Exploration

Fundamental Nature of Space &Time

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Abstract

This paper lays a hypothesis about the fundamental nature of Space and Time. Time is absolute as well as relative. Relative quantity can occur only if the absolute exists in the theory. It is an established fact that elementary particles such as quarks keep forming up in space and keep decaying. This happens in the quantum foam due to the presence of quantum vacuum fluctuations. The quantum vacuum fluctuations are caused by time energy as per the design of Consciousness (sentience). This theory aims to explain the workings of relative time, motion in the cosmos and the source of energy of the quarks, electrons and other elementary particles. This model accounts for observations such as the correlation of distance and redshift of galaxies. The conclusions of the paper are as follows:

(a) Time is an absolute dimension. What we experience is a relative time.
(b) Time results from the capability of interpretation of past, present and future. Any entity that experiences only the present would not appreciate time without memory or correlation.
(c) Time results from the motion. If the motion stops, time stops. Stoppage of motion in the electrons and other quarks may lead to the disintegration of all matter.
(d) The backward movement of time towards the past is a fantasy and so is time travel in backward time.
(e) Time is resultant of energy that causes motion. Time and space are similar substances (of energy) but vary in effect.
(f) The quantum vacuum fluctuations in dark energy are caused by time energy, guided by space energy as per the will of Consciousness.
(g) Consciousness is a para dimension besides space, time, energy, matter and intelligence.
(h) The homogeneity, isotropism and continuous expansion of space may be an incorrect conclusion.

Keywords: Time, space, universe, dimension, consciousness, intelligence, creation, energy, matter.

Introduction

The cosmos is a dynamic place where everything remains in motion. The reference frame of an observer who is part of the Cosmos also moves. This gives rise to relative motion. The motion is an action which is also known as 'Kriya' (similar to a verb in language) in Sanskrit, which is also the root of the word 'Creation'. Kriya is an important factor that makes the existence and running

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of this cosmos possible. Perception of time results from the sequence of appreciation of events that take place in our observable surroundings. The first notion of time comes from day and night which arise due to the motion of the Earth. Since this measure alone was not sufficient, larger time measurements were devised using phases of the moon (month) and the movement of Earth around the Sun. The equinoxes and repeating seasons played a great role in creating this understanding.

Since the year was also a comparatively shorter duration compared to the human life span, to help remember life events, larger time periods were required. These larger time periods could only be recorded by careful observation of the night sky. By observing the fixed number of constellations rising in the night sky in combination with the moon, sun or any other planets, new ways of marking time were devised. One such system was Brihaspati Samvat, which provided a calculation of 100 years' rise of Brihaspati (Jupiter) in each constellation. Since there are 27 constellations, it led to 2700 years of calendar system. However, this too could cause confusion in a civilization thriving long and by now wobble of the Earth's axis was carefully measured. It allowed to keep a measure of approximately a 24000-year time period. This was divided into ascending and descending cycles of four Yugas each. This calendar was made by Mayasura along with fixing the seven days in a week. The aim of this description is to indicate that time was measured by the movement of light sources in the sky.

Human beings drive more than 80% of their sense perception by observation. that's why light is the most important measure. If we sense diurnal variation in atmospheric pressure, we can detect some change but other senses of taste, sound or smell wouldn't allow any repeated observations. Plants sense light as their cycles of making food from CO_2 (photosynthesis) depend on sunlight. The human body also senses time in its cycles, its biorhythms, heartbeat, pulse and digestive cycle etc. Our speed of thought can lead to a perceived dilation or contraction of time.

Etymology of Time-related Words

The word 'time'[1] comes from Middle English tyme, from Old English tīma from Proto-Germanic tīmō, from Proto-Germanic tīmô, Swedish timme (hour), Old English 'tīd' from Proto-Germanic tīdi- "division of time". Meaning "rise and fall of the sea" (mid-14c.) probably is via the notion of "fixed time," specifically "time of high water;" The Latin word for time is 'tempus' tempo from which comes temporal, the Greek word 'Khronos' and Sanskrit 'Kaal'.

