

# Mind May Consist of Tachyons

Syamala D Hari<sup>1</sup>

## Abstract

The Indian philosophy of ancient times contains many concepts which can lead to scientific answers to some of the questions that today's consciousness researchers are trying to solve. One of them is that the mind is very fast and faster than the senses and anything in the physical world. Mind is said to be restless and one which cannot come to a stop because thoughts seem to keep rising one after another at least when awake. Properties of thought described in this literature are very similar to those of faster-than-light objects, known as tachyons in modern physics. Based on this observation, we propose that mind consists of tachyons. This proposal allows mental processes and mind brain interactions to be described as tachyon interaction with ordinary non-relativistic matter and in the terminology of mathematics and physics, and quantum mechanics in particular. As an example of this possibility, Eccles's hypothesis that mental intention (volition) becomes neurally effective by momentarily increasing the probability of exocytosis in cortical areas (the basic activity that initiates information flow between neurons in chemical synapses) is justified by assuming that volition consists of zero-energy tachyons.

**Key words: consciousness, quantum brain, tachyons, Vedanta**

## Introduction

Consciousness and the mind-body relation were thoroughly analyzed in the Indian philosophy (Vedanta) of ancient times. This

---

<sup>1</sup> Dr. Syamala Hari has a Phd in mathematics and MS in Computer Science and now researching in Consciousness Studies.

philosophy contains many concepts which can lead to scientific answers to some of the questions which modern consciousness researchers are concerned with such as “does monism or dualism, explain consciousness scientifically”, “is dualism necessarily unscientific?”, “How does a living brain create subjective experience?”, “is quantum mechanics necessary to explain consciousness in a brain?” and so on. Indian Philosophy is often considered as mystic and incomprehensible probably because it was written centuries ago with a focus on spirituality and in Sanskrit, a language not spoken today. Contrary to all misconceptions, consciousness is discussed here with the objective of finding truth and understanding reality in an unbiased way that is not based on beliefs. In Vedantic literature, one comes across ‘mind control’ very frequently. It is often said that one who can keep the mind free of all thoughts can see for oneself the true nature of consciousness and what mind is. Controlling the mind is recognized as a difficult task and various techniques are described to ‘control’ the mind. It is emphasized that the mind is restless and cannot come to a stop (it is a common experience that thoughts keep rising one after another when one is awake or in the dream state). The mind is described as being very fast, faster than the senses and faster than anything in the physical world. In this article, we think that by stressing the fast and restless nature of the mind repeatedly, the ancient authors may be implying that mind is faster than matter and material energy (hence faster than light). We will find that this observation may shed light on some of the questions concerning consciousness mentioned above. If mind consists of superluminal objects then it is possible to describe its processes and its interaction with ordinary matter in the terminology of mathematics and physics and quantum mechanics in particular, because indeed, a theory of tachyons (faster than light particles) was proposed some time ago by Bilaniuk, Deshpande and Sudarshan (1962) and pursued by others (Recami (1986) cites numerous references to Proceedings of the International Conference on Quantum Mechanics and Quantum Consciousness(ICQMQC), January 6 - 8, 2015 102 contributions in this field). New possibilities for experimental detection of tachyons would also open up. Vedanta distinguishes between thought and consciousness as described by modern researchers. According to Vedanta, the mind includes aspects which involve a memory, such as desires, thought, remembering, emotions, experiences, logic,

imagination, and so on (all associated with consciousness in modern terminology) but excludes free will which is independent of any memory and which is not bound by causality. The mind is bound by causality. Vedanta claims that the mind is *jada*, meaning that it is not conscious! It appears to be conscious by being supported by a certain Consciousness which has free will. Hereafter, we will use the word mind with the meaning as in Vedanta. The big C in front will be used to distinguish It from consciousness as it is used today to include free will and the mind defined here. Vedanta says that the senses and the mind cannot perceive Consciousness because It is beyond space, time and logic. Its existence cannot be predicted by any scientific theory, nor can It be detected by scientific experiments (Kenopanishad). Consciousness can only be known by those who can still their minds by keeping them completely free of thoughts. Hence our proposal that mind consists of tachyons applies only to the mind that is bound by causality but not to Consciousness. In section 2, we briefly summarize Vedantic concepts related to the nature of mind and those that suggest that the mind consists of tachyons. We also interpret them in modern computer science terminology. In section 3, we observe that causality associated with goal-oriented actions suggests that our desires may have causality properties similar to those of tachyons. In this section, we will also obtain a definition of awareness of an object in computational terms so that it is consistent with our experience, neuroscience, and Vedantic concepts. In section 4, as an illustration of our proposal, we present the justification by Hari (2008) of Eccles's hypothesis on the role of volition in exocytosis, the basic process of inter-neuronal communication, assuming that volition consists of zero-energy tachyons. Note that according to Vedanta, volition and desire are contents of the insentient mind and not conscious.

