



MIND AND CONSCIOUSNESS AS CREATED BY ELECTROMAGNETIC FORCE

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Abstract:

Consciousness is considered as a fundamental property of the universe in quantum theories of consciousness. We consider our physical universe as appeared by the phase-like transition of the energy waves, unfolded from 10 dimensions. The human brain and its mental aspects are associated with classical brain physiology and are also part of a quantum physical universe. We consider the whole universe being multi-dimensional, of $(4 + D)$ -dimensional Friedmann-Robertson-Walker-type (FRW), with complex scale factor “ $R + i R_I$ ”, where “ R ” is the scale factor corresponding to the usual 4-dimensional universe, and “ $i R_I$ ” is that of D -dimensional space-time. It is found that for $D = 6$ (i.e. in 10 dimensions), the Wheeler-DeWitt equation is symmetric under the exchange $R_I \leftrightarrow R$. Mathematically, when $D = 6$, it is $R_I = R$ and the physical universe starts. The universe starts with the symmetry breaking of group $SU(11)$. We assume that the extra-dimensions “ D ” are associated with a mental-consciousness or that of the individual mind-consciousness is (partly) an expression of a universal mind-consciousness through holonomic communication with quantum fields. “Consciousness” is created by the electromagnetic force in the framework of $SU(6) \times U(1)$, whereas “mind” is created by the framework of $SU(2) \times U(1)$. The human brain is conceived as an interfacing organ that not only produces mind and consciousness, but also receives information. The brain or parts of it are conceived as an “interference hologram” of incoming data and already existing ones (a “personal universe”), equivalent to the subject’s memory. If properly analyzed, information about the outer world can be distilled, with the analyzer being cerebral electrophysiology.

Key Words: Mind, Consciousness, Electromagnetic Force, Universe, Group Theory, Extra Dimensions & Mathematical Modelling.

1. Introduction:

The so called “Standard Model” is the physical theory that describes three of the four known fundamental forces, i.e. the strong, electromagnetic and weak interactions, with all elementary particles connected to them. It is based on quantum field theory, a non-Abelian gauge theory, renormalizable and coherent with special relativity. Its predictions have been largely experimentally verified with excellent accuracy. It is based on the $SU(3) \times SU(2) \times U(1)$ gauge group. It contains 12 gauge bosons with spin 1: 8 gluons of $SU(3)$, 3 weak gauge bosons of $SU(2)$ and the gauge hypercharge boson of $U(1)$. The photon is a particular combination of a gauge boson of $SU(2)$ and the hypercharge boson [1]. Fermions of the theory are three generations of quarks and leptons (Figures 1, 2).

The standard model refers to unified theories, in which the gauge group $SU(3) \times SU(2) \times U(1)$ is unified in larger groups, such as $SU(5)$, or $SO(10)$, or larger groups, such as E_6 . The exceptional groups are E_6 , E_7 , E_8 , F_4 and G_2 . The E_8 algebra is the largest and most complicated of these exceptional cases; it is so large that it could easily encompass all known particles and fields, and since also plays a role in superstring theories, it receives a lot of interest from physicists.

The problem on how the universe initially came to be is still controversial. Many questions are still to be completely resolved, as that of why the most of universe energy is in a dark form, and why the observed vacuum energy is so small in comparison to the scales of particle physics. It is possible to imagine an unknown mechanism which would set vacuum parameter exactly to be zero and then considered that there exist several unifications from the very early universe. Corresponding symmetry groups can be mathematically expressed as: $SU(11) \supset SU(6) \times SU(5) \times U(1)$, $SU(23) \supset SU(12) \times SU(11) \times U(1)$, $SU(47) \supset SU(24) \times SU(23) \times U(1)$, and so on [2].

We assume $SU(5)$ as “matter energy group” and $SU(6)$ as a new type of energy sources, that we call “latent energy group”. These two ones are associated into the super unified group $SU(11)$, giving rise to a “Super Unified Theory” (SUT). The breakdown of SUT symmetry group $SU(11)$ into fundamental groups $SU(5) \times SU(6)$ leads to a phase transition, then also the fundamental group $SU(5)$ breaks into subgroups $SU(3) \times SU(2) \times U(1)$, in which the scalar field Φ changes. The original vacuum, i.e. false vacuum ($\Phi = \sigma$), is no longer the true vacuum ($\Phi = 0$).

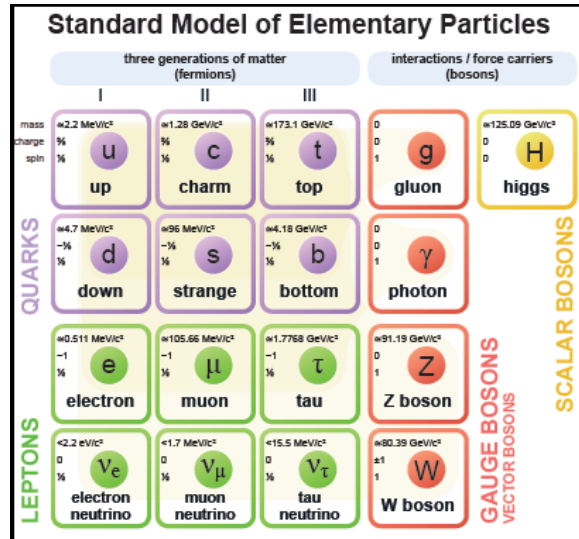


Figure 1: Elementary particles of standard model [3].