Another word repressing time is 'Date'[2] from Old French date (13c.) "date, day; time," from Medieval Latin data, noun use of fem. singular of Latin Datus "given," from late 14c as "the part of a writing or inscription which specifies when it was done."

The word 'Month'[3] comes from Old English monað, Old Saxon manoth, German Monat, Old Norse manaðr, which is related to menon- "moon". Originally the month was the interval between one new moon and the next.

The word 'Year'[4] comes from Proto-Germanic jēr, Old Norse ar, Danish aar, Old Frisian ger, Dutch Jaar, German Jahr, Gothic Jer, from PIE yer-o-, from root yer- (Avestan yare). Probably

originally "that which makes (a complete cycle)," and from the verbal root ei- meaning "to do, make."

Modern Understanding of Space-Time

The understanding of the nature of time and space was them being assumed as homogeneous and isotropic. Homogeneity means there is no inherent property arising from the general nature of space or time which may be ascribed to any one particular point. Isaac Newton[5] built the foundations of classical physics upon the ideas of Descartes, Galileo and Kepler. Kepler's three laws of planetary motion, coupled with Galileo's association of gravity with acceleration, led directly to Newton's inverse square law of gravitation and his laws of motion. His equation predicted the motions of planets but couldn't explain what causes gravity.

In Einstein's general and special theory of relativity, time is relativistic. It depends on the frame of reference of an observer in a space-time continuum. This can result in time dilation, where the time between events becomes longer (dilated), as one travels closer to the speed of light. Moving clocks run more slowly than stationary clocks, with the effect becoming more pronounced as the moving clock approaches the speed of light. Einstein explained that gravity is because of time dilation or time difference curves geodesic lines in his 4-dimensional spacetime model.

When Albert Einstein published the theory of special relativity in 1905 and subsequently of general relativity in 1916. He assumed that space is isotropic (it has the same properties in all directions), and that space and time are both homogeneous (all points in space and time are equivalent). These theoretical extensions of symmetry to space and time were necessary to assert the constancy of light propagation in opposite directions, and to "derive" his Lorentz transformation equations. Einstein also assumed that Aether was superfluous to his Special Theory and that all motions are relative. Such assumptions made the problem fit into an available method of solution. Therefore, the results were true only if the condition of isotropism and homogeneity existed.

Various Perspectives of Time

A perspective (or scien-ce) belongs to an interpreter or observer. However, for the sake of understanding, we can assume ourselves to be observers of some other existences to better appreciate the notion of time.

For a plant, time is appreciated by the availability of sunlight for photosynthesis. Plant and animal life evolved on Earth following the cycles of the sun moon and other planets leading to diurnal (solar), lunar and seasonal cycles. In this fashion, time may be assumed to be cyclic in nature where small and big circles of recurring availability of heavenly bodies affect life on Earth. The resultant loci of such circles may result in a quasi-circular time, that appears to be in circles but also keeps advancing.

For rays of light, electromagnetic waves and other type of radiation time doesn't exist because they are eternal and continuous. The universe contains 93% hydrogen which is fuel for the stars. An atom is also considered eternal despite there being a time for its origin. Like Helium atoms are made in the fusion process in the stars. For some particles, time may exist as a force that produces and destroys them. Time for sub-atomic particles such as neutrons and protons matters less as their life span is of the order of 6×10^{39} to 10^{39} years and then again it is experienced as a force. For such purposes, a super-linear model of time is most suitable.

From the human perspective, time is the movement of light. By this interpretation when we apply time to ourselves and accelerate to the speed of light it stops to exist (dilates infinitely) because time doesn't exist for a photon. It is forever in its unhindered travel.

Ancient Understanding of Space-Time

Most of the ancient's understanding is out of reach to us. Breaks in the civilizational journey didn't allow the transfer of knowledge and technology to succeeding civilizations. The availability of some designs such as ancient Vimanas, advances in architecture and timekeeping systems provide an idea of their technological prowess. The Greeks made space the subject matter of simplicity and certainty. They hypothesized the presence of four elements of Fire, Water, Earth, and Air. Air was originally supposed to be a component of the Æther. Earth represented all matter. Matter was imagined to be a substance involved in every change, and it was thought that every piece of matter could be measured as a quantity. The Law of Conservation of Matter asserts that matter remains constant in amount throughout every change.

