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The Emergence of 'Consciousness' in Natural Sciences: A Historical Overview

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***Abstract*: This paper explores the march of science from its initial stages till date in order to chronicle how the phenomenon of 'consciousness' managed to break the secure, hard boundary of materialism and undeniably encroach into their unwarranted domain. The mystery of consciousness has united Scientists and Non-Scientists already and has become interdisciplinary. Strong objectivity, causality, physicality and determinism, which defined natural sciences has reluctantly conceded to a type of indeterminism and subjectivity. A significant number of physicists speak of 'consciousness' to be a fundamental constituent of reality. A student of the Philosophy of Mind is not skeptical about the existence of the 'mental'; but none the less deserves to know how the 'mental' crept into the 'physical'. This paper is an interdisciplinary approach, especially for students of Humanities, which explores how the 'paradigm shift' in natural sciences took place over the ages from the Newtonian/Classical to the world of Quantum, occasionally supplementing it with Indian philosophical wisdom.**

Keywords*: *Citta*, Consciousness, Physics, Schrodinger's Cat, *Vedānta.

1. Introduction

The philosophy that has dominated science for centuries may be described as physical/material realism. It assumes that only matter, consisting of atoms and finally elementary particles, is real. All else are secondary phenomena of matter, a dance of atoms. The objects are real, independent of subjects, and how we observe them. This is the 400-year-old classical physics that started with Newton and launched us on a course of materialism. Although the new scientific discipline called Quantum Physics has formally replaced classical physics in this century, the material realism of classical physics is still widely accepted. The essential features of classical physics are:

- *Strong Objectivity:* Objects are independent of separate from mind/consciousness.
- *Causal Determinism:* All motion can be predicted exactly given the laws of motion and the initial conditions on the objects, i.e., where they are and with what velocity they are moving. A 'deterministic' world-view.
- *Locality:* All interactions between material objects are mediated via local signals propagating through space and time obeying the speed of light limit. This is because objects exist essentially independent and separate from one another. A 'separatist' world-view.
- *Material Monism:* Matter alone is real. Materialism/Physicalism.
- *Epiphenomenalism:* Subjective mental phenomena are epiphenomena of matter. They can be reduced to material brain states alone.

In the following discussion on physics we shall see how inert matter (the object of physics) has ultimately led the hard science into the domain of sentiency, consciousness. How physics has moved towards a fundamental world structure which has the following essential features:

- Consciousness is a fundamental constituent of reality. Physicists speak of 'One-ness'/Advaita.
- This consciousness is 'Pure'. Purity means, according to Physics, there is no limitation of space-time, electro-magnetism, gravity, causality – that is, all known natural 'forces', that can be said to constrain it in any way.
- This 'pure consciousness' is not different from matter. They are 'entangled'.
- Scientists are now actively involved to realize their dream: the discovery of a 'unified field theory', the source and substance of 'all that is'. The scientists' fixation for monism is nothing intuitive/aprori but based on the hard fact that dualism violates the law of conservation of energy: how can two/more substances interact without exchanging energy or momentum so that the total energy in this known universe is always constant?
- Subject and object are inextricably linked. Nothing can be said to be neither strictly objective nor entirely subjective.
- Determinism falters in the quantum micro-level objects. The idea of causality itself has become a suspect in a world of quantum 'probabilities'.
- Non–local communication between entities disproves locality.
- Mental causation collapses the epiphenomenalistic view. How can an epiphenomenon of matter affect matter? Moreover, it cannot explain the 'null domain' (enhanced empty states devoid of phenomenological content, non-cognitive, non-affective states) experienced by contemplatives and proven by contemplative neuroscience research.

