

# The Scientific Insights and Parallels in Time-Honored Scriptures with Modern Scientific Paradigms

Preeti Narooka<sup>1</sup>[0009-0008-3440-5192], Deepak Panwar<sup>2</sup>[0000-0002-3414-5086] and Saksham Agarwal<sup>3</sup>

<sup>1,2</sup>Artificial Intelligence and Machine Learning, Manipal University Jaipur, India <sup>3</sup>Electrical and Computer Engineering, Manipal University Jaipur, India <sup>1</sup>[preeti.narooka@jaipur.manipal.edu](mailto:preeti.narooka@jaipur.manipal.edu), <sup>2</sup>[deepak.panwar@jaipur.manipal.edu](mailto:deepak.panwar@jaipur.manipal.edu), <sup>3</sup>[saksham.229209040@mu.j.manipal.edu](mailto:saksham.229209040@mu.j.manipal.edu)

**Abstract.** In this era of rapid scientific advancement and technologies, the ancient Indian scriptures provide a reservoir of profound scientific knowledge. The advanced development in the knowledge of ancient India in astronomy, chemistry, mathematics, medical-science, architecture, cosmology, quantum studies were the results of careful, accurate and precise observations of the natural events and phenomena. This paper presents a remarkable parallel between the scientific and astronomical analysis found in ancient scriptures and in modern scientific understandings. This study aims to bridge the gap between the bygone scientific wisdom and current scientific paradigms and to explain the advanced scientific knowledge in the fields of science, astronomy and physics in ancient Indian texts. The study of this paper is based on the secondary sources data of the Vedic science, astronomy and physics studies in ancient scriptures found in India.

**Keywords:** Astronomy, Atomic Theory, Quantum Physics, Cosmology, Gravity, Vedas.

## 1 Introduction

The knowledge found in the Vedas as Shlokas, Puranas, Upanishads, Shrimad Bhagavad Geeta and in many more epics is totally scientific. They contain the advanced knowledge of Astronomy, Physics, Mathematics, Engineering and knowledge of many more fields (generally in Sanskrit language). From the ancient time in India, the scientific information is fused with hymns and stories in everyday life by explaining them with examples and metaphors, where all the scientific facts are applied and implemented in everyone's life practically (Like tradition connected to health benefits to the daily routine according to Ayurveda) through traditions and customs and stories. Many different scientific theories and calculation can be observed in the 'Rig Ved' which was written in 2000 BCE in ancient Bharat.

In Rig Veda, Puranas, Upanishads and in many more epics and scriptures we can find the evidences of the advanced scientific knowledge and the different applications of Astronomy, physics and mathematics has been observed. In scriptures we can directly

find the evidences of knowledge of, 1. Atomic Theories and Quantum Physics (where we can see the similar explanation of theory similar to Schrodinger's cat in Yog Su- tra) in Bhagwat Puran and Rig Veda; 2. Time Dilation and Age of Our Solar-System; 3. The idea of Gravity; 4. The calculation of Speed of Light in the form of Shloka; 5. The distance between the Sun and the Earth according to the shlokas and Hanuman Chalisa and its calculations. It is noticed in human psychology that humans can re- member hymns more easily than just statements, as we know that music and sound play a vital role in our nature our advanced knowledge in scriptures are described in the form of hymns and shlokas to easily understand and to easily remember them. In scriptures we find the curiosity of ancient India to understand the universe and advanced knowledge of science of sages and Rishis. Where the famous Indian astron- omers, physicists and mathematicians like Aryabhata, Bhaskaracharya, Saynacharya and many more studied and extended this subject.

## 2 Methodology

The study of this paper is a descriptive type in nature, this paper is based on the sec- ondary sources data of the Vedic science, astronomy and physics studies in ancient scriptures found in India.

**Sources of Data and Analysis:** The sources are taken from ancient India's scriptures and texts like Vedas, Puranas, Upanishads, Shrimad Bhagavat Geeta and their differ- ent translated books and researchpapers, articles and from research papers published at different time in different journals.

The different text and materials are taken from many different sources and all the sources are verified and examined carefully and the data is organized systematically under appropriate headings to ensure the comprehensive results and conclusion.