Ancient India was a hotbed of knowledge and perspectives. A thriving civilization that could sustain civilizational breaks is a result of that knowledge. Vedas and Upanishads lay down the foundation of Consciousness. More emphasis was laid on the conscious than on physical sciences and nature. According to Maharishi Kaṇāda[6], there is but one Substance, variously called Space, Time, and extent (Dik, direction). He has taken much pain to establish the difference between Akasa (Ether, space) from other tangible things such as the Self and the Mind, but he has made no attempt to prove the difference between Space and Time. Nor has he attempted to prove the difference of these from any other Dravyas (energy, initial substance). It may be, therefore, considered that with the difference of Time and Space and extent, if there is only one Substance then how does it come to be variously called Time, Space and extent? He replies that this is due to the variety of effects produced by it and also to the variety of external conditions attending it.

Akasa is one of the two facets of Brahman (extent of expansion). One is Chitta (Intellect, Universal mind) formed by the limited (digital) words and the other is Akasa formed by the Dravya (energy substance) which is fluidic (or rather radiating) and without limits, eternal and continuous. Brahman has two types of vibration (Shabda, word) Akshar (unchanging) and Kshar (changeable). Akshar is the root of intelligence, mind, and self. It helps in shaping the Mahat (cascading principle of Massivity or mass generation) passively. The form, sound and colour (Varna) and its alphabet are not only the Akshar (letters) but also contain the numbers. The space is one manifestation of Kshar Shabda (vibrations, word) and the other is of Akshar Shabda as the

universal mind. The Akshara (consonants) are the basis of space and from the command (of Akshar), other forces make up Vrittis (wave spirals).

Egress and Ingress are the marks (of the existence) of Ether because it flows. There is no mark, as an Action (resulting in relative time) but it is one Substance. Space and Time differ in property from the characteristic of another cause. Space is the inert and guiding cause. Time is non-combinative. Action is produced on account of absence conjunction. The attribute of the cause is seen in the attribute of the effect. The resultant vibration (by the effect of time energy) has an attribute of touch (affecting other such vibrations). Because it combines with other substances (energy) and because it is an object of sense-perception, it is neither an attribute of the soul nor an attribute of the mind.

The method of exhaustion (removal of vibrations) is the mark of Ether. The Substance-ness and eternality of Ether have been explained by the analogy of Air. That is like potentiality (or force) because there is no difference in the produced vibration which is its mark, and there exists no other distinguishing mark. Ether is unique so logically it is fundamental. The diversity of Space is due to the difference in effect it caused.

Posterior in respect of that which is posterior, 'simultaneous', 'slow,' and 'quick,'—Such (cognitions) are the marks of Time. The Substance-ness and eternality (of Time) are explained by the analogy of Air. Time is a potentiality (or force). The name 'Time' is applicable to a cause, in as much as it does not exist in eternal substances and exists in non-eternal substances.

The above can be understood by an analogy of the air creating waves on the sea surface. The water here reparents the original substratum whereas the air is time. The action of air on the water surface produces waves but the air blows due to differences in pressure and that intelligent role is played by space. The energy substratum which is the basis of the quantum foam after many combinations and permutations following a cascading principle is known as Tamas (superlative, extreme), energy moving it providing control is Rajas (time energy) and energy guiding it is Sattva (space energy). These are also explained by the analogy of a lamp as the material is Tamas, the flow of oil through the wick is Rajas and the light produced is Sattva.

Consciousness in Cosmos

Classical Newtonian physics is suitable for most everyday applications, but it does not apply at the microscopic level and cannot be used for many cosmic processes. General relativity[7] applies at the large scale of the universe and quantum theory at the microcosmic level. Both general relativity and quantum theory differ from each other. Quantum theory allows the interference of consciousness (observer) in the measurement process. The role of consciousness is a fundamental process in quantum mechanics.

Space, energy, matter and motion through space (time) are regarded as the existences of the real world. Matter appears to be a link in the chain of design gradually leading to biological species. The laws of physics try to represent the design of the cosmos. The patterns, movement and

design is an effect of an unseen cause which is consciousness. It is in the complex idea of design that these fundamental existences are seen in an intimate and interdependent relationship.

