (*eko kavao*) used by Nanak in his previous phrase.

ਕਵਾਵੈ² (*kavavai*) is from **ਕਵਾ** (*kava*), which means 'energy' according to *Mahan Kosh*. (K. Singh, 1981)

ਦਰੀਆਉ³ (*daryao*) has been interpreted as rivers by many scholars. Keeping in view the methodology used by Nanak, '**ਦਰੀਆਉ**³' (*daryao*) has been used as a metaphor for the word, things. What are those things?

The word, '**ਲਖ ਦਰੀਆਉ**' (*lakh dariao*), has been used to represent 'many things. It means that when there is a river, there are many things in it and around it. Nanak expresses the above phenomenon in simple language of 550 years ago as follows:

ਏਕ¹ ਮਹਿ ਸਰਬ² ਸਰਬ² ਮਹਿ ਏਕਾ³ ਏਹ ਸਤਿ⁴ ਗੁਰਿ⁵ ਦੇਖਿ⁶ ਦਿਖਾਈ⁷ ॥੫॥

Ēk mēh sarab sarab mēh ekā eh satgur ḍekhḍ ḍikhā^o. ||5||

The True⁴ Enlightenment⁵ has given⁷ (to me) the vision⁶ that everything² is in One¹ and

One³ is in everything².

AGGS, M 1, p 907.

It is worth noticing that Baruch Spinoza, 2020 quoted about God as follows:

"God is everything, and everything is God."

That is very much comparable to the above phrase of Nanak.

Nature – God

Nanak further explains that the **ਸਰਗੁਨ** (*Sargun*) state of **ੴ** is Nature/Universe in the following phrase:

ਨਾਨਕ¹ ਸਚ² ਦਾਤਾਰੂ³ ਸਿਨਾਖਤੁ⁴ ਕੁਦਰਤੀ⁵ ॥੮॥

Nānak sachḍ dātārū sinākhaṭḍ kudratī. ||8||

Guru Nanaksays¹:

The Ever-existing² Bountious³ (Eternal Entity - ੴ) is recognized⁴ as Nature⁵ (the Universe).

AGGS, M 1, p 141.

Here Nanak is equating God with Nature (Universe). That means "God is Nature."

Note: Nature: 1. Physical World - all natural phenomena and living things.

2. The forces and processes collectively that control the phenomena of the physical world independently of human volition or intervention.

According to German philosopher Karl Jaspers, when Baruch Spinoza (1632-1677) wrote "*Deus sive Natura*" ("**God or Nature**"), Spinoza meant God was *Natura naturans*, not *Natura naturata*, that is, "a dynamic nature in action, growing and changing, not a passive or static thing." (*Spinozium*, n.d.) In 1929 Rabbi Herbert Goldstein sent a telegram to Albert Einstein (Livio, 2018) asking, "Do you believe in God?". In response, Einstein wrote that he admired the Dutch Jewish philosopher Baruch Spinoza and stated: "*I believe in Spinoza's god, who reveals Himself in the lawful harmony of the world, not in a god who concerns himself with the fate and the doings of mankind.*"

Is it not strange that the Natural Philosophy of Nanak, GOD IS NATURE, is similar to that of Spinoza and Einstein?

It is evident from the above discussion that the Eternal Entity (God), conceptualized by Nanak as a logo, ੴ, has become Nature/Universe after ਕੀਤਾ ਪਸਾਉ¹ ਏਕੋ² ਕਵਾਉ³ || *Kīṭā pasāo eko kavāo* in a simple language is similar to that of Big Bang theory.

The infiniteness of the Universe

According to present-day scientific knowledge, the Universe continues expanding after the Big Bang. Nanak explains the infiniteness of the Universe as follows:

ਪਾਤਾਲਾ¹ ਪਾਤਾਲਾ¹ ਲਖ ਆਗਾਸਾ² ਆਗਾਸਾ² ||

Pātālā pātāl lakh āgāsā āgās.

ਓੜਕ ਓੜਕ ਭਾਲਿ ਥਕੇ ਵੇਦ ਕਹਨਿ ਇਕ ਵਾਤ ||

Orak orak bhāl thake ved kahani ik vāt.

ਸਹਸ ਅਠਾਰਹ³ ਕਹਨਿ ਕਤੇਬਾ ਅਸੁਲੂ ਇਕੁ ਧਾਤੁ⁴ ||

Sahas aṭhārah kahan kaṭebā asulū ik dhāt.

ਲੇਖਾ⁵ ਹੋਇ ਤ ਲਿਖੀਐ ਲੇਖੇ ਹੋਇ ਵਿਣਾਸੁ ||

Lekhā hoie ta likhīai lekhai hoie viṇās.

ਨਾਨਕ ਵਡਾ ਆਖੀਐ ਆਪੇ⁶ ਜਾਣੈ ਆਪੁ ||੨੨||

Nānak vadā ākhīai āpe jāṇai āp. ||22||

There are hundreds of thousands of nether worlds¹ and hundreds of thousands of skies².

After significant research, the Vedas have said it is definitely as above.

The Semitic books say that there are eighteen thousand³ worlds, which is the fact⁴.

However, Nanak says:

It cannot be possible to count⁵ (the number of the celestial bodies in the Universe) because the accounting person may reach the end of his life during counting, and it will still be incomplete.

Guru Nanak further says:

That Eternal Entity (God)⁶ is great. Who knows the account (of the celestial bodies in the Universe).22.

AGGS, Jap 22, p 5.

In the first two lines of this stanza, Guru Nanak refers to what the Vedas say: there are hundreds of thousands of *Patal* (nether worlds) and hundreds of thousands of skies; on the other hand, the Semitic books say that there are 18,000 worlds in the following third line. This is the information from the Vedas and the Semitic texts but not the views of Nanak. However, some theologians and preachers erroneously interpret that it is Nanak saying that there are *lacs* (hundreds of thousands) of *patal* (nether worlds) and *lacs* of skies. They also claim that Nanak was a great scientist to say so. They ignore that this is the information in Vedas and Semitic books.