## 3 Scientific Juxtaposition

**3.1 Atomic Theory and Quantum Physics** When we talk about '*The Atomic Theory*', the first name that comes into our mind is "John Dalton", who first proposed the modern atomic theory in 1808 [1], but it is a matter of startling fact that, we find the definition of *Paramāṇu* (atom) first men- tioned in the ancient Indian text of *Shrimad Bhagavat Purana* and future more charac- teristics are explained in *Vaiśeṣika sutras* by Sage *Kaṇāda*.

**Paramāṇu (atom) explanation in Shrimad Bhagavad Purana:** In chapter 11, shloka 1 [2][3]:

*"maitrīya uchava caramaḥ saḥviśiṣāṇāmanekosaṅyutaḥ sadā | paramāṇuḥ sa vijñeyo  
nṛṇāmaikyabhramo yataḥ ||"*

Where, Maitreya explain Paramāṇu or atom as: The ultimate irreducible partical of the part of a substance (which cannot be further divided), which is ever separate (which has not yet evolved) and which is not combined with any other similar parti- cles and eternally existed, is known by the name of Paramāṇu (atom). It combines with one or more than one such Paramāṇu which create an illusion of a unity or a whole substance in the mind of men.

Where it is also described as the concept of quantum physics, where all the subatomic particles are not solid but are exists in the form of fuzzy waves (Strings or vibration according to String Theory [4]), which create an illusion of reality.[3]

**Characteristics of Paramāṇu in Vaiśeṣika sutras:**

Before the John Dalton's atomic theory, *Kaṇāda's atomic theory* was introduced in 600BCE in the Indian ancient text of Kaṇāda's *Vaiśeṣika sūtra* (Vaiśeṣika Darshan also known as Kaṇāda Sūtra) [5][6], which describes the atom, and its characteristics of an atom [7]. He defined an atom as the Paramāṇu or āṇu which is the smallest unit of matter that cannot be divided further, where everything is divisible and subdivision eventually result in reviling an āṇu and subsection of every particle has an end and cannot be divided indefinitely.

Characteristic of āṇu or atom according to Kaṇāda [5][6] are:

- An āṇu cannot be seen from our naked eyes.
- An āṇu is the smallest unit or building block of matter (all material existence).
- An āṇu is indestructible.
- An āṇu has some unique properties, and that properties are same as the class of the substance from which it belongs to.
- They can combine in many different ways and produce chemical changes in them by heating or by using other measures.
- A paramāṇu or atom, can exist in two different states: in a moving(dynamic) state or completely in a static state.

#### **Size of Atom according to The Mārkaṇḍeya Purāṇa:**

We can directly find the description of the size of an atom or āṇu in the Mārkaṇḍeya Purāṇa chepter 49, shloka 37 [8]:

*“paramāṇu para sūkṣma trasareṇumahoraṇaḥ | vālāgraścaiva niškāśca yūkāmścaiva yavodaraṇaḥ ||”*

This means: “A minute atom, a para-sukṣma, the mote in a sunbeam, the dust of the earth, and the point of a hair, and a young louse, and a louse, and the body of a barley- corn; men say each of those things is eight times the size of the preceding thing. Eight barley-corns equal an angula (finger-breadth), six fingerbreaths are a pada (step), and twice that is known as bitasti; and two spans make a cubit measured with the fingers closed in at the root of the thumb; four cubits make a bow, a danda (stick), and equal to two nadikayaga; two thousand bows make a gavyūti; and four times that are de-

clared by the wise to be a yojna; this is the utmost measure for the purpose of calculation.” [9][10]

Let us consider, 1 Pada (step) = 1 foot,

On calculating the size of *paramāṇu* using ‘*Mārkaṇḍeya-Purāṇa*’, the result came out that the size of a paramāṇu or *āṇu* (atom) =  $2.9 \times 10^{-9}$ m. which is so close to the modern calculated value of an atom (10-10 m or 1 Å)

### Schrödinger's Cat concept of observer effect in Yog Sutra:

In the quantum world, on observing any particle, its behavior gets changed [11], like measuring its position or speed and forces it to choose only one state and collapse the superposition, where on not observing the particle, it can have more than one states. From this The Copenhagen interpretation arises that whatever particle is a subatomic particle; it changes its behavior on our observation [12]. This means that universe changes with the observation.

