

# Physical Sciences in Vedas: a Practical Review

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<b>ARTICLE HISTORY</b> Accepted: October, 15 <sup>th</sup> 2018 Revised: Nov, 1 <sup>th</sup> 2018 Published: Nov, 5 <sup>th</sup> 2018	<b>ABSTRACT</b> The link between science and religion is widely discussed by religious scholars and scientists. Vedic experts claim that modern scientific theories, as well as technologies developed by scientists, actually originate from Vedas. This sometimes raises a debate among scientists Vedic scholars. Some scientists believe that the evidence for science can be fully compatible with Vedas and the others claim that science and religion are separate and based on different aspects of human experience. In this study, we investigate the compatibility of physical science with Vedas. The study is performed by using a literature study. From the analysis of several samples, it can be concluded that the Vedas are fully compatible with the subject. Furthermore, the results were analyzed and reviewed by using a Technology Readiness Level (TRL) theory to understand why science in Veda can't ready be applied as a technology. The results revealed that physical sciences statements in Vedas are still general statements in which the aspects of science are still implied. So that it is required more detailed analysis and description to become a modern technology. Moreover, we found that the level of technology readiness of the technology still has TRL below 4 or classified as a basic science. According to the TRL theory, a technology can be applied when it reaches level 7. For this reason, collaboration between Vedic experts and scientists is a necessity for translating scientific statements in Vedas into technologies.
<b>KEYWORDS</b> Veda, physical science, technology readiness level, religion	

## INTRODUCTION

Today, physical science has been an influence on almost all aspects of human life. Theories of physics have fundamentally influenced most of the high technology

system and modern science. However, the impact of modern physical science goes not only on technology but also beyond it. The effect spread to the realm of thought, culture, and spiritual life as well as man's conception of the universe [1]. Recent new physical theories have moved into the world governed entirely by the highly speculative mathematical method and theory but only little of which can be experimentally verified yet. Many theories can't be verified yet. The exploration of the very small world of atomic and subatomic and very high-speed system to near speed of light in the twentieth century has revealed an unsuspected limitation of classical ideas and has necessitated a revision of many of our basic concepts to such as a quantum and relativistic theories. These concepts, however, fundamentally change our view on the universe. String theory, black holes, parallel universes, relativity and time travel, the grand unified theory of everything, the origin of the universe and its fate, etc. are contained mysterious facts and little understood. They become the subjects of interesting for physicists [3-6].

Physicists are often asked the questions that the question border on the spiritual rather than the scientific. For example the question about the purpose of the universe, the meaning of the life, and origin and fate of our earth. These discussions brought people to about modern physics and spiritual/metaphysics. This has been widely discussed by physicists and by philosophers over several decades. Many attempts performed by scientists and spiritualists to mix science and religion though. Especially for Hindu thoughts and scientific theories parallelism have been discussed by scientists such as K. Vasavada, C. Sagan, F. Copra, M.M. Yogi, P. Davies, and T.D. Singh, [1-2, 7-10]. In Indonesia, several scientists and Vedic experts such as I. K. Widnya, I.K. Donder, I.W. Suja, etc. also have tried to link between science and Hindu religion [11-14]. These studies suggested that the concepts of modern science in agreement and no contradictory to the ideas expressed in the Hinduism thoughts (Vedas). There are surprising similarities between the implications of theories of modern physics and Hindu philosophy as expressed in Vedas and Upanishads [1, 2]. For example, the basis of Hindu philosophy is the mystical idea of God. The God is usually described in Upanisads by the words: *Neti, Neti* means not this, not this. Based on this concepts, the Indian imagination has created a vast number of gods and goddesses whose incarnations and collected in many epics of enormous dimensions. The Hindu with deep insight knows that all these gods are creations of the mind, mythical images representing the

many faces of reality [1, 16-17]. On the other hand, the story of epics is created not only exciting but to convey the doctrines of philosophy from the mystical experience of spiritualists [1].

