Nature of Truth and Reality

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"While we can know the things we encounter in our experiential interactions with the world's realities as such, the realm of things in themselves are inherently unknown to us."

-Emmanuel Kant- Critique of Pure Reason (1781)

"The Truth is what stands the test of experience."

-Albert Einstein

"Spiritual Truth is a truth of the spirit, not a truth of the intellect, nor a mathematical theorem or a logical formula".

-Sri Aurobinda

Abstract

Throughout the history of our civilization one can notice that the inquisitive human mind has been struggling to compresence all within himself and outside as well asking very difficult questions about temporal and eternal, about truth and reality, about the source of the all existence, about the origin and the cause behind all occurrences. Man has been continuing his search even till today in every possible way with all different resources or capabilities available to the mind and intellect to find satisfactory answers to all those questions. This perennial pursuit has been addressed in the domain of spiritual traditions as well as in scientific terms. Our purpose here is to give a brief account of the nature of the truth and reality as arrived at in various discussions.

Key words: *Spiritual truth, Scientific truth, Source of existence, Origin of occurrence, Layers of reality, Ultimate reality, Quantum field theory, Pure consciousness, Truth Absolute.*

Introduction

We have so far been discussing how human curiosity to understand and realize the true nature of Reality and Truth as the essence behind the phenomenal world, has led to the ceaseless pursuits in all possible ways, ever since the human mind woke up to the wondrous world both internally within himself and externally outside. All religions and spiritual traditions in fact represent the human mind's very first attempt to decipher the universe it awoke to. The contemplative minds of all the ancient religions claimed to have witnessed the cosmos within the inner self to realize and experience, in reverie or meditative state, the Absolute Truth and Reality, which or been verbalized and

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expressed in various ways. In such experiential realization, the normal subject-object boundaries manifest in waking consciousness are altered completely presenting a feeling. This experiential or inter relationship with the cosmos. This experiential reality of a higher order beyond the space and time refers to an absolute and unchanging, remaining the same for all time for all people as the very ground of existence. With this conviction the seers of Vedic traditions in Mandukya Upanishad had declared that;

"Truth alone wins, not untruth.
By truth is established the path
That leads to the Divine;
by which the seers, who have
fulfilled their desires to reach
the supreme abode of Truth."

(Mandukya Upanishad III.1.6)

Truth and Reality defined in this absolute term can be called the spiritual Truth. This is an experiential realization of connectedness with a Reality beyond the immediate sense perceptions of objects in space and time. It gives rise to a holistic type of knowing manifesting cognitively, emotionally and motivationally. They call it by various names the all-pervading supreme Consciousness, the embodiment of all potentialities, the ground of existence, the supreme God Divine etc. We would come back to this aspect further in subsequent sections.

Plato also believed in some kind of Truth and Reality belonging to an abstract realm beyond space & time consisting of ideal forms of geometrical nature. Pythagoras believed the ultimate Truth lies in mathematical numbers and propositions based on mathematical logic. Plato believed further that the physical world of our sense perception is only an illusion being a shadow or projection of that abstract mathematical realm. Truth conceived in this manner may be termed as the mathematical truth which is also beyond space and time in the so-called Platonic world.

Such views as above on Truth and Reality are wide spread in many metaphysical systems. Nevertheless, these views are commonly and completely unacceptable in the current scientific world view. Thus, in the scientific quest to understand the cosmos and the very ground of existence; the emerging science after the seventeenth century in Europe implicitly incorporated the Euro-centric perspective of discarding the older Truth-seeking traditions as pre-scientific and thus invalid. Instead it viewed the world to be so obviously material in nature that any suggestion of an underlying Truth as an immaterial prime aspect of the very ground of existence must be rejected having no basis for Reality. Therefore, science ventured to explore the ultimate Truth within the material structure of the cosmos considering space, time, matter and energy to be the most fundamental ingredients with matter as the primal entity. Thus, according to such materialistic scientific paradigm; matter-energy and space-time reside at the foundation of Reality and all other immaterial qualities like mind or consciousness etc. emerged out

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of it. Therefore, science engaged itself in exploring the ultimate Truth in the form of the immutable laws of nature and the fundamental building blocks of matter applying a reductionist approach. The laws of nature are expressed in abstract mathematical formulations embracing the so-called mathematical Truths for the scientific descriptions of the ways of the world and the Reality explored in the process. These rational findings may be termed as the scientific Truth about which we may draw our critical attention again in the following section.

The Scientific Truth and the nature of Reality

In modern parlance Truth is considered as that which corresponds to Reality. In that sense science; in search of Truth; engages itself in understanding the Reality to its fullest extent. We would highlight again how science has explored the various layers of physical reality in the wake of the revolution brought about by relativity and quantum physics. In fact, the physical reality of the material world is understood as having layered structures, though no neatly stacked layers. These layers may be considered as different levels of description as one proceeds from the gross to the finer and deeper levels unfolding the enchanting and dynamic nature of the physical reality.