Scientifically there is no *patal* (nether world) in this Universe; it is an ancient myth. Similarly, there is no sky. The color of the sky on a clear cloudless daytime is because blue light is scattered in all directions by the tiny molecules of air in Earth's atmosphere. It is the color due to the depth of the air around the Earth through which the sunlight passes before coming to us; in fact, it is a void or space.

After quoting the available information or the accepted concept of that time, Nanak gives his observations in the last two lines. He says the Cosmos (Universe) contains countless celestial bodies; the actual number would be known only to the Eternal Entity (God). (Fig. 4).

According to scientific information, there are billions of galaxies, and each galaxy is composed of billions of stars and their planets and moons. Our Sun, having eight planets revolving around it, is one of the billions of stars of our galaxy, the Milky Way. (Fig. 5)

Time of the Origin of the Universe

When did the Universe come into existence? As already discussed, now we know the Universe's origin was



Figure 4. Webb's image covers a patch of sky approximately the size of a grain of sand held at arm's length by someone on the ground – and reveals thousands of galaxies in a tiny sliver of the vast universe.
Credit: Image credit - NASA, ESA, CSA, and STScI - main_image_deep_field_smacs0723-5mb (1).jpg

approximately 13.77 billion years ago. However, about 550 years ago, Nanak said that it was difficult to estimate the time of the origin of the Universe in the following stanza:

ਕਵਣੁ ਸੁ ਵੇਲਾ¹ ਵਖਤੁ² ਕਵਣੁ ਕਵਣ ਥਿਤਿ³ ਕਵਣੁ ਵਾਰੁ⁴ ॥
Kavaṇ so velā vakḥaṭ kavaṇ kavaṇ thiṭ kavaṇ vār.
ਕਵਣਿ ਸਿ ਰੁਤੀ⁵ ਮਾਹੁ⁶ ਕਵਣੁ ਜਿਤੁ ਹੋਆ ਆਕਾਰੁ⁷ ॥
Kavaṇ sē ruṭī māhu kavaṇ jīṭ hoā ākār.
Nanak first poses a question:
What was that time¹, and what was that time/moment²?
What was that month³, and what was that day⁴?
What was that season⁵, and what was that month⁶: when the Universe was created⁷?
AGGS, Jap 21, p 4.

Then he answers as follows:

ਵੇਲਾ¹ ਨ ਪਾਈਆ ਪੰਡਤੀ ਜਿ ਹੋਵੈ ਲੇਖੁ ਪੁਰਾਣੁ ॥
vel na pāīā pandṭī jē hovai lekḥ purāṇ.
ਵਖਤੁ² ਨ ਪਾਇਓ ਕਾਦੀਆ ਜਿ ਲਿਖਨਿ ਲੇਖੁ ਕੁਰਾਣੁ ॥
vakḥaṭ na pāīā kāḍīā jē likḥan lekḥ kurāṇ.
ਥਿਤਿ³ ਵਾਰੁ⁴ ਨਾ ਜੋਗੀ ਜਾਣੈ ਰੁਤਿ⁵ ਮਾਹੁ⁶ ਨਾ ਕੋਈ ॥
Thiṭ vār nā jogī jāṇai ruṭ māhu nā koī.
The pundits could not find that time¹, whether it was written in the Puranas.
That time/moment² is not known to the Qazis if it were written in the Koran.
Nor the month³ nor the day⁴ nor the season⁵ nor the month⁶ is known to the yogis.
AGGS, Jap 21, p 4.

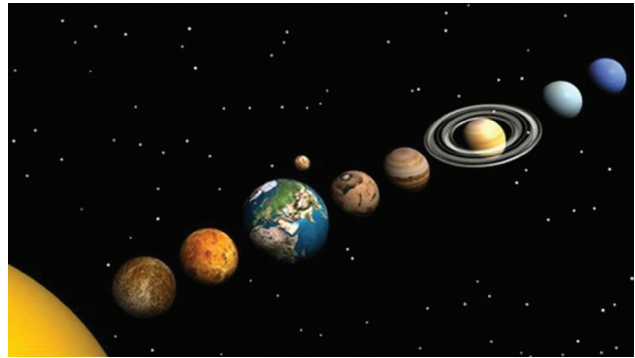


Figure 5. Sun and its planets. The Earth, with its Moon is third from the Sun.

Credit: <https://www.nasa.gov/image-feature/goddard/2022/nasa-s-webb-delivers-deepest-infrared-image-of-universe-yet>

Note: ਥਿਤਿ (*tith*) means month according to the lunar calendar.
ਮਾਹੁ (*mah*) means month according to the solar calendar.

Then who knows the answer?

Nanak answers it as follows:

ਜਾ ਕਰਤਾ¹ ਸਿਰੀ² ਕਉ ਸਾਜੇ³ ਆਪੇ⁴ ਜਾਣੈ ਸੋਈ ॥
Jā kartā sirī kaṭo sāje āpe jāṇai soī.
Only the Creator^{1,4}, Who created³ the Universe², knows it (the time of creation).
AGGS, Jap 21, p 4.

Here Nanak falls back to the ancient philosophy of Creation theory that the creator (God) knows the time of creation. On the other hand, Nanak has explained the expansion of the Universe (many things) from One source of energy, where there is no involvement of God – the Creator.