Does the universe have cosmological memory? [8] If so, does this imply cosmic consciousness? Memory and entropy are deeply related aspects of each other, in much the same way that various forms of energy are related and can be converted into one form or the other without loss. Any system converting entropy into memory, or memory into entropy, which also involves choice (such as opening or closing a gate), thus contributing to running the system, we characterize as having intelligence or consciousness. If such a system is the universe itself, or multiverses, we say cosmic consciousness is involved in the operation of the cosmology.

Consciousness[9] spreads out its web, in the form of time, over reality. Change, motion, elapse of time, becoming and ceasing to be, exist in time itself; just as my will acts on the external world through and beyond my body as a motive power, so the external world is in its turn active (as the German word " Wirklichkeit," reality, derived from "wirken " =» to act, indicates). Its phenomena are related throughout by a causal connection. In fact, physics shows that cosmic time and physical form cannot be dissociated from one another. The new solution to the problem of amalgamating space and time offered by the theory of relativity brings with it a deeper insight into the harmony of action in the world.

At a basic level, consciousness[10] seems to be associated with a sense of separation and awareness of the surrounding environment from the conscious entity. It also seems to be associated with the ability to process, store and/or act on information gathered from that external environment. This is only the effect of consciousness. As a cause, it is much unknown and can be understood in contrast to the energy. The cause [11]of the manifest (energy) is the unmanifest (consciousness) which has the opposite characteristics of the manifest. The manifest energy is for a cause, it is non-pervasive or finite, active, of many types, having a mark of its presence, made up of constituents and dependent under someone else's control.

Quantum Vacuum Fluctuations

The formatted space presents a particular way the energy flows. The root substratum energy signifies the numbers. The integers denote the potentiality in various forms and combinations of this energy. An infinite series of repetitive patterns in nature exists in cascading principle where two adjacent numbers combine to form the next number. This sequence is presently known as the Fibonacci Sequence. The alphabets represent modifications of the primal energy caused by consciousness and their resultant words and language of reality. This force translates into the vibrations of a certain frequency and carries that significance in shaping the root sub-atomic particles which are the building blocks of matter. Such cosmic language is known as Para. Para means remote or beyond and this belongs to Consciousness. It contains Akshar and Kshar (non-continuous, discreet, measures, consonants and Kshar, Svar, changeable, vowels). Like that in language, these vowels bind the consonants in a word.

This language embedded with intelligence may represent the coding of Quantum Vacuum Fluctuations. The frequency and complexity of quantum vacuum fluctuations display how much

processing of such energy has taken place before it reached this subtle level. As the waveform becomes laden with attributes of frequency, beats, amplitude, phase etc, the speed may get reduced.

The idea of creation from nothingness to expanding spheroid (Brahman) starts from the integration of initial vibration with time, forming space and non-manifesting wavelet strings. These wavelet strings further integrate into time and space using many combinations and permutations of conjunctions and disjunctions creating forces and the wavelets, strings, waves, rays, unstable elementary particles, quarks and so on.

From the ether (space), changing itself, springs the pure, powerful wavelets, the vehicle of all perfumes; that are held to possess the quality of touch (exertion of force, a cause). Next from wavelets modifying (by combining in various permutations and combinations), proceeds the brilliant light, which illuminates and dispels darkness; is declared to possess the quality of colour (visibility). The formation of matter (heavier from lighter) is according to that one cascading principle of Mahat. Brahman becomes the playground of both intelligent and intelligence-driven energies.

Source of Spin and Motion of Particles

Neutrinos are likely the most abundant particles in the universe. Neutrinos are a type of leptons, which are also fermions, and together with quarks make up matter. The difference between leptons and quarks is that leptons exist on their own, whereas quarks combine to form baryons. A neutrino is an exponentially small particle with no electrical charge. As other particles traverse galactic and extra-galactic distances, they can become deflected, scattered, or even stopped

altogether by matter, gravitational and magnetic fields. Neutrinos can pass through all of these uninhibited.