## **II. Relation of the Mind and the Body to Consciousness in Vedanta**

The Upanishads are the primary source of Vedanta and Gita is the essence of Upanishads. Upanishads emphatically declare that Consciousness is immortal and all-pervading, incomprehensible, and free, and is the source, sustainer, and ruler of this body, mind, and everything in the world. A living being (called *jiva* or *jeeva*) is said to be an infinitesimal atom of Consciousness, itself eternal, which in the world, draws to itself the senses and the mind that

are part of Nature (BG Chapter 15, verse 7). Being eternal, *jiva* survives physical death. The Self (Atma) is Consciousness seated in the hearts of all beings (BG chapter 10, verse 20). Kenopanishad (Swami, 1920) says that the mind and senses are able to perform their respective functions willed and initiated by Consciousness and without It, the senses and the mind cannot function. *Shetra Shetrajna Vibhaga Yoga* in Bhagavadgita describes the distinctions between the body mind complex and the one who 'knows' the (*shetrajna*). The Field (*shetra*) consists of the five elements, the ten organs, sense objects, the ego (*ahankara*), desires, aversion, emotions, experiences (*manas* and *chitta*), and intellect (*buddhi*) which includes the ability to make decisions based on memory. The five elements are the earth, water, fire, air and the sky. The five objects of the senses are sound, touch, form color, taste and smell. All contents of the Field, namely, the body, its environment, and the mind are said to be insentient (Bhagavad Gita, 7:4). Hence *shetrajna*, the knower of the Field is Consciousness Himself and His infinitesimal projection, *jiva* who assumed this function within this body. The Consciousness particularized in an individual form as above is covered by three bodies called: (1) *sthula* (gross) *sarira* (body) meaning physical body, (2) *sukshma sarira* meaning subtle body, and (3) *karana sarira* meaning causal body (Sivananda). The subtle body is the conglomerate of all mental aspects -our feelings, desires, intellect, reason, and so on. It continues to exist after death but loses awareness of the body and surroundings. Those who have mastered Yoga are said to be able to travel outside their physical bodies in their subtle bodies. The causal body is the cause or seed of the Proceedings of the International Conference on Quantum Mechanics and Quantum Consciousness (ICQMOC), January 6 - 8, 2015 103 subtle body. It contains the very essence of an individual, the latent impressions of all past experiences. It originates with *avidya*, "ignorance" of the real identity of the *Atma* and gives birth to the notion of *jiva* as an individual different from the non-dual Consciousness. The causal body is carried by *jiva* as it were a piece of luggage, from one physical body to another as *jiva* reincarnates. At rebirth, specific memories from past lives may slip away because usually many of them are forgotten even in this life. Thus Vedanta is a dualistic theory of mind but it differs from Cartesian Dualism. Vedanta affirms the existence of Consciousness and a *Jiva* both of which are immaterial but both are beyond the