Origin of Our Solar System

It has been discussed earlier that the origin of the Universe was not known to the pundits, *Qazis*, and *Yogis*. However, in the following verse, Nanak explains the formation of our solar system, and its formation dates back more than a billion years (today, it is known as 4.6 billion years ago). He describes the primordial state of our solar system as a mass of gases in our galaxy:

ਅਰਬਦ ਨਰਬਦ¹ ਧੁੰਧੁਕਾਰਾ² ॥
Arbaḍ narbaḍ ḍḥunḍḥūkārā.
ਧਰਣਿ³ ਨ ਗਗਨਾ⁴ ਹੁਕਮੁ⁵ ਅਪਾਰਾ⁶ ॥
Ḍḥaraṇ na gagna hukam apārā.
ਨਾ ਦਿਨੁ ਰੈਨਿ⁷ ਨ ਚੰਦੁ ਨ ਸੂਰਜੁ ਸੁੰਨੁ⁸ ਸਮਾਧਿ ਲਗਾਇਦਾ ॥੧॥
Nā ḍin rain na cḥanḍ na sūraj sunn samāḍḥ lagāīḍā. ||1||
.....

ਜਾ ਤਿਸੁ ਭਾਣਾ⁹ ਤਾ ਜਗਤੁ¹⁰ ਉਪਾਇਆ¹¹ ॥

Jā tis bhāṇā tā jagat upāiā.

More than a billion years ago¹,

There was only a mass of gases².

There was no Earth³ or sky⁴, but only the Laws⁵ of Nature/Universe, which is Infinite⁶.

There was no day, no night⁷, no Moon, no Sun, but Nothingness⁸ was by itself.^{1...}

After a lengthy description what was not happening on the Earth and about the living of people, Nanak says:

According to the Laws of Nature/Universe⁹, the mass of gases formed¹¹ the world¹⁰ (Solar System with eight planets including our Earth as our world.)¹⁴.

AGGS, M 1, p 1035.

Here, Nanak explains the primordial state of our Solar System as a mass of gases. Still, it is erroneously interpreted by some theologians to describe the primordial state of the Universe. The Universe originated with the Big Bang from the 'ੴ' (Ek – One) in ੴ as Singularity or from ਸੁੰਨ (sunn) (Nothingness) about 13.77 billion years ago. On the other hand, our Solar System originated about 4.6 billion years ago from a mass of gasses already existing in our galaxy, the Milky Way.

Note ਅਰਬਦ ਨਰਬਦ¹ (arbad narbad): arbad (a colloquial word for arb) means one billion, and narbad means that which cannot be counted in arb; therefore, arbad narbad means more than one billion, maybe a period of tens of billions of years.

3. ਹੁਕਮੁ (hukm): Nanak calls the Laws of Nature/Universe the Laws of the Eternal Entity (God) - (hukm).

The evolution of our solar system is explained as follows:

Heliocentric Solar System of Nicolaus Copernicus

Nanak (1469-1539) in South Asia and Copernicus (1473-1543) in Europe were contemporaries of the Period of Renaissance (14th to 17th centuries). Both lived for 70 years. Guru Nanak contributed a lot to understanding Cosmology by keen observations of Nature and its Laws, while Copernicus did a lot on astronomy through observations and experimentations. Nevertheless, neither of them was in favor of Astrology having any influence on the destiny of humans.

Heliocentric Solar System

Scholars believe that by around 1508, Copernicus developed a celestial model – a heliocentric planetary system. Heliocentric means having or representing the Sun as a center. However, during the second century

CE, Ptolemy invented a geometric planetary model with eccentric circular motions and epicycles. This differed from Aristotle's idea that celestial bodies moved in a fixed circular motion around the Earth. Copernicus's heliocentric solar system named the Sun, rather than the Earth, as the center of the solar system. Before Copernicus, as early as the third century BCE, the ancient Greek astronomer Aristarchus of Samos had identified the Sun as a central unit orbited by a revolving Earth. However, his heliocentric theory was dismissed because Ptolemy's ideas were far more accepted by the influential Roman Catholic Church, which adamantly supported the Earth-based solar system theory.

Around 1514, Copernicus completed, *Commentariolus* (Latin for «Small Commentary»), a 40-page manuscript summarizing his heliocentric planetary system. In addition, *De revolutionibus orbium coelestium* («On the Revolutions of the Heavenly Spheres») was published right before his death. Copernicus's theories incensed the Roman Catholic Church, which was considered heretical. When *De revolutionibus orbium coelestium* was published in 1543, religious leader Martin Luther opposed the heliocentric solar system model. His underling, Lutheran

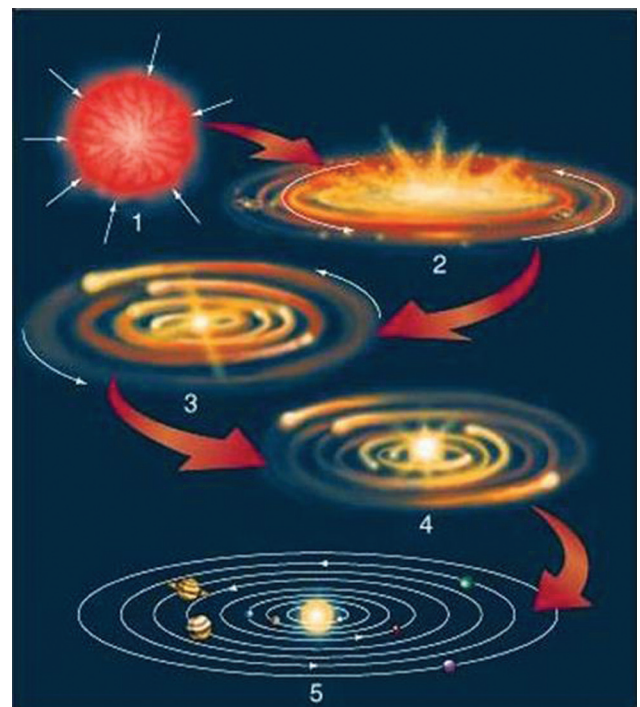


Figure 6. Formation Solar System: 1st stage indicates the Big Bang explosion, 2nd stage shows Dhundu Kara (mass of gasses/atoms) in our galaxy, the Milky Way, 3rd & 4th stages show the atoms are concentrating on forming various planets and portion of Hydrogen and Helium is gathering in the center to form the Sun, and the 5th stage is showing clearly the Sun in the center and its planets including the Earth encircling the Sun.