As an objection *Erwin Schrödinger* introduced the Schrödinger's cat thought experiment in 1935. Where in this experiment it is imagined that a sealed box containing a cat and a radioactive substance which have probability of 50% that it will decay or not and with a vial of poison, and a Geiger counter to release the poison when decay is detected. In quantum mechanics before decay is observed the radioactive atom should exist in a state of superposition where both decayed and not decayed condition can be possible at the same instant time. where, this experiment (thought) demonstrates that how accepting the uncertainty at the microscopic level affects the macroscopic objects. The cat in the Schrödinger's cat in box which is alive or dead, made it totally dependent on the state of a subatomic particles [13].

According to *The Copenhagen interpretation* in this experiment the fate of the atom is undetermined until the observer observes it. So, if the cat's life depends on the state of the atom, shouldn't the cat also be in a superposition state (where the cat is both alive and dead at the same instance of the time)? Simply which is not possible because if the cat will survive it will only remember being alive [14]. As a result, they said that the state of an object does not depend on one person's observation.

The similar explanation we get in The Yog Sutra written by maharishi Patanjali in 500BCE. When the student of Maharishi Patanjali asked that thus the universe get chance on one's perspective or observation or not? He answered it In Patanjali Yog Darshan, Kaivalya Pāda, Shloka 16 [15][16]:

“*na ca ekacitta tantraṃ ced vastu tat apramāṇakam tadā kim syāt*”

where, *Śrī Patañjali* said that “The world is not dependent on a limited mind or on a group of similar minds. Otherwise, if that limited minders were to lose perception of an object, the item would no longer exist,

which is not possible". Where everything is getting observed all the time, that consciousness is defined as the *Purusha*.

### 3.2 Time Dilation and age of Our Solar System

It is defined as the difference in rate of time passes for the different observers. In Vedas time is described as the relative quantity. We see that *Prabhu Shree Kṛṣṇa* said in *Shree Bhagavat Geeta*, chapter 8, in Shloka 17 to Arjuna [17]:

“*sahasrayugaparyantamaharyad brahmano viduḥ | rātrim yugasahasrāntām te'horātravido janāḥ ||*”

where, it is described as “Those Yogis who know from realization Brahma’s day as covering a thousand Mahayugas, and so his night as extending to another thousand Mahayugas know the reality about Time.” [18], where we can clearly see that the time for Brahma in Brahma loka passes differently where one day of the Brahma is equal to 4.32 Billion human years [19]. Where it is also supporting the *Einstein’s Theory of Time Dilation* [20].

In continuity in shloka 18:

“*avyaktād vyaktayaḥ sarvāḥ prabhavantyahar-āgame | rātryāgame pralīyante tatraivāvyakta-sanjñake ||*”

Where, he says that in the starting of the day of the Brahmā he creates or manifest all the heavenly bodies and destruction occur at the end of his night [17]. Where if we calculate the age of our solar system according to this shloka,

1 day of Brahmā = 1 night of Brahmā = 4.32 Billion human years

1 Ahoratri (1 day + 1 night combine) of Brahmā = 8.64 billion human years

Means the life span of our solar system is of 8.64 billion years, and the estimated present age of our solar system is 4.568 billion years [21] and according to the estimation our sun will enter into a red giant phase in 4.5 billion years, where the expected life span of our sun came out to be 9.068 billion years, which is so near to the expected life span according to ancient Indian texts.

**Table 1:** Comparison of calculation of life span of solar system

	Calculation	Solar System's Total Life Span
<b>Shree Bhagavat Geeta, chapter 8, in Shloka 17</b>	1 <i>Ahoratri</i> (24 hours) of Brahṁā = 8.64 Billion human years	8.64 billion years
<b>Modern Science</b>	Present age of our solar system (or sun) + estimated time left (before sun becoming red giant) = 9.068 billion human years	9.068 billion years

The continuous cyclic nature of the universe implies that the expanding universe is always followed by the contraction or destruction in cosmos. A cosmos without end (as the day and night's cycle of Brahma). Whereas, the same theory for this universe is said by Prabu Shree Kṛṣṇa in Bhagavad Gita nearly 5000 years ago and the same is said by Einstein in his theories [20].