An electron orbiting a nucleus is electrically attracted to the nucleus; it's always being pulled closer. A charged particle that accelerates emits electromagnetic radiation[12]. And because electrons are charged particles and they accelerate during their orbits, they should emit radiation. This emission would cause the electrons to lose energy and quickly spiral in and collide with the nucleus, according to the University of Tennessee at Knoxville. A balance of forces keeps the atom stable. Such balance is established by the time energy available in the quantum foam because quantum foam is everywhere even inside the atom. It is always playing a role in the formation, sustenance and decay of the elementary particles.

Homogeneity and Isotropism of Space-time

The quantum foam could be of varying density depending on the presence of stars, planets and dark stars (black holes). Black holes are very strong centres affecting such energy. Due to this reason space and time energy are not homogeneous and isotropic. Some molecular and atomic structures can be ripped apart in proximity to the dark stars. The dilation takes place near dark stars. A few minutes near a dark star could mean a few hundred or thousand years on Earth. That means the dense environment presents a challenge to the propagation of light rays. This challenge increases as they reach and never return back.

This also means that the time of the Big Bang is certainly incorrect because the time kind of matter compressed in primaeval atom had a huge amount of gravity and this time was dilated to such a great extent. Today what is perceived as 10^{-32} sec could have been billions of years in that reference frame. Similarly, the space between the galaxies could be so rare that light might speed up. Time varies in speed due to variations in the density of quantum foam space. Space is filled with quantum foam and due to the presence of massive objects with gravitational and other forces the fabric of space-time gets altered leading to unequal distribution of quantum foam hence space too doesn't meet Einstein's assumption of isotropism and homogeneity.