Credit: <https://www.phy.olemiss.edu/~luca/astr/Topics-Solar/Formation-N.html>

minister Andreas Osiander quickly followed suit, saying of Copernicus, “this fool wants to turn the whole art of astronomy upside down.” Osiander even went so far as to write a disclaimer stating that the heliocentric system was an abstract hypothesis that need not be seen as a truth.

Ironically, Copernicus had dedicated *De revolutionibus orbium coelestium* to Pope Paul III. If his tribute to the religious leader was an attempt to cull the Catholic Church's softer reception, it was useless. The church ultimately banned *De Revolutionibus* in 1616, though the book was eventually removed from the list of forbidden reading material. (*Nicolaus Copernicus Biography*, n.d.)

After Copernicus, in July 1609, Galileo (1564-1642) developed a telescope and soon began mounting a body of evidence that supported Copernican theory and contradicted Aristotle and Church doctrine. (*Galileo Biography: Astronomer, Scientist (1564–1642)*, n.d.) About 70 years after Copernicus in 1613, Galileo published his sunspots observations, refuting the Aristotelian doctrine that the Sun was perfect. That same year, Galileo wrote a letter to a student to explain how Copernican theory did not contradict Biblical passages, stating that scripture was written from an earthly perspective and implying that science provided a different, more accurate view. The letter was made public, and Church Inquisition consultants pronounced Copernican theory heretical. In 1616, Galileo was ordered not to “hold, teach, or defend in any manner” the Copernican theory regarding the motion of the Earth.

In 1623, a friend of Galileo, Cardinal Maffeo Barberini, was selected as Pope Urban VIII. He allowed Galileo to pursue his work on astronomy and even encouraged him to publish it, on condition that it be objective and not advocate Copernican theory. In 1632, Galileo published the *Dialogue Concerning the Two Chief World Systems*.

Church's reaction against the book was swift, and Galileo was summoned to Rome. The Inquisition proceedings lasted from September 1632 to July 1633. He was convicted of heresy and was kept under house arrest for the rest of his life. Though ordered not to have any visitors or his works printed outside of Italy, he ignored both. In 1634, a French translation of his study of forces and their effects on the matter was published, and a year later, copies of the *Dialogue* were published in Holland. While under house arrest, Galileo wrote *Two New Sciences*, a summary of his life's work on the science of motion and the strength of materials. It was printed in

Holland in 1638. By this time, he had become blind and in ill health.

However, in time, the Church could not deny the truth in science. In 1758, it lifted the ban on most works supporting Copernican theory and, by 1835 dropped its opposition to heliocentrism altogether. In 1992, Pope John Paul II expressed regret about how the Galileo affair was handled. His contributions were recognized as a scientific revolution and earned the moniker “**The Father of Modern Science.**” (*Galileo Biography: Astronomer, Scientist (1564–1642)*, n.d.)

Let us return to the discovery of Copernicus that the Earth revolves around the Sun, which challenged the concept in the Bible that the Sun revolves around the Earth. On the other hand, Guru Nanak has a great vision to observe that our Sun and Moon are moving (revolving) around the center of our galaxy, the Milky Way, at a speed of hundreds of millions of miles in his simple language of that time as follows:

ਭੈ¹ ਵਿਚਿ ਸੂਰਜੁ² ਭੈ¹ ਵਿਚਿ ਚੰਦ੍ਰ³ ॥

Bhai vich sūraj bhai vich chand.

ਕੋਹ⁴ ਕਰੋੜੀ⁵ ਚਲਤ⁶ ਨ ਅੰਤੁ⁷ ॥

Koh karorī chalaṭ na ant.

ਅਗਸ, ਮ: 1, ਪੰਨਾ 151.

*The Sun² and the *Moon³ are travelling⁶ (around the center of Milky Way galaxy) about tens of millions⁵ of** miles⁴ under the Laws of Nature/Universe¹ and still traveling without any limit⁷.*

AGGS, M 1, p 151.

Note: *The Moon has been considered a planet of the Sun by Nanak, although it is a satellite of the Earth.

Bhai (ਭੈ): The word Bhai (ਭੈ), in general, is interpreted as “fear” by almost all theologians. But in the above phrase Bhai (ਭੈ) appears to mean under specific laws now known as the “Laws of Nature/Universe.

Our Sun lies near a small, partial arm called the Orion Arm, or Orion Spur, located between the Sagittarius and Perseus arms. (Fig. 7) The Sun, with its planets, travels at an average speed of 720,000 km/h (*In Depth| Sun – NASA Solar System Exploration*, n.d.) It would take about 230 million years to travel around the Milky Way even at this rapid speed. Our Sun (with its Earth and other planets) is about 23,483 to 28,700 light years away from the center of our Galaxy, the Milky Way (Williams, 2017)

The Earth revolves once every 23 hours, 56 minutes, and 4.09053 seconds, called the sidereal period, and its circumference is roughly 40,075 kilometers. Thus, the surface of the Earth at the equator moves at a speed of

