Origin of Consciousness and Zero-Point Field

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ABSTRACT

Yukawa coupling of scalar fields of Nambu-Goldstone bosons and Dirac fields of electrons creates interference pattern. Nambu-Goldstone bosons emerge from the quantum electric dipole field of the brain triggered by small energy of brain wave. The electrons come from the axons of neurons initiated by ions. The collapse of the interference pattern creates consciousness. This consciousness merges with supreme consciousness which is zero-point energy of super universe that includes our universe. It has been experimentally proven that zero-point energy exists even at absolute zero temperature. The author postulates that this zero-point energy not only exists in our universe but also outside our universe in the super universe and was there even before Big Bang which created our universe. The author postulates that our universe was created from zero-point energy. This zero-point energy is the supreme consciousness where our consciousness merges after every event.

Key Words: consciousness, OrchOR model, quantum field theory, Yukawa coupling, zero-point energy

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Introduction

In my previous papers (Das, 2009; Das, 2015), I mentioned that the theory of consciousness as a manifestation of a complex net of electric impulses within the brain is now discredited. I have proposed that Yukowa coupling between Nambu-Goldstone boson scalar field and electron Dirac field in the brain is the basis of consciousness. I further proposed that tubulins in the microtubules in the brain are involved in the activities of consciousness.

Penrose and Hameroff Objective Reduction Model

Penrose and Hameroff have worked extensively on quantum consciousness and have proposed a model called Orchestrated Objective Reduction (Orch OR model) (Hameroff and Penrose, 1996; Hameroff and Penrose, 2003). They suggested that quantum vibrational computations in microtubules were "orchestrated" ("Orch") by synaptic inputs and memory stored in microtubules, and terminated by Penrose "objective reduction" ('OR'), hence "Orch OR."

Microtubules are self-assembling hollow crystalline cylinders as long as 50 micrometers whose walls are hexagonal lattices of subunit proteins known as tubulin. In neurons, microtubules self-assemble to extend synapses and dendrites and form synaptic connections. Tubulins are peanut-shaped dimers with two connected monomers and can undergo several types of confrontational changes. Hence two possible states of a tubulin can represent one bit of information. If they are superimposed and exists in both states simultaneously then they represent a qubit and has the possibility of constituting a quantum computer.

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Orch OR model works in the following way.

1. Internal quantum events lead to confrontational states in tubulins in microtubules.
2. Quantum coherent superposition leads to quantum computation among tubulins. This will continue until the threshold for objective reduction is reached.
3. According to Penrose, the threshold for objective reduction is given by: $E=h/2\pi T$, where h is Planck constant. For T = 25 ms, E is roughly the superposition of 2 x 10^{10} tubulins.
4. Each brain neuron contains about 10^7 tubulins. If 10% of these tubulins become coherent, then Orch OR of tubulins within roughly 20000 neurons would be required for a 25 ms consciousness event.

Penrose suggested that at the Planck scale curved spacetime from Einstein's Theory of Relativity is not continuous, but discrete. Penrose postulates that each separated quantum superposition has its own piece of spacetime curvature, a blister in spacetime. Penrose suggests that gravity exerts a force on these spacetime blisters, which become unstable above the Planck scale of 10^{-35}m and collapse to just one of the possible states of the particle. The rough threshold for OR is given by Penrose's indeterminacy principle: $T=h/2\pi E$, where, T is the time until OR occurs, E is the gravitational self-energy or the degree of spacetime separation given by the superpositioned mass and h is Planck constant.

Orch OR was harshly criticized from its inception, as the brain was considered too "warm, wet, and noisy" for seemingly delicate quantum processes. However, evidence has now shown warm quantum coherence in plant photosynthesis, bird brain navigation, our sense of smell, and brain microtubules (Hameroff and Penrose, 2014). The recent discovery of warm temperature quantum vibrations in microtubules inside brain neurons by the research group led by Anirban Bandyopadhyay at the National Institute of Material Sciences in Tsukuba, Japan corroborates the pair's theory and suggests that EEG rhythms also derive from deeper level microtubule vibrations (Phys.org, 2014). In addition, work from the laboratory of Roderick G. Eckenhoff at the University of Pennsylvania suggests that anesthesia, which selectively erases consciousness while sparing non-conscious brain activities, acts via microtubules in brain neurons.