In physical science, scientists realized that, as far as knowledge of ultimate reality is concerned, physicists are in the same situation. That is every reality cannot describe precisely in everyday language. If we can explain something precisely by using language then that is not a reality [18]. Today we know that the Newtonian model is valid only for objects consisting of large numbers of atoms, and just for velocities which are small compared to the speed of light. When we face on very small or speedy world, the quantum and relativistic theories should be applied. All these models are partly right and the approximations which are valid for a certain range of physical phenomena. Beyond this range, they no longer give a satisfactory description of phenomena.

Similar to the Eastern religion where all verbal descriptions of reality are inaccurate and incomplete. Only a direct experience of reality transcends the realm of thought and language, and, since all mysticism is based on such direct experience, everything that is said about it can only be partly true. This thought may influence some early pioneers in quantum theory such as Bohr, Schrodinger, Heisenberg, and Einstein. Some books have been published on this subject [2]. Then they conclude that the fundamental laws of nature searched for by the scientists were thus seen as the laws of the supreme power (God). Some Indian scientists and spiritualists claim that not only fundamental of modern scientific theories but also modern technologies found by scientists are already available in Vedas previously[1-2, 7-8].

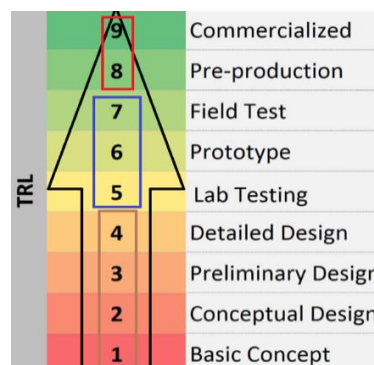
Especially for physical science, nowadays, the last several decades, physicists faced with the challenge of the revolutionary discoveries of relativity (very high-speed particles) and quantum physics (very small particles). It turned them into philosophical thinkers, initiating the development of reason of physics into philosophical logic. However comparing between modern physics and Hindu thought, we have to deal with the question of how we can make any comparison at all between an exact science and spiritual ideas and experiences. The spiritual disciplines are mainly based on meditation and insist on the fact that their insights cannot be communicated verbally. In another hand, the exact science (physics) are expressed in the highly sophisticated language of modern mathematics. The limitations of any knowledge obtained by scientific methods have become increasingly apparent in contemporary science, particularly in modern

physics which as stated by Werner Heisenberg that every word or concept, clear as it may seem to be, has only a limited range of applicability. The knowledge in physical science is acquired through the process of scientific research which can be seen to proceed in the standard scientific method. However, if there is an intuitive element in science, there is also a rational element in spiritual/metaphysics. The Vedas have been claimed to contain many science truths by many scientists as well as spiritualists [2]. But we face on the question that even though the Eastern spiritual, especially the Hindu, where the Vedas as their main source contains so many scientific truths, why the technology of Western people is more advanced than that of Eastern people up to now?. Isn't the progress of science in line with technological progress?. For this reason, in this paper, we will analyze several scientific statements in the Vedas by using technological/practical point of view. To analyze, we use a standard Technology Readiness Level theory [19].

## DISCUSSIONS

### Technology Readiness Levels (TRL)

Technology Readiness Levels (TRLs) are a systematic measurement system that supports assessments of the maturity of a particular technology and the consistent comparison of maturity between different types of technology [19]. They are estimating technology maturity of critical technology elements of a program during the acquisition process. The program concepts, technology requirements, and technology capabilities are examined. Figure 1 shows the graph of Technology Readiness Levels. The detail description of fundamental principles for each level has been published elsewhere.



1-4: Basic Concept; 5-7: Ready for Application;

8-9: Ready for Commercialization

Fig. 1. Technology Readiness Levels Descriptio

## Several Physical Concepts In Vedas

In the following table, we summarize from various Vedas/Upanishads and science literature, scientific concepts especially related to physical science, which are available in Vedas literature. Each verse (sloka) was then correlated to the existing theoretical physics. These concepts were then analyzed their level of technology readiness by using TRL standard method.