ego (the I-feeling) component of the mind; it further claims that the ego is not conscious. Hence neither *Jiva* nor the ego is the 'I' of Descartes who presumes that the mind, the 'I', and soul are more or less the same thing and that it is conscious. Vedanta accepts mind's action upon the body; for example, Bhagavadgita (chapter 3, verse 42) says that the senses influence the body and that the mind influences the senses. Vedanta accepts also the converse that the brain/body creates the mind; Chandogyopanishad says subtle part of food taken in by the body contributes to mental contents. These descriptions of Consciousness, mind, and body, suggest the following analogy: A living being is similar to a computer whose hardware is the physical body. The body is made up of matter. The living being has an accumulation of experiences, desires, etc. i.e., an accumulation of information in a memory which we call the mind in this paper. The mind is like a computer memory containing data and programs. Just like a computer's hardware and software do not know what they are doing, their own existence, and the meaning of their memory contents, both the body and the mind of a living being also do not "really know" anything but there is a certain Consciousness (apart from the mind mentioned above) that "knows". Consciousness is like the computer operator, as it were, and the one who "really knows" everything that is going on in the living being's life. Similar to the compute software, the mind being an instrument, cannot act as an agent and needs initiation from *Jiva* to do anything. In the case of a computer, we know that the stored information is not "real information" but a mapping of some "real information" existing in the programmer's head because the programmer assigns meaning to states (bits or qubits) of the computer's hardware elements. Hence the information in the computer in a way, exists independently of the computer. When the hardware of a computer is broken and cannot work in it, the same software can be loaded into the hardware of another computer

and can run again if the software was copied and stored on a storage device. The reincarnation principle of Vedanta conveys a very similar scenario for beings that have mind; the mind carried by the sukshma sarira and karana sarira which survive the death of the physical body, enters another physical body at rebirth and continues to express itself in the new life. Reloading of the insentient mind contents into another body is initiated by *Jiva* for fulfilment of desires to which *Jiva* is attached. Vedantic literature constantly talks

about the restless nature of the mind. In yogavasishta, the mind is compared to fluttering peacock feathers in the wind, to a deer that has left its herd, to agitated surface of the ocean, a lion in a cage and so on; controlling the mind is said to be more difficult than drinking the ocean, or breaking the Meru mountain, or eating fire. Verse 26 of chapter 6 in Bhagavadgita, says that *manas chanchalam asthiram*, that is, the mind is always moving and does not come to rest. In verse 34, Arjuna says that the mind is restless, turbulent, and too stubborn to control. In the next verse, Krishna agrees that the mind is difficult to control because its nature is to move (chalam) but that it may be restrained by practice and by dispassion. The mind is considered to be faster than anything ever known to humans, for example, the fourth verse of Ishavasya Upanishad (Raghavendra, 2000) says that "the unmoving Atma is faster than the mind (the fastest thing known) because Atma is everywhere. By the time the mind reaches a place, Atma is already there!" Of course, it is an idiomatic way of saying that Atma is beyond the reach of the mind, but the description makes the assumption that the mind is the faster than anything known, hence faster than matter and energy, that is, light. The emphasis placed in the ancient literature on the fastness and restlessness (impossible to bring its speed to zero) of the mind seems to imply that mind consists of superluminal objects. Proceedings of the International Conference on Quantum Mechanics and Quantum Consciousness(ICQMOC), January 6 - 8, 2015 104

### **III. Some Rationale for the Assumption that Mind is Faster than Matter and Light Perception of circular causality:**

Let us consider a few examples of how we perceive causality while performing purposeful or goal-oriented actions in our daily lives. If I want to go to New York (NY) from New Jersey, I take a bus to NY now, to be in New York later but not to any place other than NY. Hence what I do now depends on some information pertaining to my future physical state. The goal in my present imagination is a mapping of the future physical state. How does the brain create in its present memory, a mapping of a future physical state of itself? When it is raining outside, I leave home with my umbrella so that I will remain dry later when I am out. On the other hand, a child who ants to play in the rain goes out without an umbrella when it is already raining outside. Whether one takes the umbrella now or