New Theory Quantum consciousness

In quantum field theory (QFT), photons are quanta-ripples in a field. Similarly, fermions like electrons are excited states of field. According to quantum brain dynamics (QBD) brain is considered as spatial distribution of quantum electric dipoles making it a quantum electric dipole field (Ricciardi and Umezawa, 1967; Stuart, Takahashi and Umezawa, 1978; Vitiello, 2003). In the quantum electric dipole field, Nambu-Goldstone bosons emerge due to breakage of symmetry triggered by arbitrary small incoming energy. This small energy is created by the wave in the brain according to Planck constant h and frequency ν given by $h\,\nu$. Also, electrons coming from the axons of the neurons create Dirac field. The Yukawa coupling between Nambu-Goldstone scalar field φ and Dirac field ψ is given by,

$V = K\,\varphi\,\psi\,\varphi/$

Where K is the Yukawa coupling and V is the energy transfer due to Yukawa interaction. The wave function φ(x) of the Nambu-Goldstone boson is given by,

$$\psi(x) = \rho(x)e^{j\theta(x)}$$

Where $\rho(x)$ is the local density of the condensate and $\theta(x)$ is the phase.

The Dirac field φ for an electron is given by, $\varphi = m_e\, e^{j\omega t}$

Where m_e is the electron mass.

Hence $V(x) = K\, m_e^2\, \rho(x)\, e^{j\,\theta\,(x)}$

These energies come from different couplings and will have different phases. Calling these different energy levels V(x1), V(x2), (x3), etc., then these energy levels will create an interference pattern.

$$V(x) = V(x1) + V(x2) + V(x3) + \cdots$$

$$= Km_e^2[\rho(x1)e^{j(\theta x1)} + \rho(x2)e^{j(\theta x2)} + \rho(x3)e^{j(\theta x3)} + \cdots]$$

$$= \sum_1^n km_e^2\rho(xn)e^{j\theta(xn)}$$

This interference pattern generates an image. When this interference pattern collapses, it creates consciousness. Ultimately, this consciousness merges with the supreme consciousness.

Supreme consciousness and Zero-point Energy

Zero-point energy is the energy of a system at absolute zero or the lowest quantized energy level of a quantum mechanical system. The origin of

zero-point energy is the Heisenberg uncertainty principle which reflects an intrinsic quantum fuzziness from the wave nature of the quantum fields. Liquid helium-4 is a great example. Under atmospheric pressure even at absolute zero, it does not freeze solid and will remain a liquid. This is because its zero-point energy is large enough to keep it as a liquid (Huffingtonpost, 2011).

Casimir effect is another example of zero-point energy (Calphysics, 2011). In this experiment two conducting plates in vacuum are placed parallel to each other. Although there is no applied electromagnetic field, the two plates will attract each other, the pressure being more and more as they move closer. In quantum field theory a vacuum is full of fluctuating electromagnetic waves that can never be completely eliminated. These waves come in all possible wavelengths, and their presence implies that empty space contains a certain amount of energy, an energy that we cannot tap, but that is always there. Now, if two plates are placed facing each other in a vacuum, some of the waves will fit between them, bouncing back and forth, while others will not. As the two plates move closer to each other, the longer waves will no longer fit, the result being that the total amount of energy in the vacuum between the plates will be a bit less than the amount elsewhere in the vacuum. Thus, the plates will attract each other, just as two objects held together by a stretched spring will move together as the energy stored in the spring decreases. S. Lamoreux verified Casimir force in the 0.6 to 6μm range within 5% of the agreement of the theory (Calphysics, 2011)

Planck proposed his second quantum theory, in which he introduced the zero-point energy. He found that the average energy ϵ of an oscillator is,

$$\epsilon = \frac{h\upsilon}{2} + \frac{h\nu}{e^{\frac{h\nu}{kT}} - 1}$$

Where, h = Planck constant; ν = frequency; k = Boltzmann constant; T = absolute temperature.