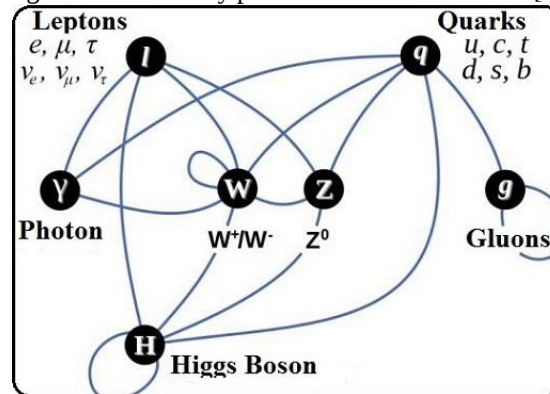


Figure 2. Scheme of interactions among particles described by the standard model [1].

2. Technical Details:

The inflationary stage arises, however, if the true vacuum is not immediately attained. Our universe emerges from infinity to the universe of the energy group SU(11), a special unitary group having 11×11 matrices. The Hermitian matrix H has 120 arbitrary constants, corresponding to 120 bosons that now mediate between the different basic entities. We already have 60 bosons from the matter energy group SU(5), the latent energy group SU(6) and U(1). Thus, $120 - (24 + 35 + 1) = 60$ more bosons (named *J*-bosons) are expected to link the participants of SU(6) with SU(5). Therefore, in the SUT it is possible to change any of 30 latent energy bosons of SU(6) into any of the 30 matter energy bosons of SU(5) or vice-versa, by exchange of *J*-bosons.

In the wider universe (i.e. complex space-time) there is neither any starting point nor any ending point. Initial and end conditions are present for the narrower universe (i.e. Einstein space-time), which emerged from the wider universe by a process of phase-changing. The idea that our 4-dimensional universe might have emerged from a higher dimensional space-time is now receiving much attention, where the compactification of higher dimensions plays a key role (multiverse and Calabi-Yau spaces) [4-6]. From the string theory we know that the compactification may take place provided that the higher dimensional manifold admits special properties, for example the existence of a suitable Killing vector [7]. It is not easy to understand why such manifolds are preferred and whether other possible mechanisms for compactification do exist; in cosmology different kinds of compactification could be considered. For example, in the approach called "dynamical compactification", the extra-dimensions evolve in time towards very small sizes and the extra-dimensional universe reduces to an effective 4-dimensional one. It is then natural to ask how an effective 4-dimensional universe evolve in time and whether the resulting cosmology is similar to the standard 4-dimensional FRW without extra dimensions [8].

Einstein expected the universe to be closed and filled with matter. According to his theory of General Relativity, the matter-space-time cannot be separated by any cost. Thus, outside the Einstein's universe, where "real" time can be not defined, the corresponding space (although the matter belongs to another phase) can be measured as "imaginary". Thus the space-time of the universe becomes a "complex space-time". The generalized solution of the Einstein field equations for a homogeneous universe was first presented by Alexander Friedmann [9]. The Friedmann equation for the evolution of the cosmic scale factor $R(t)$, representing the size of the universe, is as follows:

$$\left(\frac{\dot{R}(t)}{R(t)}\right)^2 = \frac{8\pi G}{3} \rho(t) - \frac{kc^2}{R^2(t)}, \quad (1)$$

where G is the Newton's gravitational constant, k is constant throughout a particular solution (but may vary from a solution to another), c is the speed of light in vacuum and we don't consider the cosmological constant Λ .

$$H = \frac{\dot{R}(t)}{R(t)} \quad (2)$$

is the Hubble parameter. Rewriting Eq. (1) as:

$$\dot{R}^2(t) = \frac{8\pi G}{3} \frac{[\rho(t) R^3(t)]}{R(t)} - kc^2 \quad (3)$$

and considering that the total matter in a given expanding volume is unchanged, i.e.:

$$(\rho(t) R^3(t)) = \text{constant}, \quad (4)$$

differentiating Eq. (3) with respect to t , we get:

$$\ddot{R}(t) = -\frac{4\pi G}{3H} \rho(t). \quad (5)$$

Therefore, according to these models, the content of all galaxies must have once been united in a very small volume, where the temperature would have been immensely high.