not depends upon whether one wants to stay dry or get wet later. (Of course, taking the umbrella allows one to stay dry and that is normal causality). Hence it appears as though a future event can be a cause for the present action of a living being contrary to the causality principle of classical physics (that deals with macroscopic objects). Can the assumption that the brain is a quantum system explain the appearance of retro-causality in goal-directed actions? As far as the author knows, this question is not answered yet. When tachyons are introduced into relativity, assignment of cause-effect relations to events is no longer invariant with respect to Lorentz frames of reference; what is cause and what is effect in one frame may be interpreted as effect and cause respectively in another frame for events involving tachyons although, each observer finds in one's own frame, that causes always precede effects for all events even if they involve tachyons (Sudarshan 1970). The same causality principles hold in the extended relativity theory developed by Recami (1986) which includes superluminal reference frames. In this theory, when the relative speed of two frames is faster than light, the cause-effect relation between two events in one frame may be reversed in the other frame. Hence, the mind (if made up of tachyons) may see a cause-effect relation of two events as the reverse of what the body sees. We will not attempt further analysis of this proposition here because of space limitations. **The mind appears as though it knows but it is not Conscious!** Nowadays, while working with computers we often use expressions like "the computer knows", or "it does not know", "it remembers", "it understands", "it thinks", etc. What do these expressions mean? In fact, we can precisely define what we mean by them. *A computer behaves as if it knows an object (a data item or a program instruction), when a representation of that object exists in its memory as bytes of "0"s and "1"s in a digital computer or qubit states in a quantum computer, in other words, as a sequence of states of some hardware elements (let us call it the hardware correlate of the object).* Once such a mapping is entered into a computer's memory, the computer can do almost anything that a person can do with that object and behave as though it "knows" the object without really knowing the meaning of anything that it stores or it does! As said before, the programmer maps some "real information" existing in his/her head to states (bits or qubits) of the computer's hardware elements and assigns meaning to them. One cannot create meaning in a computer, nor anywhere else in the

physical world outside the brain; one can only assign meaning to computer cells, or words, or sounds, or electrical signals transmitted on a telephone line. Even a word in any language is not identical with its meaning because the same meaning may be conveyed by different words in different languages. All known means of storage or communication of information whether digital, electrical, etc. all contain a material mapping of some 'real information' which exists only in some human brain. Unlike the computer, the brain creates and associates meaning to its neural patterns although we do not know how it does so (the hard problem of Chalmers (1995)). Hence the brain-mind behaves as if it knows an object according to the following: Definition: *The mind-body complex is aware of an object (which may be a physical object, or a past event, or a sensory experience in the present, or a future goal) when a physical representation (neural correlate) of that object reportable to the outside world, and the "meaning" of the neural correlate both exist in its memory.* There is ample experimental evidence in neuroscience for this definition ever since Libet (1999) concluded that neuronal adequacy is required to experience an external sensory stimulus or to be Proceedings of the International Conference on Quantum Mechanics and Quantum Consciousness(ICQMOC), January 6 - 8, 2015 105 a are of an internal stimulus such as the intention to do a volitional act. Incidentally, the above definition of awareness agrees with Sankhyakarika verse 40 (Swami 1995) which claims that the world can only be experienced when both sthula and sukshma sarira are present. Awareness of objects defined here differs from Consciousness; the latter is eternal unlike the former which fades with time and goes away when the neural record is damaged, for example, at death. According to this definition, whenever awareness of an event occurs, a neural record of the event reportable to the outside world (i.e. a classical state instead of a linear superposition of states) must have been created and therefore the wave-function of the quantum brain must have collapsed. Note that the converse, namely, that a collapse of the brain's wave-function produces awareness need not be true; no collapse of the wave-function of a lifeless quantum system ever produces awareness in it. Supporters of quantum-consciousness usually assume the converse that a quantum collapse of the brain produces awareness of the state into which the brain collapses (for example, see Stapp 2007). Using this definition of awareness and assuming mind-brain interaction as tachyon interaction with

a nonrelativistic quantum brain, in earlier work, it is shown that subjective experience is created in the form of tachyons if the mind consisting of tachyons pays attention to the brain Hari (2011). The delay-and-antedating paradox about timing of sensory experience (Libet et al., 1979) and the paradox about unconscious cerebral initiative in voluntary action (Libet et al., 1983) are also explained Hari (2014).