The first layer of this reality, according to scientific views, is the observable universe of material objects and the natural phenomena all around us that we normally perceive through our senses. This is the only reality for a lay person in conformity with our common sense. This is also the reality that seems to exist outside of us, which led Descartes and his followers to believe that there is a distinct separateness or split between matter and mind or between the object and the observer. Classical Science dealt with the physical reality at this level adopting a mechanical world view. We are not outfitted with an X-ray vision to see what is inside this first level of reality appearing as solid, substantial, concrete material bodies. The next level of reality, which our ordinary senses are not equipped to perceive; required a great leap in our imagination as well as necessary tools as mechanical extensions of our senses, which include not only electron microscopes, particle-accelerators etc. but also intricate mathematical constructs and abstract models for visualization. The idea that everything is made of atoms and molecules goes all the way back to the 3rd century BCE with Kanada Kashyap of Vaishika Darshana and the Greek Philosopher Democritus. But what exactly is an atom made of; say the simplest hydrogen atom? As we know now this is simply a proton orbited by an electron. Similarly, other atoms are built with a central nucleus consisting of neutrons and protons surrounded by an appropriate number of orbiting electrons. Again, we know that protons and neutrons are made up of other elementary particles called quarks, while an electron is itself an elementary particle. More than 99.98% of the atom's mass is due to the heavy nucleus consisting of neutrons and protons. The radius of an atom is about a few angstroms (1 Angstrom = 10^{-10}m). Considering the relative size of the atom and its nucleus; and their corresponding volumes; it follows obviously to reveal that almost 99.99999...% of the atomic volume is empty space. Thus, solidity is not a result of an actual content of matter, but rather a property resulting from the interactions of electrons. What a trick that the reality at this level plays by projecting the illusion of solidity of objects! This tangible aspect of

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material objects providing the very sensation of the physical, is based astonishingly on nothingness.

All the matter that makes up our everyday world with complicated structures we recognize as stars, planets, with plants, birds, animals and human beings, is primarily composed of two kinds of fundamental particles Palled fundamental fermions and bosons. Quarks and electrons belong to this class of fermions which provide the material contents. The fundamental bosons include another class of particles which provide all types of bindings to these material contents necessary for various structure formations. These are the force-carrying particles called gauge bosons. Besides these fundamental fermions and bosons, science has discovered a zoo of subatomic particles and their mirror world of antiparticles revealing a far greater structure to reality at this level, which is not only quite astonishing but also very bizarre with all the quantum weirdness at its heart. The subatomic particles display contradictory dual behaviors as waves and particles depending on if and how they are observed. At this quantum level of reality any certainty is lost and measurement can only be expressed as probabilities. In other words, the location of such a particle is only probabilistic, so that it could be observed where in the universe however small the probability may be. As a result, it can appear at places ordinarily forbidden for it in a process called quantum tunneling. These quantum particles do not have any definite properties of their own including any definite location or motion at any instant of time before observation. They exist as potentialities only having certain tendencies to be revealed only if and how a measurement is made on them to observe. Thus, the sharp boundary between the object and the observer melts away at this quantum level of reality. It is all the more baffling to know that the marriage of such quantum entities allows them to stay connected in quantum entanglement and be both instantaneously influenced regardless of their spatial separation between them. This clearly violates the classical local realism revealing the non-local nature of the reality at this level. Such instantaneous communication between the two entangled quantum entities is in contradiction with special theory of relativity according to which there is an upper limit to how fast information can travel in the universe and that is the cosmic speed limit as the speed of light.

After coming across all these mind-boggling natures of the quantum entities considered as the constituents of matter at its deeper level; we may now ask what these constituent parts are which are not particles in the real sense of the term having no definite location and motion besides the other aspects. In fact, these constituent parts are in a constant state of flux and the propeller of this flux is energy. In other words, they are nothing but discrete packets of energy. If all things are made of this abstract immaterial substance known as energy; why do we see them as stable and unchanging? Why don't the fundamental elementary particles simply diffuse or fall apart? Why all the elementary particles belonging to a particular species such as say electrons are all absolutely identical everywhere in the Universe, no matter when or where they are created. This is because they have a fixed confined energy; confined like a genie in a bottle. But here the bottles are not physical; they are known as fields which are real; though abstract. These fermions and bosons are identified as the