2. 'Consciousness denied' in classical physics

The scientific revolution began with Nicolaus Copernicus

(1473-1543). The Copernican Revolution is the first major paradigm shift from the Ptolemaic geocentric model of heaven (earth stationary at the center) to the heliocentric model (Sun at the center of solar system). The completion of the revolution is attributed to Isaac Newton (1643-1727) in around 1687. Newton's Laws of Motion which led to classical Mechanics and Newton's Universal Law of Gravitation are the two successful and comprehensive physical theories that he detailed. Newton's Laws of Motion which led to classical Mechanics and Newton's Universal Law of Gravitation are the two successful and comprehensive physical theories that he detailed. The laws of motion of Newton triggered the industrial revolution. His law of gravitation says that there is an attractive force between any two objects that have mass. He developed a new Math – Calculus and his mechanics could understand all from pendulums to planets.

Newtonian or 'classical physics' appeared to have solved the mysteries of the universe by the end of the 19th C. The Newtonian world view was totally mechanistic based on reductionism, determinism and materialism. He discovered (i) The Law of inertia, (ii) Force/F = Mass times Acceleration/MA (iii) For every action there is an equal and opposite reaction.

He proposed a universe where small solid masses (hard little balls of atoms) were in motion and absolute space and time existed as its independent aspects. Absolute linear time exists independently of any observer and progresses at a consistent pace throughout the universe. Much of our daily lives still run on Newtonian mechanics. We experience our bodies in a mechanical and solid way and in linear time.

The next important wave in Physics was introduced by Michael Faraday (1791-1867), who with his "field theory" of electromagnetism unified Electricity and Magnetism. 'Field' was defined as a condition in space. It is a 'physical reality' that occupies space and eliminates vacuum. When a particle is placed in a 'field', the particle 'feels' a force. An electromagnetic field (EMF) is a physical field produced by electrically charged objects and that includes our brain, our physical body and all animate and inanimate units in various degrees. In the past electric and magnetic fields were thought to produce two different types of fields. But Faraday observed that magnetic fields could induce electric currents and it was realized that electric and magnetic fields are better thought of as two parts of a greater whole – the electromagnetic field. Studying the behavior of electricity and magnetism and unifying the two phenomena into a single theory of electromagnetism was finally confirmed by James Clark Maxwell by the "Maxwell's Equation". J C Maxwell (1831-1879), a mathematical physicist, during this time left his mark on history by formulating the classical theory of 'electromagnetic radiation'. This theory brought together for the first time electricity, magnetism as well as light as manifestations of the same phenomenon. Maxwell's equation for electromagnetism have been called the 'Second great unification in physics".

Philosophical Assessment: It seems to be an empirical proof of the existence of prāṇamaya koṣa, as mentioned in the Yoga scriptures, which is said to exist around our gross physical bodies (annamaya koṣa). Thus with the 'field theory' humanity moved out of the world of discrete, solid and separate individual units into a world of 'interconnectedness', a world where every unit (animate/inanimate) is fused into the being of every other unit, a world of dynamic energy fields. The separate and individualistic identity was shaken. This was a starting of a scientific framework within which we could begin explain our ability to affect each other from a distance, the instant 'likes' or 'dislikes' when we meet a stranger, the 'good or bad vibes' about a situation, our 'gut feeling' or extra sensory perception.

3. Albert Einstein

The stage was now set for the world's finest physicist to enter: Albert Einstein (14th March 1879-18th April, 1955). A theoretical physicist and philosopher of science, he is best known in popular culture for his mass energy equivalence (E = mc2) which has been dubbed "world's most famous equation". He is therefore the one who scientifically united 'energy' and 'mass' and proved their equivalence.

Einstein's pursuit began when he found that laws of Newtonian /classical mechanics were no longer enough to reconcile with the laws of electromagnetic field. Classical mechanics describes the motion of macroscopic objects (projectiles, machinery, space craft, planets, stars, galaxies). But they only provide accurate results as long as the domain of study is restricted to large objects and the speeds involved do not approach the speed of light. In 1905, in the paper "On the Electrodynamics of Moving Bodies" Einstein proposed the special theory of relativity, STR, as an explanation to the inconsistency of Newtonian mechanics with Maxwell's equations of electromagnetism and the inability to discover Earth's motion through luminiferous ether. It explained how two observers moving relative to one another at constant speed would view the world. For e.g. if X and Y astronauts are moving in different spaceships and want to compare their observations, all that matters is how fast X and Y are moving with respect to each other. Special relativity includes only the 'special' case where motion is uniform (i.e. travelling in a straight line at a constant speed). But as soon as one curves or accelerates or does anything that changes the nature of the motion in any way, special relativity ceases to apply. That is where Einstein's General Relativity comes in, because it can explain the general case for any sort of motion.