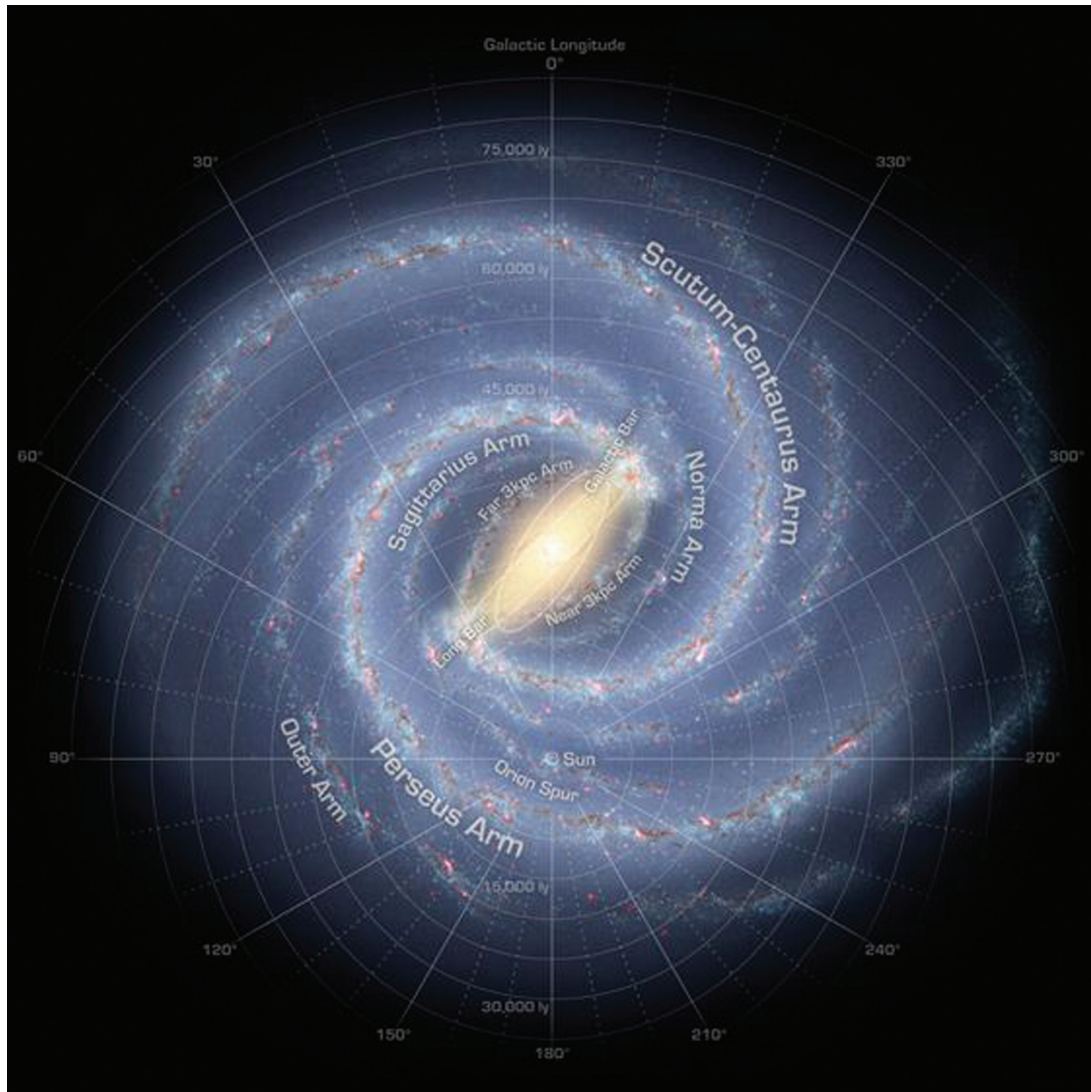


Figure 7. The location of our Sun is in our Milky Way.
Milky Way Courtesy NASA JPL-Caltech. ssc2008-10b1

460 meters per second--or **approximately 1,000 miles per hour.** (*How Fast Is the Earth Moving?* n.d.)

How the Earth is Staying in Its Orbit.

In ancient philosophy there was a concept that a white bull is carrying the Earth on his horns. Nanak challenged this concept with logic and in simple language as follows:

ਧੌਲੁ¹ ਧਰਮੁ² ਦਇਆ³ ਕਾ ਪੁਤ੍ਰੁ⁴ ॥
ਸੰਤੋਖੁ⁵ ਥਾਪਿ⁶ ਰਖਿਆ⁷ ਜਿਨਿ ਸੂਤਿ⁸ ॥
ਜੇ ਕੋ⁹ ਬੁਝੈ¹⁰ ਹੋਵੈ ਸਚਿਆਰੁ¹¹ ॥
ਧਵਲੈ¹² ਉਪਰਿ¹³ ਕੇਤਾ ਭਾਰੁ¹⁴ ॥
ਧਰਤੀ¹⁵ ਹੋਰੁ ਪਰੈ ਹੋਰੁ ਹੋਰੁ¹⁶ ॥
ਤਿਸ¹⁷ ਤੇ ਭਾਰੁ ਤਲੈ ਕਵਣੁ ਜੋਰੁ¹⁸ ॥ ...
Dhoul dharam dāiā kā pūt.
Santokh thāp rakhīā jin sūt.
Je ko bujhai hovai sachīār.

Dhavlai upar ketā bhār.
Dhartī hor parai hor hor.
Fis tē bhār talai kavan jor...
ਅਗਗਸ, ਜਪੁ # 16, ਪੰਨਾ 3.

The mythical white bull¹ that supports the Earth is, in fact, the mutual gravitational attraction^{3,4} between the Sun and the Earth under the Laws of the Universe²). This gravitational attraction⁵ holds^{6,7} the Earth in place⁸. The one⁹ who discovers¹⁰ this order (Laws of the Universe) becomes enlightened¹¹ and understands that a mythical white bull¹² carries so much¹³ load¹⁴ of the Earth. This bull will need another Earth¹⁵ to stand on, and another bull must carry that Earth, and so on¹⁶.
AGGS Jap # 16, p 3.