It can be seen that at T = 0, there is still a residual energy (hν)/2 which is the zero-point energy. Each wave has represented a propagating mode of the electromagnetic field. So each mode of the field must have (hν)/2 as its minimum energy. This is a tiny amount of energy in each mode, but the number of modes is enormous and increases as the square of the frequency per unit frequency per unit volume. The product of this tiny energy per mode and the huge number of modes produce a very theoretical zero-point energy density per cubic centimeter. The density of this energy depends on the frequency where the zero-point fluctuations cease. It can be argued that zero-point fluctuations will end at Planck frequency 1.8×10^{43} Hz. In that case the zero-point energy density will be greater than the radiant energy at the center of the Sun (Calphysics, 2011). However, the lifetime of a zero-point energy photon corresponds to an average distance traveled of only a fraction of its wave length. Hence the energy density is not as much as thought but still needs lot of research work to properly understand and interpret this area.

Zero-point energy has been directly measured in current-biased resistively shunted Josephson tunnel junctions as a current noise up to 500 GHz (Koch *et al.,* 1982). Having seen enough proof that zero-point energy exists, I will now expand my theory of consciousness with zero-point energy. I will call the observable universe as our universe which is part of much larger universe which I call super universe and our universe is expanding into the super universe according to Hubble's law. The diameter of our observable universe is 93 billion light years and the mass is 1.46×10^{53} kg. The universe is also expanding at a rate proportional to the distance according to Hubble's law;

$v = H_0 r$,

where v = velocity, H_0 = Hubble's constant, r = distance.

Hence the expansion of our universe is accelerating. This has led to the concept of dark energy which is a resurrection of Einstein's cosmological constant. According to latest evidence, our universe consists of 70 percent dark energy, 25 percent dark matter and 5 percent ordinary matter e.g. hydrogen, helium and heavy elements. There is a current theory that dark energy is zero-point energy. But nobody knows yet the actual amount of zero-point energy per unit volume, whether it ranges up to Planck frequency, and its properties. Hence the theory of dark energy as zero-point energy is under lot of debate without any experimental proof.

According to Bing Bang theory, the universe was created out of nothing. Now the following questions arise.

1. How could something be created out of nothing?

2. What was there before Big Bang?
3. What is the universe expanding into?
4. What lies beyond our universe?

Based on the facts given so far, the author is making the following postulations.

1. Zero-point energy is everywhere inside our universe and super universe.
2. It has been there before our universe has been created.
3. Our universe has been created out of zero-point energy. Hence the assumption of Big Bang theory that our universe was created out of nothing is not true.
4. Zero-point energy is supreme consciousness.

In my theory of consciousness (Das, 2009; Das, 2015), I have stated that Nambu-Goldstone bosons emerge due to breakage of symmetry in quantum electric dipole field in the brain. The neural pulse is created by electrons tunneling into ion channels and subsequent capture of ions by synapses (Burger, 2013). Yukawa couplings between the Nambu-Goldstone scalar fields and electron Dirac fields create an image of interference pattern. The collapse of the interference pattern creates consciousness. The energy of the interference pattern is transferred to consciousness as zero-point energy. After that consciousness merges with the supreme consciousness which is the zero-point energy of super universe.

Conclusion

Consciousness obtains energy from zero-point energy to interpret the interference pattern of the energy levels generated by the Yukawa coupling of scalar fields of Nambu-Goldstone bosons and Dirac field of electrons before it collapses. Nambu-Goldstone bosons emerge from the quantum electric dipole field of the brain triggered by small energy of brain wave. The electrons come from the axons of neurons. The collapse of the interference pattern creates consciousness transferring its energy. Consciousness merges with the supreme consciousness which is the zero-point energy of super universe. It has been experimentally proven that zero-point energy exists even at absolute zero temperature which is contrary to the third law of thermodynamics. The author postulates that this zero-point energy not only exists in our universe but also outside the universe and was there even before Big Bang which created our universe. Big Bang theory assumes that universe is created from nothing. Since something cannot be created out of nothing, the author postulates that our universe was created from zero-point energy. This zero-point energy is the supreme consciousness where our consciousness merges after every event.

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