Table 1. Physical Science in Vedas

No	Vedas/Upanisads	Physical Science
1	<u>Rig Veda II.72.4</u> <i>Aditer dakso ajayata</i> , dark, sad audition part (From Aditi (material) the origin of daksa (energy) and from the daksa (energy) the origin of Aditi (material))	Mass–Energy Equivalence (by Albert Einstein) Anything having mass has an equivalent amount of energy and vice versa $E= mc^2$
2	<u>Rig Veda II,11.20</u> <i>Avartayat suryo na cakram</i> (The sun rotates like a wheel on its axis)  <u>Atharwa Weda XII.1.37</u> <i>Ya apa sarpam vijamana vimrgvari</i> (The earth rotates and translates) <u>Yajur Veda III.6</u> <i>Ayam gauh prsnir akramid,asadan mataram purah,pitaram caprayam svah</i> (This mottled earth exists and rotates in the sky like a mother, it goes around the sun as a father) Rig Veda 10.149.1 <i>Savita Yantraih Prithiveem</i> <i>Aramnaat Dyaam Andahat Atoorte</i> <i>Baddham Ashwam Iv Adhukshat</i> ( The sun has tied Earth and other planets through attraction and moves them around itself as if a trainer moves newly trained horses around itself holding their reins)	Heliocentric Model (by Nicolaus Copernicus) Heliocentric is an astronomical model in which the Earth and planets revolve around the Sun at the center of the Solar System. The formulas of planetary motion were describing the motion of planets around the Sun are explained by Kepler’s Law I, II and III. KL I : All planets move in elliptical orbits, with the sun at one focus. KL II : A line that connects a planet to the sun sweeps out equal areas in equal times $rv_{\theta} =  \vec{r} \times \vec{v}  = \frac{ \vec{L} }{\mu} = \frac{L}{\mu}$ KL III : The square of the period of any planet is proportional to the cube of the semi-major axis of its orbit. $T^2 = \frac{4\pi^2}{GM} a^3$
3	<u>Atharwa Veda VI.106.3</u> <i>Suryasya rasmayah para patanti asumat</i> (The sun's rays emanate with very high speed)	Speed of Light ( $c$ ) = $3 \times 10^8$ m/s. According to the special Relativity theory, $c$ is the maximum speed at which all conventional matter can travel.
4	<u>Yajur Veda IX:3</u> <i>Apam rasam udvayasam surye santam</i>	Sun contains Hydrogen dan Helium gases. The chemical reaction of

	samahitam, apam rasasya yo rasah (The most subtle essence that forms water is in the sun)	Hydrogen (H <sub>2</sub> ) with Oxygen (O <sub>2</sub> ) result in water (H <sub>2</sub> O). $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
5	<u>Atharva Veda XIV.1.2</u> <i>Somena aditya balinah</i> (The sun produces energy from the soma (hydrogen))	<b>FUSION REACTION IN THE SUN</b> A continuous fusion reaction occurs in the Sun. The reaction must be at very high temperature. In the sun, the temperature is about 10-15 x 10 <sup>6</sup> °C. The Hydrogen is converted to Helium and providing enough energy for sustaining our lives in the Earth. $4\text{}^1_1\text{H} \rightarrow \text{}^4_2\text{He} + 2\text{}^0_{+1}\text{n}$
6	<u>Rig Veda II.27.4</u> <i>Dharayanta adityaso Jagat stha</i> Sunlight supports the entire universe	The Earth receives energy from the Sun about two calories per minute per square centimeter. Without this energy, all water in the Earth would be ice and life is impossible.
7	Rig Veda 8.12.28 O Indra! By putting forth your mighty rays, which possess the qualities of gravitation and attraction-illumination and motion – keep up the entire universe in order through the Power of your attraction. Rig Veda 1.6.5, Rig Veda 8.12.30 O God, You have created this Sun. You possess infinite power. You are upholding the sun and other spheres and render them steadfast by your power of attraction. Rig Veda 1.164.13 Sun moves in its orbit which itself is moving. Earth and other bodies move around sun due to the force of attraction, because the sun is heaviest Atharva Veda 4.11.1 The Sun has held the Earth and other planets	<b>GRAVITATIONAL LAW</b> (by Sir Isaac Newton)  All the particles of matter in the universe attract each other through the force of gravity The Force (F) between two objects is proportional to the product of their masses (m <sub>1</sub> and m <sub>2</sub> ), divided by the square of the distance between them (r). $F = G \frac{m_1 m_2}{r^2}$ G= 6.693 × 10 <sup>-11</sup> (Gravitation constant)
No	Vedas/Upanishads	Physical Science
8	<u>Atharvaveda III.13.5</u> <i>Agnisomau bibhrati app it tah</i> (Water is formed from Oxygen and Hydrogen)	The molecular formula of water : H <sub>2</sub> O (H= Hydrogen and O= Oksigen)
9	<u>Avadhuta Gita I.25</u> <i>Tattvamasyādivākyena svātmā hi pratipāditaḥ</i> <i>neti neti śrutirbrūyād anṛtam pāñcabhautikam</i>	<b>HEISENBERG UNCERTAINTY THEORY</b> (by Werner Heisenberg) Heisenberg's Uncertainty Principle states that there is inherent uncertainty in the