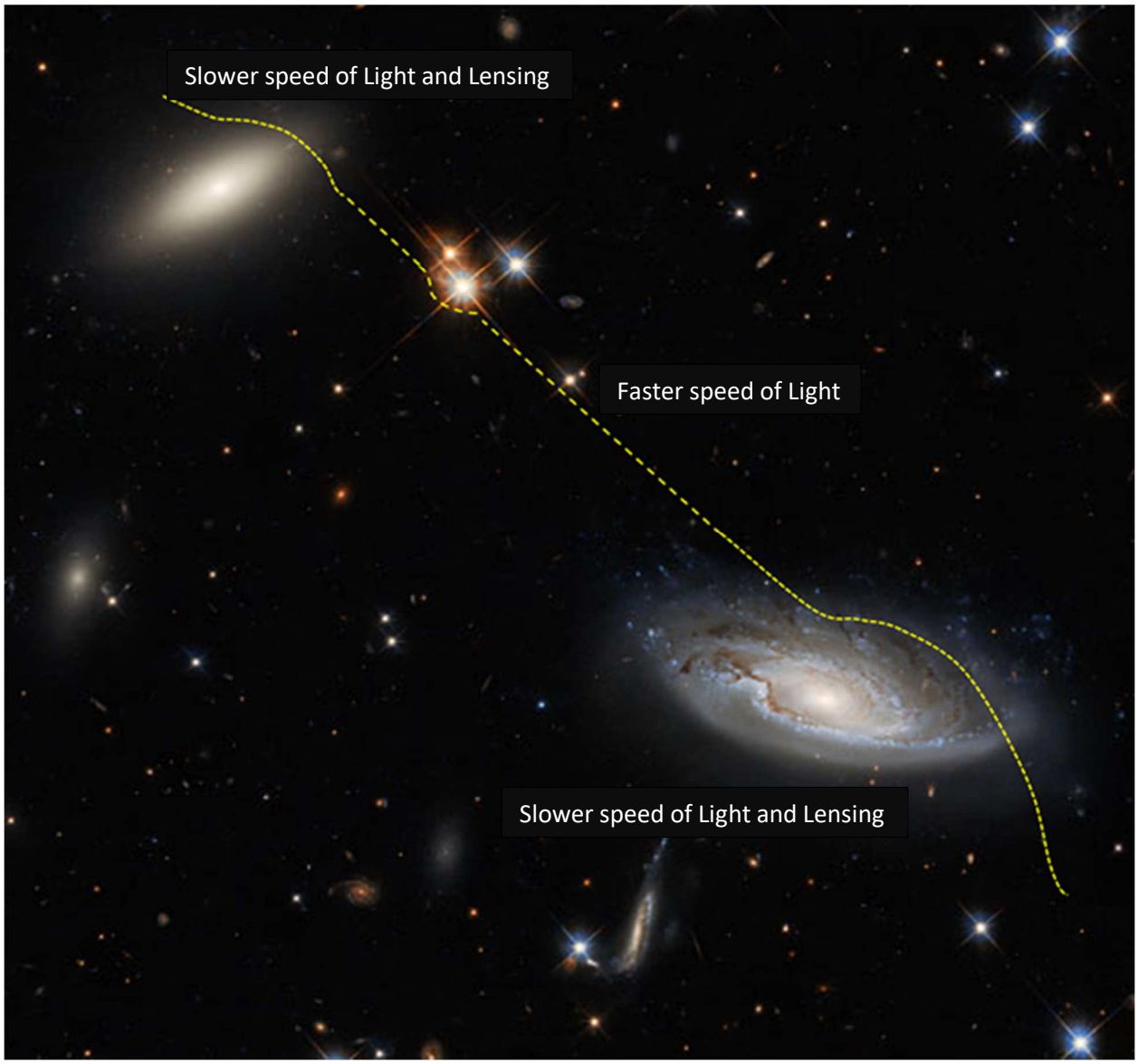
Likely Variation in Speed of Light

Einstein inferred that gravity is caused by the curvature of space-time. The presence of gravitational waves has proved their independent existence, It is the gravity that causes the bends and variation in space and time, The bending of light by gravitational lensing is a proven fact. The reason for incorrect perception has been the incorrect assumption of homogeneity and isotropism of Space-time.

Given below in a picture of a part of Cosmos, a rough depiction of the speed of and lensing of light has been attempted. In a denser space-time, medium light will be slowed such as near dark stars (black holes), in dense electromagnetic and gravitational fields. The light will also bend consequently time too. This speeding of light might also be responsible for the redshift.

Redshift in the received light gives an illusion that the cosmos is expanding, in some estimates near or even more than the speed of light (in our local universe). In 2016, a measurement of the value of the Hubble constant, implying a universe that seems expanding too fast compared to previous measurements reported a value of 73 for the constant. This led to the development of models of cosmic inflation, the expansion of the universe became a general feature resulting from vacuum decay to answer the question of why is the universe expanding.

The universe is not based on an ad-hoc idea. It came into existence against great odds. As per the physicist Lee Smolin, the odds of life-compatible numbers coming up by chance is 1 in 10^{229}. The idea of an expanding universe is therefore based on an incorrect assumption, observation or deduction.



This Hubble image shows two galaxies, 2MASX J03193743+4137580 (left) and UGC 2665 (right), in the Perseus cluster. Image credit: NASA / ESA / Hubble / W. Harris / L. Shatz.

Time and Quantum Uncertainty

The logic of causality (that every effect has a cause) is perennial and axiomatic. The Cosmos seems to be built to perfection without wastage in which all systems act in harmony. Time consciousness works in tandem with energy to direct the motion in Cosmos from smallest to biggest formations. The Vedic view of time and space is that cosmic consciousness acts as an observer and decides the quantum uncertainty. The observer of the event here is cosmic intent and intelligence influencing space and time energies in shaping up and in motion. This also acts as the cause of quantum vacuum fluctuations. Intervening the mind and Scien-ce (knowing in a special way) in a particular order is the mark of general consciousness. It is spread in conscious and non-conscious existences. Depending on the forces the expression of light transforms.

The intelligence spread in space is part of the quantum vacuum fluctuations and the unified field. In the famous cat experiment by Schrodinger, the cat will live or die as per the action of the cosmic observer. If an assumption can explain the riddle of life in the cosmos then the hypothesis is proved. Quantum uncertainty can be solved and the mathematical solution to quantum wave fluctuation can be understood as to why it may not exist. In the quest to know humanity moves a step closer and evolves.