### 3.3 The idea of Gravity

Whenever we start the discussion on gravity, the first scientist that comes to our mind is the “*Sir Isaac Newton*”. In our school books we read a story that he discovered the gravity when he was sitting under an apple tree and suddenly an apple falls on his head and he got the idea of gravity. But as a matter of fact, that 1200 years ago before the discovery of theory of gravitational force an Indian Mathematician BhaskarAcharya gave the concept of gravity as *Gurutvākṛṣaṇa*. Where, in his thesis *Siddhānta Śiromaṇi*, where he talked about many topics like position of planets, solar-eclipse and lunar-eclipse, cosmology, different mathematical techniques and about many astronomical equipment and many more. Gravity plays a vital and important role in the existence of our universe, its due to gravity only that earth revolves around the sun and sun, moon, earth, planets and everything in our universe is affected by gravitational forces. We can say that one of the major things due to which this universe and life exists. The law of gravitation force is first given by Bhaskaracharya in his book *Surya Siddhanta* (Siddhant Shiromani) [22]:

“*madhye samantandasya bhugolo vyomni tisthati bibhranah paramam saktim brahmano dharanatmikam*”

This means that The spherical earth (bhūgolo) stands at the center of space due to the dharanatmikam sakti (force or energy also known as *gurutvākṛṣaṇa*), which is of the self-supporting in nature. Also, in Sidhanta Shiromani, Bhuvanakosa, 6th Sloka:

*“akrsta saktisca mahi taya yat svastham guru svabhimukham svasaktya akrsyate tatpatativa bhati same samantat kva patatviyam khe”*

This means that every object falls on the ground because of the earth’s force of attraction (Gurutvākṛṣaṇa or gravity). where, this force of attraction allows the planets and constellations to stay in their respective orbits.

In these shlokas we can directly see that how Bhaskaracharya is explaining the concept of gravity very clearly and also specifying that the earth is spherical in shape not flat. Ebenezer Burgess and Pundit Babu Deva Shastri [23] also define *Gurutvākṛṣaṇa* or gravity as self-supporting in nature and it is also referred as Brahma’s most excellent power of steadiness and which is all around in universe(ether) from the two shlo- kas.

Further, in his book name Lilavati, where he explained the earth’s gravitational force (Gurutvākṛṣaṇa Shakti) and that there is a mutual-attraction between the planets, this helps them to hold themselves strongly in the universe or space and many more concepts. There’s a lot to understand but we don’t have any idea about the knowledge of sage Bhaskaracharya and their *“Bhaskaracharya’s Law of Gurutvākṛṣaṇa”* [24].

### 3.4 Calculation Of Speed of Light in Rig Veda

From a long time, it was really fascinating and challenging to calculate the speed of light in our world. Great scientists and astronomers like Galileo, Hippolyte Fizeau, Albert A. Michelson and many more tried to find and calculate the speed of light. Where, before 1675 it was not even known that whether the light travel instantaneous- ly or at a very high and finite speed [27]. In 1907 Rosa and Dorsey concluded that the speed of light to be  $299710000 \pm 30000$  m/s [25][26].

But amazing fact is that the Speed of light is already mentioned in the Rig Veda, in 14th century, 600 years before the calculation of speed of light Maharishi Saynacharya added a shloka with the original sloka of chapter 50, shloka 4 [28] where we can see that the speed of light is mentioned as:

*“taraṇi-viśva-darśavo jyotiṣkṛd asi sūrya | viśvam ā bhāsi rocanam ||”*

This mean: “Swift and all beautiful art thou, O Surya, maker of the light, Illuming all the radiant realm.”

*“tathā ca smaryata yojanānām sahasram dve śate dve ca yojane | ekena nimiṣārdhena kramamāṇa  
namo'stu te ||”*

This mean: “With deep respect, I bow to the sun, who travels 2202 yojanas in half nimesha.”

Here, we can see that in first 2 lines of shloka it is said that sun (Surya) produces light and in the second line the speed of light described as it covers 2202 yojanas in just half a nimesha. Where: 4 Hasta = 1 Dhanu, 8000 Dhanu = 1 Yojana, 1 Nimesha = 0.2 second

As, 1 Dhanu = 6 ft,

1 Yojana = 8000 \* 6 ft = 48,000 ft = 9.09 miles

2202 Yojanas = 2202 \* 9.09 miles = 18379.98 miles

As, speed = distance/ time = 18379.98/0.1 = 183799.8 miles/sec

So, the Speed of light according to the Rig Veda's shloka is 183799.8 miles/s = 295,797.105331 km/s

Speed of light according to modern physics = 299,792.458 km/s

Where, accuracy in speed of light according to Rig Veda to modern physics is 98.67%. it doesn't stop here in Rig Veda we find many things about our cosmos we can't even think how ancient sages calculated this all.