**IV. Eccles’s Psychons could be zero-energy tachyons**

Eccles hypothesized that volition plays a role in triggering exocytosis, the process of releasing neurotransmitters from presynaptic neurons. From experimental data, Beck and Eccles (1992) inferred that exocytosis involved quantum tunneling. To generate an EPSP (excitatory postsynaptic depolarization) large enough for the discharge of an impulse by a pyramidal cell, exocytosis should occur simultaneously across all boutons of a dendron because in the absence of such coherent action, probability amplitudes would act independently causing fluctuating EPSPs. Eccles proposed that a psychon (volition) provided the required simultaneous trigger. In this section, we show that a zeroenergy tachyon (ZET) can function exactly like a psychon in the exocytosis phenomenon. Beck and Eccles (B&E) modeled exocytosis as a quantum tunneling process of a two-state quasiparticle governed by a one-dimensional Schrödinger equation:

$$i\hbar\partial_t\psi(q, t) = - (\hbar^2/2M)(\partial_q^2 + V(q))\psi(q, t), \text{ (SE1)}$$

where  $q$  is the quasiparticle’s degree of freedom,  $V(q)$  the external potential energy,  $\partial$  denotes differentiation with respect to its suffix,  $M$  is the mass of the particle and  $\hbar$  is the Plank’s constant. In this model, the various boutons in a dendron have probabilities of exocytosis that are independent of one another. Hence, the equation SE1 contains no term of interaction from any other bouton. To describe the interaction of a ZET with the quasiparticle, consider the Klein-Gordon equation for a free tachyon having negative squared-mass  $-\mu^2$  (where  $\mu$  is a positive real number) is written as  $(\partial_t^2 / c^2 - \Delta - m^2)\psi(\mathbf{x}, t) = 0, \text{ (1)}$

$$\text{where } \mathbf{x} \text{ is the vector } (x, y, z), \Delta = \partial_x^2 + \partial_y^2 + \partial_z^2$$

$c$  is the speed of light in free space, and  $m = \mu c / \hbar$ .

Separating the time dependence of  $\psi$  by writing  $\psi(\mathbf{x}, t) = \psi(\mathbf{x})\psi'(t)$ , we get solutions  $e^{i\omega t}\psi(\mathbf{x})$  of equation (1), where  $\psi(\mathbf{x})$  satisfies

$$[-\Delta - k_2] \psi(\mathbf{x}) = 0, \text{ and } \omega^2 / c_2 = k_2 - m_2. \quad (2)$$

The frequency  $\omega$  is real only for  $k \geq m$ . We will use the property of tachyons that they are not localizable in ordinary space; a tachyon is more similar to a field than a particle (Recami 1986; Shay and Miller, 1977). In the frame of reference in which the energy of a tachyon vanishes, the magnitude of the momentum is equal to  $mc$ ; and rather than being at rest, the tachyon has infinite speed. In an interaction with ordinary matter, a ZET would transfer no energy but transfer all its momentum instantaneously in a manner analogous to a rigid body's transferring impulses instantaneously in a collision without exchanging energy (Sudarshan 1970). A zero-energy solution of (1) corresponds to frequency  $\omega = 0$  and  $k^2 = m^2$  and satisfies

$$\Delta \Phi(\mathbf{x}) = -m_2 \Phi(\mathbf{x}). \quad (3)$$

Proceedings of the International Conference on Quantum Mechanics and Quantum Consciousness(ICQMQC), January 6 - 8, 2015 106 To describe the interaction of a field satisfying equation (3) with a particle whose motion is governed by the equation SE, we define the following electromagnetic (EM) field. Let  $\varphi(\mathbf{x}, t) = e^{imct}\Phi(\mathbf{x})$  where

$\Phi(\mathbf{x})$  is a real solution of (3). Then the four- vector

$$\vec{A} = (\vec{A} = -\nabla \varphi(\mathbf{x}, t), U = \partial_t \varphi(\mathbf{x}, t)), \quad (4)$$

where  $\tau = ct$ , defines EM potentials  $\vec{A}$  and  $U$  which give rise to zero electric and magnetic fields. B&E assumed that the interaction of the tachyon (psychon) with the dendron is momentary. For simplicity, we take  $t=0$  as the moment of interaction. Therefore, at  $t = 0$  the scalar potential  $im\Phi(\mathbf{x})$  is purely imaginary whereas the vector potential  $-\nabla \Phi(\mathbf{x})$  is real and therefore, a ZET would only transfer momentum to a charged particle but no energy. The EM interaction of a solution of (3), with the quasiparticle with charge  $e$  changes equation SE1 to:

$$i\hbar \partial_t \psi(q, t) = 1/2M [((\hbar/i)\partial_q - (\epsilon/c)eimct d\Phi/dq)^2]\psi(q, t) + [i \epsilon m\Phi(q)eimct + V(q)]\psi(q, t). \quad (SE2)$$