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discrete quantas of their respective fields. We have now entered the third layer of reality, where the matter fields of the fermions and the force fields of the bosons seem to be more primary than matter itself, since these fields behave as the breeding ground for the so-called elementary particles. Therefore, fields are some dynamic manifestation of a charged think of. We are of course quite familiar with the classical think of fields, whose influence is felt locally; like our earth's field or the electrostatic field of a of gravity body and the magnetic field of a magnet. Considering these cases, one could easily be misled into thinking that field is something that arises from matter retaining the primacy of matter. But in fact, this is not true. The truth is far stranger. Even if one imagines a universe with no material objects leaving an absolute void, still then these un-manifested fields, known as quantum fields would be found to pervade all space and time. These fields are non-local in the sense that they are felt equally in all parts of the universe. Again, unlike our familiar classical fields, the magnitude of energy of a quantum field is not continuous but appears in discrete or quantized lumps, what we called elementary particles. Frank Wilczek, an exponent of quantum field theory and a Nobel laureate sums it up as: -

"In quantum field theory, the primary elements of reality are not individual particles, but underlying fields....". These quantum fields do possess their usual quantum nature of not being locatable in any geometrical sense although they are everywhere. This is according to Heisenberg's uncertainty principle, so that a quantum field cannot have a definite value at any given instant, not even the value zero. As a result, the amplitude as a measure of its size must change all the time resulting in what are known as vacuum fluctuations. The effect of these fluctuations is revealed in several phenomena observed experimentally. Notable amongst all these phenomena is the Casimir Effect, which the Dutch physicist Hendrick Casimir predicted in 1948 in order to demonstrate the effect of vacuum fluctuations of quantum electromagnetic fields. According to this, a measurable force can be seen to act to push together two parallel metal plates even in vacuum. This was conclusively demonstrated in 1996 by Physicist Steven Lamoreaux establishing the existence of electromagnetic ghost force in vacuum and thus validating the notion that all fields at quantum level fluctuate. This provides the strongest evidence for the actuality of the un-manifested quantum fields in vacuum. The wild fluctuations of the un-manifested fields create a quantum frenzy at microscopic dimensions of space creating pairs of virtual particles of matter and antimatter by borrowing energy from space in accordance with the uncertainty principle. The larger the energy debt, the shorter is the time to pay back when these pairs of virtual particles annihilate each other. These virtual particles are like ocean sprays thrown up when turbulent ocean waves crash with each other or against the rocks only to fall back into the ocean from which it came. But only when sufficient energy surplus is made available by any source, stable particles can emerge from the quantum fields to have a real existence in the universe. Without this surplus energy there are only virtual particles. This energy is the zero-point energy of the quantum fields called vacuum energy, which becomes available by a process called spontaneous symmetry breaking. This unseen but ubiquitous quantum fields and their vacuum fluctuations together with the so-called spontaneous breaking of symmetry may seem utterly alien because of its abstractness

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and the very esoteric mathematics involved in the construction of the standard model of particle physics. The triumph of the standard model in explaining all the observed fundamental particles is a hall mark of twentieth century physics.

Thus, the un-manifested quantum fields interlace throughout the cosmos like multidimensional fabrics woven in such a way that each infinitesimal weave of the fabric contains, so to say, the whole cloth. Regardless of our puzzlements, the omnipresent quantum fields permeate the whole space, definitely as a further layer of the reality of this phantom world in which there is no such thing as empty space. Thus, science seems to have found the most crucial elements of existence in the quantum vacuum by comprehending this intrinsic fundamental reality of our cosmos in support of the concept of the 'one source' - the nothingness or sunyata of Buddhism or the 'Brahman' of the Vedantic tradition. The analysis of the structure of reality at the macroscopic as well as the microscopic level to find a solid foundation of reality has landed the philosophers of science to wonder whether there is something fundamentally flawed in the idea of a world built up of matter. P. Davies and J. Gribbin in their book 'The Matter Myth;' summarize about the current paradigm shift, we are witnessing with the following words:

"It is fitting that physics, the science that gave us materialism, should also signal the demise of materialism. During this century the new physics has blown apart the central tenets of materialist doctrine in a sequence of stunning developments. First came the theory of relativity, which demolished Newton's assumption about space and time -assumptions that still hold sway in our everyday commonsense view of the world. The very arena in which the clock-work universe acted out its drama was now exposed as subject to shifting and warping. Then came the quantum theory, which totally transformed our image of matter. The old assumption that the microscopic world of atoms was simply as scaled down version of the everyday world had to be abandoned. Newton's deterministic machine was replaced by a shadowy and paradoxical conjunction of waves and particles governed by the laws of chance rather than the rigid rules of causality. An extension of quantum theory, known as the quantum field theory, goes even beyond this, it paints a picture in which solid matter dissolves away, to be replaced by weird excitations and vibrations of invisible field energy. In this theory, little distinction remains between material substance and apparent empty space which itself seethes with ephemeral quantum activity."