### 3.5 Distance between Sun and Earth in Hanuman Chalisa

It is well known that the Earth to Sun most precise measurements of the distance have come from radars in the 1960. But the fact is that in Hanuman Chalisa written by Goswami Tulsidas in 15th century, which proves that the distance between Surya and Prithvi was calculated much more accurately by Goswami Tulsidas ji than the 17th century scientists that is even 2 centuries ago. where in the two lines we can find the exact distance between Bhānu and Pṛthvī is given:

*“yuga-sahasra-yojana-para-bhānu, līlyo tāhāham adhura-phala-jāna”*

This says that the Surya (bhānu or Sun) is at the distance of yuga \* sahasra \* yojana from the earth.

According to the following units we can calculate the distance [19]: Where, 1 Yuga = 12,000 divine years

1 sahasra = 1000

1 yojana = 12.8 km

Total Distance between The Bhānu and The Pṛthvī = 1 yojana \* 1 yuga \* 1 sahasra. Total Distance between The Bhānu and The Pṛthvī = 12,000 × 1000 × 12.8 km = 153,600,000 km. As the Pṛthvī (Earth)

orbit in elliptical orbit around the Bhānu (Sun), so there can be slight difference in this actual distance. Now, the question is that how does Tulsidas ji calculated the distance between The Bhānu (Sun) and The Pṛthvī (Earth). We should observe this that the ancient people or sages from India had much more advanced knowledge that is beyond our imagination [30].

#### 4 Conclusion

Scriptures of the ancient India definitely contains much more advanced knowledge in field of Science, Astronomy and much more. From a long time, the knowledge in scriptures like Vedas, Puranas, Upanishads, Shree Bhagavat Geeta and many more epics contains the knowledge which we can't even imagine. In this paper we saw the some evidences that how the topics like Atomic Theory, Quantum physics and Mechanism, Time Dilation, Gravity or *guruvākṛṣṇa* and so on are well defined in our ancient scriptures not only theoretically but exact calculations are also give for the constants like speed of light, size of an atom or *paramāṇu*, distance between Sun and earth and even the Life Span of our Solar System are specified in our scriptures like Hanuman Chalisa, Rig Veda, Shree Bhagavad Geeta, Mārkaṇḍeya Purāṇa and in many more in the form of shlokas and sutras (Laws). These examples are just some drops from the ocean of the advanced knowledge in our scriptures which are written centuries ago, it is said that the oldest record found is Rig Veda which was written 2000BCE ago, but the truth is that many scriptures in Sanatan (eternal) Dharma was written ages ago, we should not forget that the many scriptures and their records got destroyed with the time.

We should not forget that the history of homo sapiens is so old on this planet Earth and we cannot say that humans got this success in advanced modern science and knowledge from just 400-500 years ago. In support of the knowledge in ancient scriptures Vedanta, the opinion of Erwin Schrödinger and Albert Einstein are:

- “When I read the Shrimad Bhagavad Geeta and reflect about how God created this universe, everything else appears superfluous.” – *Albert Einstein*.
- “The Unity and Continuity of Vedanta are reflected in the unity and continuity of wave mechanics. This is entirely consisting with the Vedanta concept of All In One.” - *Erwin Schrödinger* [29].

Where, as a fact it is found that that the well-known lines said by Erwin Schrödinger [29] was also inspired from Mandukya Upanishad. Indian ancient scriptures are not only the religious text but in reality, they are text filled with science and knowledge.

It will be not wrong if we say that there is extremely advanced knowledge in our scriptures which can boost our modern knowledge and science so much and can help us to understand many concepts which are

unknown to us till yet. In era of artificial intelligence and automation and machine / deep learning we can use this knowledge and can understand the unknown using the technology and as a result we can address many decades of the upcoming future with this advancement in our knowledge. I am dedicating this paper and this study to *Lord Śiva (Mahadev)*, who showed me the path of knowledge and love and who oversees the whole brahmāṇḍa (universe) and illumines the whole brahmāṇḍa and reality through their words and knowledge. Jai Visvanath.

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