Note: In ancient philosophy, there was a concept that a white bull was carrying the Earth on its horns. Nanak challenged this concept with logic, as explained in the above phrases.

ਸੰਤੋਖੁ (santokh): Santokh is usually interpreted as contentment or satisfaction; the one who is content and satisfied settles

down in tranquility. Contentment (*santokh*) for the Earth signifies the mystic power with which the Earth stays in orbit. According to present-day science, this magical power has been interpreted as gravitational attraction, which keeps the Earth in orbit around the Sun.

It may be difficult for many scholars and theologians to accept the above interpretation. However, Principal T. Singh has interpreted above stanza almost in the same sense as of the author as follows:

“ਲੋਕਾਂ ਨੇ ਜੋ ਮੰਨਿਆ ਹੋਇਆ ਹੈ ਕੇ ਧਰਤੀ ਨੂੰ ਏਕ ਬਲਦ ਚੁਕੈ ਖੜੋਤਾ ਹੈ, ਉਹ ਬਲਦ ਅਸਲ ਵਿਚ ਰੱਬ ਦੀ ਕਿਰਪਾ ਦਾ ਸਾਜਿਆ ਕਾਨੂੰਨ ਹੈ, ਜਿਸ ਨੇ ਸਾਰੇ ਸੰਸਾਰ ਦੇ (ਸਿਸਟਮ) ਪ੍ਰਬੰਧ ਵਿਚ ਸੰਤੋਖ ਨੂੰ ਵਰਤਾਇਆ ਹੋਇਆ ਹੈ। ਅਰਥਾਤ, ਇਸ ਸਰਿਸ਼ਟੀ ਦੀ ਰਚਨਾ ਜੋ ਇਕ ਬੱਧੀ ਹੋਈ ਮਿਰਆਦਾ ਵਿਚ ਚਲ ਰਹੀ ਹੈ, ਇਸ ਵਿਚ ਹਰ ਇਕ ਚੀਜ਼ ਕਿਉਂ ਸਰਬ ਸ਼ਾਂਤੀ ਨਾਲ ਰਹੀ ਹੈ?... ਇਸ ਲਈ ਕੁਦਰਤ ਦਾ ਕਾਨੂੰਨ ਰੱਬ ਦੀ ਦਇਆ ਦਾ ਨਮੂਨਾ ਹੈ।”

English:

“The people have accepted that a bull has lifted the Earth; in fact, that bull is the law of the blessing of God, the system with which the whole Universe works under *santokh* (contentment or satisfaction). This means the evolution of the Universe is bound to work under those rules. Why does everything work perfectly and peacefully in this? If it is not under specific laws, there will be chaos everywhere. That is why the Law of Nature/Universe is the compassion of God.”

Principal T. Singh's interpretation also leads us towards understanding that ਸੰਤੋਖੁ (*santokh*) means 'gravitational pull.'

Nanak further writes about the Earth and its environment as follows:

ਪਵਣੁ¹ ਗੁਰੂ² ਪਾਣੀ³ ਪਿਤਾ⁴ ਮਾਤਾ⁵ ਧਰਤਿ⁶ ਮਹਤੁ⁷ ॥
ਦਿਵਸੁ⁸ ਰਾਤਿ⁹ ਦੁਇ¹⁰ ਦਾਈ¹¹ ਦਾਇਆ¹² ਖੇਲੈ¹³ ਸਗਲ¹⁴ ਜਗਤੁ¹⁵ ॥
Pavan gurū pāṇī pitā mātā dharatī mahat.
Divas rāt dū-e dā-e dā-e khelai sagal jagat
ਅਗਸ, ਜਪੁ ਸਲੋਕ # 2, ਪੰਨਾ 8.
Air¹ is like a Guru², water³ is like a father⁴ (both represent the environment),
And Earth⁶ is like the great⁷ mother⁵.
(Which provides all types of resources and food).
Both¹⁰ day⁸ and night⁹ are like a female nurse¹¹ and a male nurse¹, respectively,
And the whole¹⁴ humanity¹⁵ plays¹³ in their laps.
AGGS, Jap Sloka # 2, p 8.

This means humanity enjoys the natural environment and resources the Eternal Entity (God) provides. Therefore, humans must use their resources carefully

without any waste and preserve them for the next generations.

Nanak continues to describe the Earth as follows:

ਰਾਤੀ ਰੁਤੀ ਥਿਤੀ ਵਾਰ¹ ॥
ਪਵਣੁ² ਪਾਣੀ³ ਅਗਨੀ⁴ ਪਾਤਾਲ⁵ ॥
ਤਿਸੁ ਵਿਚਿ ਧਰਤੀ⁶ ਥਾਪਿ⁷ ਰਖੀ ਧਰਮ ਸਾਲ⁸ ॥
ਅਗਸ, ਜਪੁ 34, ਪੰਨਾ 7.
Rātī rutī thiṭī vār.
Pavan pāṇī agnī pātāl.
Fis vich dharṭī thāp rakhī dharam sāl.
Earth⁶ having hot (molten lava)⁴ in its center⁵ is a place⁷, among air² and water³ around it with day, night, and different seasons¹, for humanity to practice righteousness⁸.
AGGS, JAP 34, p 7.

And

ਧਰਤੀ¹ ਦੇਗ² ਮਲਿ ਇਕ³ ਵੇਰਾ ਭਾਗੁ⁴ ਤੇਰਾ ਭੰਡਾਰੀ⁵ ॥੨॥
Dharṭī deg milai ik verā bhāg terā bhandārī. ||2||
ਅਗਸ, ਮ:1, ਪੰਨਾ 1190.
The Earth¹ is great potential⁵ for the production of food² and storage⁶ of various matters have been produced only once³ for your⁴ (humanity) use⁴.
AGGS, M 1, p 1190.