Special relativity implies a wide range of consequences, which have been experimentally verified, like length-contraction, time-dilation, relativistic-mass, mass-energy equivalence, and relativity of simultaneity. It has replaced the conventional notion of an absolute universal time with the notion of a time that is dependent on reference frame and spatial position. Rather than an invariant time interval between two events, there is an invariant space-time interval. Combined with other laws of physics, the two postulates of special relativity predict the equivalence of mass and energy, as expressed in the $E = mc^2$, where c is the speed of light in vacuum. The Newtonian notion was that space is something which separates objects; time is that which separates events. They are absolute. That is for every individual or observer in the universe, space and time have the same meaning. If an earthling measured a scale to be 1 meter an alien in a distant galaxy would also measure it to be 1 meter. The same applied to time. With STR the scenario changed dramatically.

STR proved space and time to be relative; not absolute. Here's how - There is a passenger A in a moving train and a stationary man B. Let us suppose that two bolts of lightning, X and Y, struck at 2 different points on the train track and we want to determine if they both struck at the same time. For the sake of convenience also assume that the bystander B was standing exactly at the middle point of these two lightning. Because B was in the midpoint, both lightning X and Y have identical distances to travel; hence both will reach his eyes at the same time. He will then conclude that the lightning X and Y were simultaneous. But the passenger A is moving towards one beam and away from the other. Therefore, the beam Y coming from ahead will reach A first as it has less distance to travel. So A will conclude that Y occurred prior to X. Both will be correct. This would be a case for relativity in simultaneity.

Again let us suppose there are 2 persons, He and She. Both have a five-inch scale, 2 identical and synchronized clocks, and a flash light. She travels past at some constant speed while He is stationary. As She passes by, He measures the length of Her scale and finds that it is shorter than his own. This is 'space contraction'. They had also arranged that She would flash the torch leaving an interval of 1 second. Now when He sees the flash he finds that according to his clock it is more than 1 second. Obviously her clock was running slow. This is 'time dilation'. When He and She meet again, She argued that her scale had remained 5 inches throughout and that her clock had not slowed down. Relativity theory says both are correct.

In his General Theory of Relativity Einstein proved that the same is true of 'gravity'. The paths followed by moving bodies appear to be the result of gravitational forces, but in actuality they are dictated by the curvature of the space-time surface along which the bodies are moving. So under General Relativity we no longer say, for example, that a planet orbits round the sun because the sun from a distance exerts a gravitational force on it. Instead we say that the presence of the Sun's gravitational field causes the space-time in its vicinity to be curved. The motion of the planet is then determined by the shape of this curved space-time surface.

Precisely Einstein proved that space-time, matter and gravitation are inextricably linked. Newtown's classical mechanics held space and time existed independently of matter. If all material bodies of the universe are removed, space and time would remain behind as a kind of canvas for re-manifestation of matter. But Einstein wrote, "On the basis of General Theory of Relativity space…………… has no separate existence. The gravitational field produced by matter defines the very structure of space-time. Without matter, there is no gravitational field, without gravitational field, there is no space-time. If all matter is removed from the Universe, what is left behind is not empty space but 'absolutely nothing'."

Philosophical Assessment: The philosophical significance of such a state of affairs is marvelous. It is important to note here that all the above mentioned effects are real and confirmed in laboratory experiments. They are now accepted as the physicists' understanding of how the universe is constituted. None of the observations can be termed illusory or misapprehension or an invalid cognition (bhrama pratyakşa). Neither can it be said that they are many appearances and reality is something over and above all these varied appearances. They are all real. So what can one say regarding the real nature of space and time based on these observations and calculations? The physicists' remarks about this sound not much different from that of philosophers. Einstein concluded, "Space and time are free creations of the human intelligence, tools of thought. Persons had to be introduced for the formation of an objective concept of time." Again he says, "People like us who believe in Physics know that the distinction between past, present and future is only a stubbornly persisting illusion." A philosopher, especially of the Vedanta tradition, would find the definite world of Physics fizzling out into dimensions of a magical and indefinite conjuring, Māyā.