We describe the tunneling process in the language of Bohmian mechanics (Holland, 1996) and write the wave-function in SE1 as  $\psi(q, t) = R(q, t)e^{iS(q, t)/\hbar}$  with real valued functions  $R$  and  $S$ . Equating the real and imaginary parts on both sides of (SE1), we obtain the following two equations:

$$\partial_t S + (\partial_q S)^2 / 2M + Q + V = 0, \text{ (B1)}$$

$$\partial_t R^2 + \partial_q (R^2 \partial_q S) / M = 0, \text{ (B2)}$$

where  $Q = -\hbar^2(\partial_q^2 R) / 2MR$  is called the quantum potential. The particle's total energy  $E = -\partial_t S$ , and  $\partial_q S$  is the particle's momentum. Once SE1 is solved for the wave-function  $\psi(q, t)$ , and initial conditions are prescribed, the particle's trajectories can be computed classically from (Holland 1993):

$$M dq/dt = \partial_q S \text{ or } M d^2q/dt^2 = -\partial_q(Q + V) \text{ (B3)}$$

Just before tunneling begins motion is classical and  $E = V$  and  $Q = 0$ ; hence in equation B1 the particle's kinetic energy  $(\partial_q S)^2 / 2M = 0$  at this time. As the potential  $V$  increases and becomes  $> E$ , motion is classically forbidden. As long as the particle remains in the state of no exocytosis, it has not crossed the barrier  $V > E$ , the particle's momentum  $\partial_q S$  remains zero and the quantum potential  $Q$  adjusts itself so that  $Q + V = E$ ;  $Q + V$  cannot be  $> E$  because  $(\partial_q S)^2$  cannot be negative. On the other hand,  $Q + V$  can be  $< E$  although  $V > E$ ; if so, the second of equations B3 gives trajectories penetrating the barrier (Holland, 1993) and equation B1 gives a nonzero kinetic energy.

To describe the momentary interaction, we will consider equation SE2 in a small time interval  $\delta t$  and take its limit as  $\delta t$  tends to zero. In this interval, considering the solution  $\psi'(q, t) = \psi(q, t)e^{i(\epsilon\Phi/c)(\cos mct + i\sin mct) / \hbar}$  of equation SE2, the effect of the tachyon interaction on equations B1 and B2 is obtained by substituting  $\psi'(q, t) = R'(q, t) e^{i[S(q, t) + (\epsilon\Phi/c)(\cos mct + i\sin mct)] / \hbar}$  in SE2 and equating real and imaginary parts on both sides and then taking limit as  $\delta t$  tends to zero. Writing  $Q' = -\hbar^2(\partial_q^2 R') / 2MR'$ , and denoting the unit vector along the direction of motion by  $\mathbf{I}$ , equation B1 and B2 respectively become

$$\partial_t S + \partial_q (S - \epsilon \mathbf{A} \cdot \mathbf{I} / c)^2 / 2M + Q' + V = 0 \text{ (B5)}$$

$$\partial_t R'^2 + \partial_q [R'^2 \partial_q (S - \epsilon \mathbf{A} \cdot \hat{\mathbf{I}} / c)] / M = \epsilon m \Phi R'^2 \text{ (B6)}$$

In B5, the first term  $\partial_t S = -E$  is total energy of the particle and same as in B1 because no energy is exchanged in the interaction.

The second term in B5 is the particle's kinetic energy. The particle's momentum changed from  $\mathbf{p} = 0$  before interaction, to  $\mathbf{p} - \varepsilon \mathbf{A}/c = \varepsilon \nabla \Phi/c$  after interaction. Hence after interaction we have