	<p>(By such sentences as "That thou art," our Self is affirmed. Of that which is untrue and composed of the five elements - the Sruti (scripture) says, "Not this, not this.")</p> <p>In Advaita Vedanta, God (Brahman) is usually described by the words Neti, Neti where means "not this, not this". This statement states what uncertainty and how God is. Furthermore, we cannot understand anything in the universe fully as well as described them well by everyday language.</p>	<p>act of measuring a variable of a particle. This is contrary to classical Newtonian physics which holds all variables of particles to be measurable to an arbitrary uncertainty given good enough equipment. The Heisenberg Uncertainty Principle is a fundamental theory in quantum mechanics that defines why a scientist cannot measure multiple quantum variables simultaneously.</p> $\Delta p \Delta x \geq \frac{h}{4\pi}$ $\Delta t \Delta E \geq \frac{h}{4\pi}$
10	<p><u>Brihadaranyaka Upanishad 1.3.28</u>  <i>Aum. Asato ma sad-gamaya; tamaso ma jyotir-gamaya; mrtyor-ma amrutam gamaya.</i>          (Oh, God, Lead me from unreal to real; lead me from darkness to light; lead me from death to immortality)          (Swami Vivekananda III:420)          If you leave it alone, let name and form go, all this variety vanishes for ever, and you are what you really are. This is Maya. Material World is only Illusion (Maya) This reminds one of the ideas of sunyata and Maya or illusion covering the whole universe as Adi Shankaracharya said "Brahma Satyam, Jagat Mithya".          Brahman is the only truth; the world is a false illusion. Because of the covering of Maya, one does not see the underlying real Brahman.</p>	<p>QUANTUM MECHANICAL MODEL OF ATOM          (Electrons as probabilistic matter waves, the Schrödinger equation, and the Heisenberg uncertainty)          In physics, one sees only the material objects around and does not see strange quantum fuzzy world underlying all the matter. Moreover, the particles of modern physics are believed to be in some kind of suspended state devoid of any specific properties until they are measured. First of all, it was found that the world is not made out of rigid objects as shown in everyday life. At the sub-atomic level, it consists of wavelike objects and a lot of space. So the solid nature of objects we see around is only apparent. As one goes deeper and deeper into subatomic. We will find vacuum all the way. This agrees with the quantum mechanical model of an atom where electrons within atoms could be explained by treating them mathematically as matter waves with no exact position, an only cloud of probability.</p>
11	<p>Grand Unified Field of Consciousness (Maharshi Mahesh Yogi's program of the grand unified field of consciousness)          The science of being is the transcendental science of mind. The science of transcending the science of mind which,</p>	<p>GRAND UNIFIED FIELD THEORY AND THEORY OF EVERYTHING          The program of a grand unified field theory of physics is nowhere near completion, especially as far as gravity and strong interactions are concerned.</p>