4. The wave-particle conundrum

The next discovery of Einstein for which he received the Nobel was the discovery of the law of photoelectric effect. Photoelectric effect is the observation that many metals emit electrons when light shines upon them. Light was considered to be a wave till then. But experiments showed that among frequency, wavelength and amplitude – the three qualities of a wave phenomenon – it is only a 'threshold frequency' that led to the photoelectric effect and not the remaining two. Amplitude and wavelength did not matter in the case of a dim light leading to a photoelectric effect. To make sense of the fact that light can eject electrons even if its intensity in low, Einstein proposed that a beam of light is not a wave propagating through space – but a collection of discrete energy packets / photons each with an energy denoted as hf. A similar conceptual problem known as the 'ultraviolet catastrophe' was also being scrutinized by another historical physicist, Max Planck.

According to classical physics, electromagnetic waves have a spectrum that ranges from radio waves, microwaves, infrared, visible light, ultraviolet, X-rays and gamma rays. Waves are characterized by frequency, wavelength and amplitude and are supposed to be continuous. Max Planck, who collaborated with Einstein's theory offered a bold conceptual leap and said that a vibrating molecule will either loose or gain electrons, that is either emit or absorb energy (radiation), only in specific discontinuous little chunks, which he called 'quanta' of energy.

If electromagnetic radiation were a wave, it would flow like a steady and uninterrupted stream of oil; but if it were made of particles then it would eject particles intermittently. For example, if we try to pour water from a vessel it will flow smoothly; however, if we try to pour grains of rice we shall see some grains shooting off randomly. This was exactly what was discovered with regard to the nature of light. This was a landmark discovery because it proved the particle nature of electrons and photons in addition to the already established continuous wave nature of subatomic entities. It also proved that the energy of a photon is proportional to its frequency: $E \propto f$. This is the discovery which led to its inevitable corollary 'the wave-particle dualism' of photons and microscopic matter, electrons.

According to Max Planck (1858-1947), the originator of Quantum Theory, a photon, which is a quantum of light and all other forms of electromagnetic radiation, is simplified first into energy and then finally into action. Every photon of light is an identical unit of action. 'Planck's constant' denoted by 'h' is accepted as the unit of action. While energy is denoted as 'erg', action is denoted as 'erg/sec'. The difference between Energy and Action may be understood in terms of potentiality and actuality, static and kinetic energy. An energy state can be condensed/low (ground state) or exited depending on whether the atom is absorbing or releasing energy.

Philosophical Assessment: How can something exhibit two contradictory characteristics like wave-ness and particle-ness, considering the fact that they have entirely opposite ways of behavior? This aspect has been discussed in depth within the framework of Śaiva Tantra philosophy as the Śiva and Śakti aspects of Parasaṃbit, the Ultimate. While Śiva is described as the localized particle nature, Śakti is described as the surrounding 'field' of active – kinetic energy. In other words, they are representatives of the two kinds of energy: static and kinetic.

5. The birth of quantum physics

The discovery of the wave-particle dualism and quantum jump associated with photoelectric and ultraviolet effects are directly related to the birth of Quantum Physics. Quantum Physics is the child of the 20th century and its journey started in the 1900s. As discussed earlier, it began with Max Planck. The most famous quantum physicists during this time are: Neils Bohr, Werner Heisenberg, and Erwin Schrödinger and many others.

The properties of a particle and a wave are quite different. But it was not possible to know the 'trajectory' (both position and speed) of a particle at the same time, cognition of any one was possible at one time, suppressing the other. This dilemma was known as Heisenberg's Uncertainty Principle.