Direction of Time

The arrow of time indicates the direction of the flow of time. The question of why time is irreversible is one of the biggest unresolved questions in science. One explanation is that the physical world follows the laws of thermodynamics. The second law of thermodynamics states that within an isolated system, the entropy of the system either remains constant or increases. If the universe is considered to be an isolated system, its entropy (degree of disorder) can never decrease. In other words, the universe cannot return to exactly the same state in which it was at an earlier point. Time cannot move backwards.

Entropy is a measure of disorder and the thermodynamic arrow of time implies that entropy always goes up. This law is often misinterpreted taking the universe as a closed system. The Universe looks so well organised and is in order with solar systems, galaxies and intricate cosmic structures. The entropy may increase in a closed system but the intelligence in the Cosmos acts against the entropy and organises it.

The orderliness encountered in the unfolding of life springs from two different 'mechanisms' by which orderly events can be produced: the 'statistical mechanism' which produces 'order from disorder[13]' and the new one, producing 'order from order'. The 'order-from-disorder' principle, is actually followed in Nature and which alone conveys an understanding of the great line of natural events, in the first place of their irreversibility. But we cannot expect that the 'laws of physics' derived from it suffice straightaway to explain the behaviour of living matter, whose most striking features are visibly based to a large extent on the 'order-from-order' principle.

The philosophical explanation of the direction of time is based on intent, because the cosmos has a purpose for its existence and time is a causal force to achieve that. The sequence of events creates a notion of time. If time as a causal force is removed from the cosmos, all matter will cease to exist. If due for some reason in a particular galaxy, the time energy stops rotating particles, then all the matter would collapse and that galaxy will cease to exist. Other galaxies will continue to rotate. A theoretical sequence of events (God's view of the Cosmos) would still be maintained and therefore the absolute time is superlinear, it will always move forward.

There is no way of knowing or measuring that superlinear time because it is represented by the will and purpose of the cosmos. Since time itself appears as an illusion caused by motion, the backward movement of time towards the past is a fantasy. It also impacts the notion of time travel.

Time Travel

Like any other wave, the speed of light is dependent upon the properties of the medium. In the case of a light wave, the speed of the wave depends upon the optical density of that medium. To understand time travel it is important to understand time dilation. Let's assume one reference frame is Earth and the other reference frame is at an arbitrary point. If the arbitrary point is in a place from where the events at earth appear faster (there may be no way to practically confirm this by the observer) then time for that observer is dilated (events there are slow).

Time travel is possible in the forward direction of time. That means if a person transports himself near the boundaries of Sagittarius A*, he can stay there for a few minutes and come to find that a few hundred years may have passed on Earth. In ca 3150 BCE when science fiction hadn't even been invented there is a story in the Mahabharata when Kakudmi and Revati[14] returned to Earth. For them, it was as if they had left only just a short while ago to Sagittarius A* (seat of Brahma). They were shocked by the changes that had taken place on Earth. Not only had the landscape and environment changed, but over the intervening 27 Chaturyugas had elapsed. This time period means 324,000 years. They found that mankind was at a lower index of human spiritual and cultural evolution. The Bhagavata Purana describes that, on return to Earth, they found the race of men had become dwindled in stature, reduced in vigour, and enfeebled in intellect.

Conclusion

The research methods used in this article are references, inferences and direct perception. The foremost conclusion is that relative time is dependent on the motion and particularly the motion of light. Time dilation is caused by gravity and not vice versa. The laws of science represent the effect of Consciousness in shaping our cosmos. Energy is a primordial substance which starts as extremely subtle and leads to the creation of matter. Matter forms through a combination of elementary particles resulting from the fluctuations or vibrations in quantum foam. These vibrations are caused by time energy and their shaping is guided by space energy. There is integrity and intelligence from deciding about the quantum outcome through the smallest of

particles to the biggest of galaxies. It is carried forward from the code of design of the initial substratum and affects the way in which ways the initial energies interacted, accelerated, and accentuated leading to the formation of quarks, unstable particles, elementary and subatomic particles etc. The nature of space of time is the same but it varies in effects. Time energy results in movement and movement gives us a sequence and an idea of time.

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