Han-Peter Durr, a renowned physicist who was the successor of Heisenberg in 1978 as the director of the Max-Planck-Institute for physics in Munich also ended up with a mystical view of reality with a bold claim that "Matter does not exist! Therefore, I have worked fifty years on a notion that is inexistent. This was an extra ordinary experience: Learning that something, whose reality everyone is convinced of, in the end, does not exist."

Adding further on this, the remark by P. Davies and N.H. Gregersen in their book 'Information and the Nature of Reality: From physics to Metaphysics (2014), we quote here as: - "One has the sense that, at the end of the day, the speculation of the

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philosophers and the data from the scientists are pointing in the same surprising direction. At the root of tall physical reality is not primary matter."

Thus, one comes to realize that the more science moves away from common sense to intellectually visualize and understand the real world using powerful mathematical abstractions, the harder it becomes to decide what constitutes a mere model and what is supposed to be a faithful description of reality. Science has been following the age-old conviction that mathematics represents the blueprint for reality and the deep truths about the workings of the world. And therefore, it ventures into the realms in the abstract world of mathematics in building theoretical models which interrelate with the workings of the physical world from the quantum weirdness comprising reality to the awe-inspiring vastness of the cosmic fabric in the form of the quantum frenzy of the void. This translation aspect of reality into abstract representations with a purpose to decode the deep truths ultimately leads to ever changing descriptions of scientific truths and realities in terms of physical concepts. Albert Einstein had once remarked - *"Physical concepts are free creations of the human mind, and are not, however it may seem, determined by the external world."*

Therefore, such physical concepts, although they are true in the sense of the predictions of the abstract theoretical models based on solid mathematical logic and the support of experimental evidence; they do not describe the true nature of Reality. The concepts describing the truth are model dependent corresponding to a particular level of description. As one proceeds to the deeper and deeper levels in the description, more and more abstract formulations of mathematical models come to the fore with newer concepts describing reality. Therefore, this intellectual enterprise of the human mind may be called **scientific realism** which is based on the foundation of mathematical truth. For a better assessment and appreciation of this scientific realism, it is worthwhile to understand the scope of mathematical truth encoding the physical reality which is deciphered as the scientific truth.

Conclusion

Thus, we placed here the arguments in favour of the spiritual truth as the Truth Absolute to represent the ultimate Reality as against the scientific truth. This has been described in the widest variety of wisdom traditions referring it variously as attribute-less potentiality-the 'Brahman' or as the cosmic consciousness - the 'Purusha'. This pure consciousness is said to be experienced in an elevated state of awareness. The Yogasutras of Patanjali, for example, explains that at the state of perfection, one's mind relaxes and settles down so completely within itself that it is no longer aware of any objects, sensations, thoughts, feelings and not even the subjective spatio-temporal manifold in which all our other experiences occur. The complete absence of any empirical content is the characteristic of this experience. When all of the phenomenal objects of one's conscious awareness disappear and yet one remains awake; it is the consciousness alone by itself that is experienced. This experience is, of course, a very

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unusual one and is hardly ever found in the absence of the practice of meditative techniques to produce it. The veracity of such claims has been investigated to some extent by modern science to make it clear that the mystic experience talked about so often is associated with a very unusual physiology, where overall metabolic processes settle down to such an extent that even at times breathing almost stops entirely. A considerable body of research has come to be conducted on these meditative techniques including some on the physiological correlates during the experience in question. In the laboratory settings, at least, reports of the experience are often highly correlated not only with significant reduction of metabolic activity, but also with cases of complete cessation of respiration which is in conformity with the ancient texts. There are also other unusual physiological features such as changes in blood chemistry, very high inter-hemispheric EEG-Coherence etc. have been noticed. The significance of such research results shows that it is not a mere belief system that could itself produce the unique physiological state described above relating to the unique experience. It is even less reasonable to think that the different belief systems of Yoga, Vedanta, Taoism, Medieval Christianity etc. should all converge to produce the same unique physiological state leading to the experiential accounts of pure qualityless awareness as the common underlying experiences.

Thus this 'pure consciousness'-experience is extraordinarily abstract, having no concrete phenomenological objects like colors, sounds, tastes, smells, shapes or even thoughts in it at all. However, it does have some contents, namely, pure abstract bliss, joy, happiness or fulfillment unbounded in intensity and independent of all the things we ordinarily associate it with. Bhagabat-Gita puts it (verses 6.18. to 6.28) as;

"Having established the mind in the Self (i.e. pure consciousness), let him not think at all, for supreme happiness comes to the yogi whose mind is deep in peace. Thus, collecting himself the yogi.... with ease attains contact with ... infinite joy, free from craving for any pleasure. Having gained (that) which he counts no other gain as higher."

Having said all that; the question no doubt arises; 'what is it like, if it is not like 'anything'? Can science stretch its limits beyond quantum physics and its implications to come to terms with this abstract concept of 'consciousness' vouched as the spiritual truth and the Ultimate Reality?

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