When light is seen as a wave, it seems capable of being in two places at the same time forming a diffraction pattern as through a slit through an umbrella. But in a photographic film, for example, it shows up spot by spot like a beam of particles. Therefore, it is both. L-V de Broglie whose thesis was approved by Einstein, proved not only photons, but a material object such as an electron exhibits both wave as well as particle nature. The wave nature of an electron was no ordinary wave but 'probability waves'. The mathematical formalism that consolidated this idea, discovered by E. Schrodinger and W. Heisenberg, is called Quantum Mechanics.

Probability begets 'uncertainty'. For an electron or any other quantum object we can only speak of the probability of finding the object at such and such a position or its momentum being so and so. No longer can we calculate the exact trajectory of the object based on position and velocity as Newton had proved. It is impossible to determine the position and momentum of an object simultaneously. Any effort to measure one obliterates the knowledge of the other. Moreover, even though the wave nature of an electron was proven by its diffraction effects we can never observe the wave nature. Whenever the object is observed it becomes localized as a particle. Physicist Henry Margenau says that watching electrons is like watching fireflies on a summer evening. We can see a flash here, a flash there, but we have no idea where it is between our observations of flashes. Its trajectory is indefinite. Even for a macro object like the moon, QM predicts essentially the same picture: the only difference is that the spreading of the wave packet is imperceptibly small, but non-zero, between observations. While measurement quantum objects appear at a single place like a particle. When we are not measuring it, it spreads and exists in more than one place at the same time like a wave-cloud. In order to explain the above paradox Niels Bohr introduced the notion of The Complementarity Principle. The wave-ness and particle-ness are not dualistic, not opposite polarities, but complementary. We can identify only one aspect in a given experimental set-up. These aspects refer to 'transcendent waves' and 'immanent particles'. Bohr therefore called the electron, 'wavicle'.

Philosophical Assessment: Summing up the quantum world picture we can say that the phenomenal world is not made of discrete solid atoms existing in an absolute space in linear time. Its fundamental constituents are 'fields' of probable actions interwoven into one another and existing atemporally, aspatially. Thus quantum particulars are 'wave-like' but not physical waves like water or sound. Rather, they are 'probability waves'. Probability waves do not represent probability of things, but rather probabilities of 'inter connections'. Essentially, the physicists are saying that there is no such thing as a 'thing'. What we used to call things are really 'events' (actions) or paths that might become events. Our old world of solid objects and deterministic laws of nature is now emerging into a world picture of wave like patterns of interconnections. Concepts like, 'elementary particle', 'material substance' has lost their meaning. The whole universe appears as a dynamic web of inseparable energy patterns – a web, which is a dynamic whole and always includes the observer in an essential way. Being a web, there is no such thing as a part. We are not parts of a whole – but every individual is the whole.

6. The role of the observer

There are two schools of thought about the significance of quantum theory for understanding the world of nature. The more prevalent school says that quantum mechanics covers only a small part of physics, namely the part with events on a local or limited scale. Most cognitive scientists and philosophers of mind today assume this to be true. The other school declares that quantum mechanics applies to all physical processes equally. The leading exponent of this view is Stephen Hawking, who is trying to create a theory of quantum cosmology with a single wave function for the whole universe. Einstein said, "It is the theory which decides what we can observe". By this he meant that our observations of the physical world are not entirely objective. Rather, what we see is to a certain extent determined by what we have decided to look for. Classical physics allowed that a physical system being measured is unaffected by the process of measurement and that the object exists in the own right, even if there is no observer. Quantum theory proposed something quite the contrary.

The problem of observation was soon taken up by Niels Bohr (1885 – 1962), who from the late 1920s was in the process of formulating his Copenhagen Interpretation of Quantum Mechanics. The cornerstone of this interpretation was the principle of complimentarity according to which in a given experiment a particle can exhibit either of two diametrically opposed qualities, but not both.