$$Q' + V = E - ((\varepsilon/c)\nabla\Phi(q))^2 / 2M \quad (B7)$$

$$Mdq/dt = \partial q S, \quad Md^2q/dt^2 = -\partial q(Q' + V) \quad (B8)$$

At all points  $q$  where  $\nabla\Phi(q) \neq 0$ , the right hand side of B7 is  $< E$ ; hence  $Q' + V < E$  in the second equation in B8. Thus, the quantum potential  $Q'$  lowers the barrier momentarily at all such points and permits the particle to penetrate through the barrier (Holland 1993) and exocytosis occurs. It can be shown that for sufficiently small  $m$ , the whole dendron will be within a region where  $\nabla\Phi \neq 0$  (Hari 2008). Hence exocytosis takes place simultaneously in all the boutons which are ready for it. The field  $\Phi(\mathbf{x})$  may be normalized to so that the total momentum acquired by all the boutons in the interacting dendron equals  $mc$ , the momentum of the tachyon. The four-momentum of each interacting bouton is also conserved because its mass is reduced by spilling its contents (neurotransmitters) into a postsynaptic cleft satisfying the Recami (1986) criterion that a body at rest can absorb a ZET only if its rest mass reduces in the interaction. The nonzero term on the right side of equation B6 indicates violation of probability conservation at the moment of interaction. Proceedings of the International Conference on Quantum Mechanics and Quantum Consciousness(ICQMOC), January 6 - 8, 2015 107

## References

- [1] Beck Friedrich and Eccles John C. Quantum aspects of brain activity and the role of consciousness. Proc Nadl Acad Sci USA 1992; 89: 11357-11361.
- [2] Bilaniuk OMP, Deshpande VK, Sudarshan ECG. (1962). Meta Relativity. Am J Phys, 30,718.
- [3] Chalmers David J. Facing Up to the Problem of Consciousness. Journal of Consciousness Studies 1995; 2(3): 200-19.
- [4] Feinberg G. (1967) Possibility of Faster-Than-Light Particles. Phys Rev, 159(5), 1089-1100.

- [5] Hari S. (2008) Psychons could be zero-energy tachyons. *NeuroQuantology* 6 (2),152.
- [6] Hari, S.D. (2014). Mind and Tachyons: Quantum interactive dualism - Libet's causal anomalies. *NeuroQuantology*, 12(2), 247.
- [7] Hari SD. (2011). Mind and Tachyons: How Tachyon Changes Quantum Potential and Brain Creates Mind. *NeuroQuantology* 9(2), 255.
- [8] Holland P R. (1993). *The Quantum Theory of Motion*. Cambridge University Press, Cambridge.
- [9] Libet B. (1999). How does conscious experience arise? The neural time factor. *Brain Research Bulletin*, 50(5/6), 339.
- [10] Libet B, Gleason CA, Wright EW, Pearl DK. 'Time of conscious intention to act in relation to onset of cerebral activity (readiness potential): The unconscious initiation of a freely voluntary act'. *Brain* 1983; 102:623-642.
- [11] Libet B, Wright EW, Feinstein B, Pearl DK. Subjective Referral of the Timing for a Conscious Sensory Experience. *Brain* 1979; 102:193-224.
- [12] Mukherjee BD. (2002). *The Essence of Bhagavad Gita*. Academic Publishers, Kolkata.
- [13] Raghavendra. (2000). *Ishavasya Upanishad*. SRG Publishers.
- [14] Recami E. (1986). Classical tachyons and possible applications. *Rivista Del Nuovo Cimento* 9(6), 43.
- [15] Shay D, Miller KL. Propagation of Tachyon Waves. *Tachyons, Monopoles, and Related Topics*. Ed. E. Recami North-Holland, Amsterdam, 1978; 189.

- [16] Sivananda. Divine life Society, Bases of Vedanta
- [17] Stapp H. P. (2007). The Mindful Universe. Appendix E. Springer-Verlag Berlin Heidelberg.
- [18] Sudarshan ECG. (1970). The Theory of Particles Traveling Faster than Light I. Symposia on Theoretical Physics and Mathematics 10 A. Ramakrishnan (ed.) Plenum Press New York.
- [19] Swami Shravananda. (1920). Kenopanishad. The Ramakrishna Math, Mylapore, Madras.
- [20] Swami Virupakshananda. (1995). Sankhyakarika. The Ramakrishna Math, Mylapore, Madras.
- Proceedings of the International Conference on Quantum Mechanics and Quantum Consciousness(ICQMOC), January 6 - 8, 2015 108