	<p>in its turn, transcends the material sciences which deal with the diversity of material existence. In the other way, Amit Goswami states that consciousness creates reality including atoms.</p>	<p>From physics may a program to understand consciousness starting with atoms or elementary particles. Furthermore, a theory of everything is a theory which tries to explain the four forces of nature and reconciles quantum physics with relativity. Einstein tried to do just that for the last thirty years before his death and proposed a formula which combines gravity and magnetism. The theory is a hypothetical single that fully explains and links together all physical aspects of the universe.</p>
12	<p><b>Time Travel</b> An often recurring mention in Vedas is that Brahma's time is different from ours. In Mahabharata Arjun can travel to the past, present and future in the mouth of Lord Krishna in Vishwaroop Darshan. One is reminded of the collapse of the space-time coordinate system near singularities of the general theory of relativity. Also, it is well known that Veda came up with the correct order of magnitude of the age of the universe of several billion years.</p>	<p><b>Time Travel and Twin Paradox</b> There are strange facts in the theory of relativity. One of them is the time is not absolut. If we can travel with speed nearly the speed of light (<math>3 \times 10^8</math> m/s), we can go back in the past. Moreover, the measurement of time depends on the observer's motion and also the strength of the gravitational field he/she is in. Another example is the twin paradox. Two identical twins, one of whom makes a journey into space in a very speed rocket and returns home to find that the twin who traveled is younger.</p>
No	<b>Vedas/Upanishads</b>	<b>Physical Science</b>
11	<p><b>Ishopanishad</b> Brahman : It moves, and it moves not; it is far, and it is near; it is within all this, and it is also outside all this.</p>	<p><b>Wave-Particle Duality</b> Wave-particle duality is the concept in quantum mechanics that every particle or quantic entity may be partly described in terms not only of particles but also of waves. Through the work of Planck, Einstein, Broglie, Compton, Bohr and many others, the current scientific theory holds that all particles exhibit a wave nature and vice versa.</p>

### TRL Testing and Discussions

From these statements related to science in the Vedas, we analyze the level of their technological readiness for several samples in section C.



No. 1

**Rig Veda II.72.4**

From material the origin of energy and from the energy the origin of the material

We can see this statement No. 1 as just a basic concept. There are no details for testing to potential application yet. Or no proof-of-concept has been demonstrated. We can classify this statement as basic science which matches to TRL Level 1-2.

No.2

**Rig Veda II,11.20**

The sun rotates like a wheel on its axis

When tested with TRL, this statement No. 2 is also fall in TRL Level 1 and can be classified as basic science. Need further detail detailed analysis and testing to become a modern technology.

No. 7

**Rig Veda 8.12.28**

O Indra! By putting forth your mighty rays, which possess the qualities of gravitation and attraction-illumination and motion – keep up the entire universe in order through the Power of your attraction.

**Rig Veda 1.164.13**

Sun moves in its orbit which itself is moving. Earth and other bodies move around sun due to the force of attraction, because the sun is heavier than them

**Atharva Veda 4.11.1**

The Sun has held the Earth and other planets

The statement that every object has an attraction force and the earth and planets surround the sun because of that attraction is surely parallel to modern physical science theory. However, It is not yet defined how strong the attraction is and how the shape of its orbit and how their interacts. So that, the statements no. 6 is still categorized basic science (TRL:1-3). The gap between Vedic science and physical science is shown in Fig. 2. The physical sciences statements in Vedas are still only general statements in which the aspects of science are still implied. So that it is required more detailed analysis and description to become a modern technology to be applied in human life. For this reason, a collaboration between Vedic experts and scientists is needed in translating scientific and technological statements in Vedas to applications for the modern technology.