The experimental set up issued to measure the position of a particle is not the same as that used to measure its momentum. The 'two slit experiment' is a classic example of the above-mentioned situation. A photon arrives at a screen in which two narrow slits 'A' and 'B' have been cut. Reasonably, the photon can pass through any one: 'A' or 'B', and not through both. If a detector is placed behind each slit, we can know through which slit the photon has passed. But according to quantum theory, the state of the photon prior to observation would be a mixture of two states: one in which it passed through A and not B, and the other in which it passed through B and not A. This is an absurd, inconceivable state, yet quantum theory cannot be more specific about the situation of the photon before it is detected. Niels Bohr and his Copenhagen colleagues stated unequivocally that this vagueness was an intrinsic property of nature.

Particles, such as electrons and photons, have no definite location and in fact do not even exist as discrete entities unless and until they are measured—they exist only as mathematical abstractions. Yet somehow these nebulous entities are measured with instruments of technology, with which they causally interact. Then these intangible quantum phenomena turn into the objectively real, elementary building blocks of the physical universe. No one yet knows how this transition from mathematical abstraction to concrete reality takes place, but in some way the observer—the person who designs and conducts experiments—plays a key role in bringing the quantum world to life.

The famous thought experiment 'Schrödinger's cat' (1935) is based on this quantum mechanical indeterminacy. In this experiment a live cat is placed inside a closed box which contains a vial of poisonous gas, a radioactive material, a Geiger counter and a mechanical hammer. If the hammer is triggered it breaks the vial of poison and the cat dies. The hammer will trigger only if the Geiger counter detects the disintegration of one atom of the radioactive material. The radioactive atoms will disintegrate in such a way that the probability of their disintegration can be calculated according to the rules of quantum mechanics. It is assumed that after an hour the probability of one atom disintegrating is exactly 50%. This means that there is a 50% chance that the vial has broken and the cat is dead, and a 50% chance that there is no disintegration and the cat is alive. At that point of time the cat is both dead and alive. Now the observer opens the box and looks inside. There he finds that the cat is either dead or alive. But prior to the act of observation, the cat was a mixture of two states – dead and alive. We cannot even say that it is half dead; it is a mixture of fully dead and fully alive. This is the incredible state of quantum superposition. How to account for such bizarreness?

7. The entry of consciousness

Physicists reluctantly admitted is the act of observation which changes the unreal pre-measurement mixture of states into a single real outcome of a measurement. So the question is what causes this reduction or jumping from unreal to real? To answer this, John Von Neumann, the American mathematician and physicist, examined the entire chain of elements involved: viz. the system being measured, the measuring device, the medium where the result in recorded and the human observer. He realized that all these elements are composed of the same physical matter, with the exception of only the last one – the observer. The human observer by virtue of his consciousness is unique. So Neumann was forced to conclude that the ultimate outcome of a quantum experiment is determined in the consciousness of the human being. The consciousness of the observer pulls out from the realm of all possibilities the one outcome that is to manifest. It is here that the decision of 'cat dead' or 'cat-alive' is made. Quantum theory tells us that the observer is the vital ingredient in any act of observation and in a sense 'creates' the observed object. Therefore, human consciousness is the site of the 'wave function collapse'. This phenomenon of collapse is due to what is known as 'quantum decoherence', which is the reduction of the physical possibilities into a single actuality seen by the observer.

The original EPR experiments however led to a situation where the incomprehensibility of quantum behavior was shown empirically to have been augmented by the genius of David Bohm (1917 – 1992). Because of the original EPR experiments, quantum experiments were then conducted on two particles, simultaneously, instead of one particle. Instead of measuring position and momentum of a single particle 'photon polarization' of two particles together were conducted, where a correlation of X and Y was to be determined. The correlation is positive if the polarization of X and Y matches, and negative if they do not. In the experiment X and Y were separated so much that they could not affect one another even at the speed of light, before the measurements were taken. To the astonishment of physicists, the twin particles somehow seemed to 'communicate' with each other in a totally unmediated and immediate fashion. The positive connection was instantaneous.

The implication of the above mentioned non-local connections were profound. It demonstrated unequivocally that the particles are not separate. There was no other way but to say that X somehow 'knew' instantaneously that state of 'Y'. This led David Bohm to formulate his Holographic Theory based on the 'undivided wholeness' of reality. If the particles, in essence, are one substance, then the communication between them no longer seems strange or inexplicable. There is no need even for an exchange of information between two separate objects because, in truth, one underlying substance exists everywhere.