Sunn (ਸੁੰਨੁ) – Is It Nothingness?

The “Nothingness” has been described by Kaup C., 2007 as Follows:

“Nothingness Theory defines nonexistence as the absence of existence, the absence of nothingness, and absence. It is what is not being referred to under any circumstances. Nonexistence, by definition, cannot be referred to, named, or defined. So, referring – to it in any way violates its strict definition. But this fundamental paradox is at the basis of Nothingness Theory and must be referred to anyway. Despite its not being, absolute nonexistence exerts a detectable force. We have proven through simple logic that the Universe has and always will exist. Therefore, the Universe must have existed before the “Big Bang” and will exist forever. This also means that the state of nothingness from which the Universe bursts into existence must have existed relative to absolute nonexistence, given that absolute nonexistence is not achievable. So, space/time – matter/energy can attain relative nonexistence by collapsing into infinite density, a uniform state of static equilibrium. Examples of this state of relative nonexistence can be seen throughout the Universe as ‘black holes.’”

A black hole is created when matter and space become concentrated, so they are not differentiated. One must embrace the whole paradox embodied in a black hole to

apprehend the full meaning of existence, nonexistence, energy, matter, and force. The essence of a black hole is that it isn't there, but it has a location relative to existing systems upon which it exerts the most powerful cosmic force. It is an area of nonexistence that has no place. The so-called supermassive black holes, apparently at the center of every galaxy, swallow up entire solar systems and yet contain nothing inside them because they have nothing inside to fill up. (KRUESI, 2012)

Nothingness does not mean without anything. The thing is there, but it is in such a small volume that it appears to be nothingness. It is actually the pinnacle of perfectly symmetrical uniformity of matter, energy, space, and time. According to the Big Bang Theory, the point was in such a small volume that it has been termed Nothingness by some and Singularity by others. This Nothingness was termed **ਸੁੰਨ** (*sunna*) and **ਨਿਰਗੁਣ** (*nirgun*) state by Nanak during the 15th century. He also called it *lyot* (highly condensed energy). The following discussion will further strengthen it.

WHAT IS **ਸੁੰਨ** (SUNN)?

The ੧ (One) in ੴ represents Singularity as discussed earlier, and it is also called **ਸੁੰਨ** (*sunna*) by Nanak, as is apparent from the following stanza:

The first three phrases are in the form of questions. Here **ਸੁੰਨ** (*sunna*) has been interpreted as Nothingness:

ਸੁੰਨੋ ਸੁੰਨ ਕਹੈ ਸਭੁ ਕੋਈ ॥
ਅਨਹਤ ਸੁੰਨ ਕਹਾ ਤੇ ਹੋਈ ॥
ਅਨਹਤ ਸੁੰਨਿ ਰਤੇ ਸੇ ਕੈਸੇ ॥
Sunno sunn kahai sabh koī.
Anhaṭ sunn kahā ṭe hoī.
Anhaṭ sunn raṭe se kaise.
Everyone speaks about Nothingness¹.
How did the Infinite² Nothingness³ originate⁴?
How⁸ can one understand⁷ the Infinite⁵ Nothingness⁶?

Then Nanak answers it as follows:

ਜਿਸ ਤੇ ਉਪਜੇ ਤਿਸ ਹੀ ਜੈਸੇ ॥
Jis ṭe upje tis hī jaise.
That (Nothingness)⁹ originated¹⁰ from the Universe¹¹;
therefore, it is the same since it has everything of that
Universe¹² (energy-matter and space-time but appears as
nothingness), and it will become the same as the Universe
again.
AGGS, M 1, p 943.

In other words, **ਸੁੰਨ** (*sunna*) Nothingness) became the Universe after the Big Bang. This is the same phenomenon

already discussed where the 'One' in ੴ became the Universe. After that, this Universe will go back to **ਸੁੰਨ** (*sunna*) (Nothingness) or Singularity again through the Big Crunch, and the cycle will go on. If it is so, then all theories trying to disprove Big Bang will fall apart, and the Singularity to Universe to Singularity cycle will continue, as mentioned by Guru Arjun:

ਕਈ ਬਾਰ ਪਸਰਿਓ ਪਾਸਾਰ ॥
Kaī bār pasriō pāsār.
ਸਦਾ ਸਦਾ ਇਕੁ ਏਕੰਕਾਰ ॥
Sadā sadā ik ekankār.
The Universe⁴ came into existence³ many¹ times².
Nevertheless, the One⁶ (Singularity or Sunn/Nothingness)
will remain One and Only⁷ all the time⁵.
AGGS, M 5, p 276.

The above two stanzas support the idea that the **ਸੁੰਨ** (*sunna*) (Nothingness/Singularity) is that Entity which has been represented as ੴ by Nanak. Moreover, Nanak also says that the **ਸੁੰਨ** (*sunna*) gave rise to the Universe (stars, planets, living, and non-living) very similar to that of the Big Bang Theory:

ਸੁੰਨਹੁ ਚੰਦੁ ਸੂਰਜੁ ਗੈਣਾਰੇ ॥
Sunnahu cḥand sūraj gāṇāre.
ਤਿਸ ਕੀ ਜੋਤਿ ਤ੍ਰਿਭਵਣੁ ਸਾਰੇ ॥
Fis kī joṭi ṭaribḥvaṇ sāre.
ਸੁੰਨੇ ਅਲਖੁ ਅਪਾਰੁ ਨਿਰਾਲਮੁ ਸੁੰਨੇ ਤਾੜੀ ਲਾਇਦਾ ॥੫॥
Sunne alakh apār nirālam sunne ṭāṛī lā'idā. ||5||
Moons² and Suns³ appeared⁴ from sunn¹ (Nothingness),
and Its⁵ energy⁶ pervades the whole Universe⁷ (mythical
three worlds).
The Ineffable⁹, Infinite¹⁰, without any flaw¹¹ (the Universe),
originated from the sunn (Nothingness)⁸ and is imbued¹³
in the same sunn (Nothingness)¹². 5.
AGGS, M 1, p 1037.