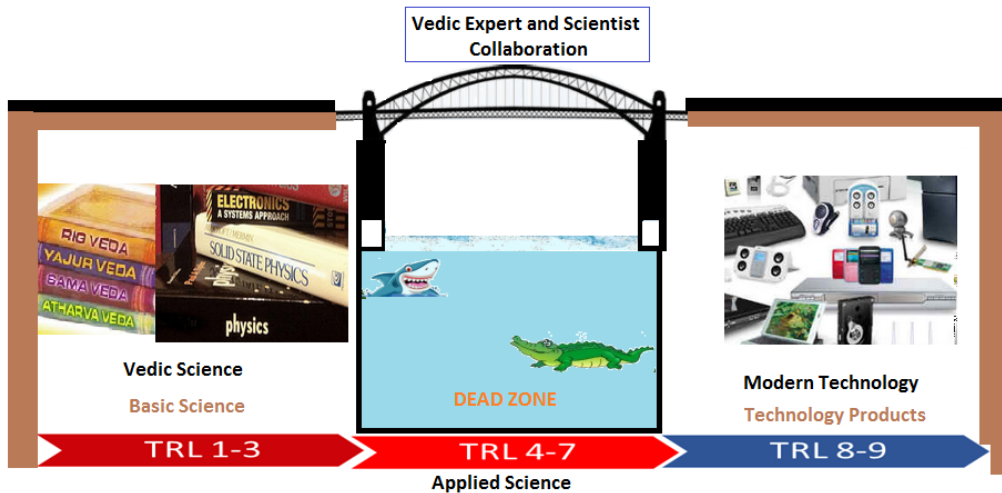


Fig. 2. Vedic Science and Modern Technology Gap

Nevertheless, all scientific statements in the Vedas agree and have no contradictory with modern physics theories. This fact has been recognized by world scientists as describes in the following statements [20-23].

Albert Einstein:

When I read Bhagawad Gita and reflect about how God created this universe everything else seems so superfluous.

We owe a lot of Indians who taught us how to count without which no worthwhile scientific discovery could have been made

Jagadish Chandra Bose :

Modern science thus endorsed the ancient Upanishadic truth that the entire universe is born of a life-force and is quivering with a touch of animation. His wor represents the triumph of spirituality over extreme materialism.

Erwin Schrodinger :

Vedanta teacher that consciousness is singular, all happenings are played out in one universal consciousness, and there is no multiplicity of selves.

Carl Sagan:

Scientists have discovered the scientific theory that I have described in recent years, here, in India, people have known that information since thousand years ago, from the Vedic books.

A physicist can explain anything in the objective world, yet we cannot understand our own life. Even several scientists as well as spiritualist attempt to collaborating science and religion, we still cannot answer the fundamental questions such as why we born and what the universe exist for?. However, we come to the conclusion that everything in the universe is arranged and controlled in detail by the existence of a superpower creature. The superpower is God, the intelligent designer and fine-tuner of our universe [8]. One example is that energy of the Sun radiated to our Earth is precisely correct to our life where about two calories per minute per square centimeter. If Earth received more than two cars/min/cm<sup>2</sup> than all water in our world would be vapor and our Earth will dry without liquid water. Otherwise, If Earth received less than two cars/min/cm<sup>2</sup> than all water in our world would be ice and life is impossible. Apparently God has arranged everything carefully so that all goes well and this life happens. We just need to uncover the secrets laws of nature as the laws of God. Integration of religion and science is required so that science does not bring destruction but bring welfare and happiness for human life [24].

## **CONCLUSION**

The study of Vedic science and its correlation to modern physical science have been successfully performed. The study is carried out by using a literature study of several scientific statements in Vedas and then be compared to the physical science theories. From the analysis of several samples, it can be concluded that the Veda is fully compatible with the subject. Furthermore, from the Technology Readiness Level testing indicates that physical science truths in Vedas are still general statements ( $TRL \leq 3$ ) and categorized as abasic science. So that it is required more detailed analysis and further investigation for translating them to modern technology products. The collaboration between Vedic experts and scientists is urgently required to convert Vedic sciences to be modern science and technology.

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