Philosophical Assessment: To summarize, the observer in quantum mechanics creates reality in the following two steps. (1) By deciding what to measure. For instance, he or she can construct an experiment to measure either position or momentum, but not both. Philosophically speaking this is the point when a subject 'chooses' on exercises his 'free will'. (2) Secondly, by collapsing the wave function to select which of all the possible outcomes of an experiment will actually manifest.

The idea that consciousness/thoughts have power and energy is consistent with our metaphysical systems. That the content of our thoughts has a strong influence on what happens to us in life is also consistent with spiritual teachings, not to mention common sense. Clearly, sick people who think they will heal are likely to do much better than those who think they are doomed. The problem, according to me, lies in the fact that we tend to evaluate the teachings of Vedanta and Tantra in terms of 'religion'. But essentially they are chronicles of the most recondite science of consciousness that one can think of. It is because of this conviction that I have attempted a comparative study of science and Śaiva āgama philosophy in this project in order to understand the phenomenon of consciousness.

The problem of Non-locality can be understood in terms of Indian Yoga philosophy in this way: The citta 'A' and citta 'B' are distinct and different physical entities working in accordance with physical laws. But in sādhanā where the Yogi transcends all physical laws one by one, he reaches the point of 'unity' or Advaita where he realizes the 'one-ness' of all creation. He can then say 'Ahaṃ Bramhasmi'. He at that point transcends all physical and phenomenal wave-function to settle at that unifying fundamental 'mechanism' which connects all: that is, 'pure consciousness'. It is within this 'pure consciousness' that all the other states of consciousness – waking, dreaming and deep sleep –emerge and disappear.

The quantum phenomenon of non-locality is also proved today on human subjects. Researchers from the University of Washington have managed to non-invasively link up two persons' brains leading them to communicate without speaking. Our yogis have given ample examples of their telepathic, clairvoyant and other "psi" powers or vibhūti. Modern science proves their claims were totally scientific and at least theoretically possible. The philosophical implication of the above mentioned experimental evidence of today can only be that there exists a 'unified field of consciousness' – the non-dual, Advaita – which is the noumenal support and source of the entire phenomenal matrix.

8. Conclusion

Physicists have been trying to explain the paradoxes posed by Schrodinger's Cat, concept of entanglement et al by proposing that not only is the experimental apparatus subject to quantum decoherence but also the observer himself. If the brain-mind is itself an object in a non-local consciousness that encompasses all reality, then what we call objective empirical reality is within this consciousness. The one becomes many through self-reference, fragmentation into tangled hierarchies of self-iterating information. The conviction has been growing among many physicists that the brain is an interactive system with a quantum mechanical macrostructure as an important complement to the classical neuronal assembly. The classical/quantum distinction is purely functional. Its essence is one. Experienced mental states arise from the interaction of both classical and quantum states. And most importantly, the classical and quantum components of the brain-mind interact within a basic idealist framework in which consciousness is primary.

Thus matter meets mind in Physics. As Jules Henri Poincaré says, "Science is built up with facts, as a house is with stones. But a collection of facts is no more a science than a heap of stones is a house." In order to organize the facts in a meaningful way the necessity of an overarching intelligence, consciousness, seems justified. And Max Planck said, "I regard consciousness as fundamental. I regard matter as derivative from consciousness. We cannot get behind consciousness. Everything that we talk about, everything that we regard as existing, postulates consciousness."

Verily, the most arcane Tantra-Vedic literature seems to be a palimpsest of modern day science. The Ṛg Veda and the other Vedic books do not only present a logical resolution of the paradox of consciousness but also assert that knowledge is of two types, like the quantum and the classical it is superficially dual but at a deeper level it has a unity. The Vedic theory implies a complementarity by insisting that the material and the conscious are aspects of the same transcendent reality. The modern scientific tradition is like the Vedic tradition since it acknowledges contradictory or dual descriptions but seeks unifying explanations in their 'unified field theories'.

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