Nanak has also explained that the first elements were formed from the elementary particles from this *sunna* (Nothingness or Singularity) which gave rise to stars (like our Sun) and planets and galaxies in this Universe:

ਪੰਚ ਤਤੁ ਸੁੰਨਹੁ ਪਰਗਾਸਾ ॥
Panch ṭaṭ sunnahu pargāsā... 14
The five¹ elements² have originated³ from Nothingness⁴
(sunna)...14.
AGGS, M 1, p 1037-1038.

It can be concluded from the above discussion that the **ਸੁੰਨ** (*sunna*) of Nanak is similar to Nothingness or Singularity as described by scientists in which space-time, matter-energy has attained relative nonexistence by

collapsing into infinite density, which is a uniform state of static equilibrium. It is also called **ਨਿਰਗੁਣ** (*nirgun*) state of that Eternal Entity (God). This **ਸੁੰਨ** (*sun*) (Nothingness or Singularity) after the Big Bang gave rise to elementary particles, then to protons, neutrons, electrons, neutrinos, and anti-matter. The combination of one proton and one electron formed the first element, hydrogen. The addition of one neutron with a proton in the nucleus, one more electron around it gave rise to the second element, Helium. Therefore, with each proton, neutron, and electron addition, more elements were formed, as already explained. These elements gave rise to the whole Universe. This Universe is the **ਸਰਗੁਣ** (*sargun*) state of that Eternal Entity (God).

The *panj tatt* (five elements) considered in ancient and Vedantic philosophies are earth, water, air, fire, aether, or sky. However, these are not elements but compounds (water), mixtures (Earth and air), voids. These cannot form the Universe since they are part of this Universe. These so-called elements are only the parts of our Earth, not the part of the whole Universe. For example, Stars (Suns) in this Universe are made of only Hydrogen and Helium.

I compare the *paj tatt* as Hydrogen, Carbon, Oxygen, Nitrogen, and Phosphorus, which gave rise to the DNA (Deoxyribonucleic Acid) molecule called 'Thread of Life.' There is no life without DNA on this Earth. In addition, these five elements are the bases for forming inorganic and organic matter.

The above discussion of ੴ (One) by Nanak in ੴ represents Singularity or Nothingness in science and is called **ਸੁੰਨ** (*sun*) and **ਨਿਰਗੁਣ** (*nirgun*) state by Nanak where energy-matter and space-time collapsing into infinite density.

CONCLUSIONS

Since time immemorial, humans have wondered what the Universe is, where it came from, and how it got to be the way it is today. This mystery was resolved when it was discovered that the Universe burst from a single point called **Singularity**. Although there are many theories about the origin of the Universe, the Big Bang Theory still holds strong. According to the Big Bang Theory, our Universe sprang from a single point (**Singularity**) around 13.77 billion years ago.

This **Singularity** is comparable to the ੴ (*Eko - One*) in ੴ of Nanak. Some scientists consider SINGULARITY as NOTHINGNESS. But for Nanak Nothingness is **ਸੁੰਨ** (*sun*)

or **ਨਿਰਗੁਣ** (*nirgun*) state. The ੴ (*Eko - One*) in ੴ exploded and many things appeared as described by Nanak, **ਕੀਤਾ ਪਸਾਉ¹ ਏਕੋ² ਕਵਾਉ³ ॥** (*Kītā pasāo eko kavāo*). This explanation of the Universe is similar to that of the Big Bang Theory.

Nanak and Copernicus were contemporaries during the Period of the Renaissance, and both were 70 years old. Copernicus, in Europe was working on Astronomy through observations of Nature and declared that 'the Sun is the center, and the Earth revolves around it – A heliocentric system'. This challenged the concept of the Church that 'the Earth is the center, and the Sun revolves around it.'

On the other hand, Nanak in India, studying Nature and its laws observed that the Sun and its Moon have been moving for a long and still moving at an incredible speed around the center of our Galaxy, The Milky Way.

Galileo confirmed the discovery (The Sun is in the center, and the Earth revolves around the Sun) of Copernicus using Mathematics and the newly invented telescope in 1609. The discovery of Copernicus and its confirmation by Galileo shocked the concept of the Bible that the Earth is the center, and the Sun revolves around the Earth. The Church condemned both and their publications were banned, declared heretics, and punished. Galileo was kept under house arrest for life.

This observation of Nanak is comparable to today's Big Bang Theory. The observations about the origin of elements, celestial bodies, like Suns, Planets, etc., from **ਸੁੰਨ** (*sun*), called Nothingness in Science and **ਨਿਰਗੁਣ** (*nirgun*) state by Nanak, are also comparable to the Big Bang Theory. Cosmology in Nanakian Philosophy of the 15th century briefly provides critical similarities with today's Cosmology.

Therefore, the present in-depth study of '**Cosmology in Science and Nanakian Philosophy**' is an excellent addition to understanding the originality and uniqueness of Nanakian Philosophy of the 15th century, comparable to the Cosmology of today.

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Competing interests

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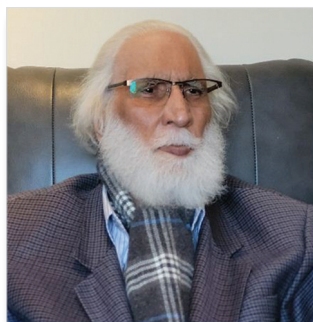
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