We start from a fundamental theory including both gravity and standard model of particle physics. It is interesting to begin with a $10(4+6)$ - dimensional space-time, with a compactification of 6 dimensions [1]. We consider the internal space as imaginary pseudo-space $R_I (= iR)$ (where R is the scale factor of the universe and i is the complex imaginary unit), where the matter belongs to another phase, and then transfer the new energy sources as phase transition systems with the help of the latent group $SU(6)$. It is shown that using a more general metric and introducing matter without specifying its nature, the size of compact space evolves as inverse power of the universe radius [10]. The FRW equations of the standard 4-dimensional cosmology are obtained by using an effective pressure expressed in terms of the components of the higher dimensional energy-momentum tensor; the negative value of this pressure may explain the acceleration of our present universe.

The class of symmetry group from Big-Rip singularity (the Big-Rip is a cosmological hypothesis on the final destiny of the universe [11]) can be mathematically expressed as follows:

$$\begin{aligned} SU(11) &\supset SU(6) \times SU(5) \times U(1), \\ SU(23) &\supset SU(12) \times SU(11) \times U(1), \\ SU(47) &\supset SU(24) \times SU(23) \times U(1), \\ &\dots\dots\dots \\ SU(12N-1) &\supset SU(6N) \times SU(6N-1) \times U(1). \end{aligned}$$

So, according to the laws of symmetry breaking of the Gaussian-like energy group, there exists neither any Big-Bang nor any Big-Crunch singularity, but the Big-Rip singularity and Big-Break-singularity [12]. The energy mainly related to $SU(12)$, $SU(24)$, is also responsible for consciousness and intelligence of living cells or bodies, as the progress of the material universe depends on the sub-energy groups of $SU(5) \supset SU(3) \times SU(2) \times U(1)$ stated by the standard model of physics. The activities of the energy groups for consciousness are restricted to unfold ones for each galaxy of the universe as well as for every solar system of the galaxies. The quantum universe actually started from a Big-Rip singularity, where energy pressure and densities simultaneously exists.

3. Photon and Electric Charge Mediating Consciousness:

The series of new energy sources $SU(6)$, $SU(12)$, etc. are connected with double slit experiments. In fact, our 4-dimensional matter universe has been observed when there was created as "a whole", like by a single open slit, by the symmetry breaking of the unified group $SU(5)$, creating a shower of photons and quanta of matter particles on the natural screen of the universe.

Another way to see the landscape is as double open slits from the 10-dimensional space-time, by the new energy sources of $SU(6)$ emitted as "knew", i.e. by the symmetry breaking of the super-unified energy group $SU(11)$ and then $SU(5)$; we found an entangled-like matter energy with "spirit energy" by $SU(6)$. The subgroup $SU(6)$ can be interpreted as a new type of energy sources, different by $SU(5)$, related to the standard model of physics. We assumed our physical universe appeared from something instead from nothing.

The strength of weak force gradually decreases and the strength of strong force increases as we advance from the symmetry breaking of the unified group $SU(5)$. The initial so called "nothing" derives by the symmetry breaking of the super unified energy group $SU(11)$, where the energy group $SU(6)$ remains latent in the present and behaves as "consciousness" in the framework of $SU(6) \times U(1)$, creating an electromagnetic force called "spirit matter". The bosons of the energy group $SU(6)$ control all measurable energies of $SU(5)$, including

quarks and leptons, and produce a strong neutral current that is applicable within “live” cells, elements, animals, plants and so on, with an electromagnetic interaction created by SU(2) with U(1) in the framework of $SU(2) \times U(1)$, called “mind”.

We consider the existence of two phases of the universe:

- “local phase”: matter particles produce the requirements of our physical universe, in particular the wave-particle duality;
- “non-local phase”: particles, remained in the wave form (called “spirit”), control the phase of our physical universe.

The energy group SU(6) directly controls the whole universe including ourselves, also creating the consciousness.

It is helpful to have a conceptual picture of quantum superposition in a super gravitational context, i.e. in the Super Unified Theory (SUT) of SU(11). According to modern accepted physical theories, reality is rooted in a 3-dimensional space and a 1-dimensional time, combined together into a 4-dimensional space-time. But here we consider instead that the origin of reality is rooted in $(4 + D)$ -dimensional FRW-type universe, having complex scale factor $R + i R_i$, where R is the scale factor corresponding to the usual 4-dimensional universe and $i R_i$ is that of D -dimensional space. According to the latest research (superstring theories), the actual reality of the so called “material universe” would be rooted in a 10-dimensional space-time instead of 4-dimensional space-time [13,14].

It is also well known that superconductivity and other large-scale quantum effects can actually occur at temperatures which are very far from absolute zero. The participation of the neutral current occurs in the framework of the super-unified group SU(11), in particular in the framework $SU(6) \times U(1)$. The strong neutral current created by SU(6) with U(1) can be compared with the weak neutral current created by the framework of SU(2) with U(1) of the unified group SU(5). In the electroweak picture, at very high energies, the universe has four vector gauge fields related to a single electroweak force, expressed by four massless gauge bosons coupled to a scalar field (the Higgs field). Below a certain level of energy, the Higgs field, due to its instability, undergoes a spontaneous symmetry breaking that produces three Goldstone bosons, which are assimilated by three of the four electroweak fields providing them with the mass (Higgs mechanism). The three massive fields become the W^+ , W^- and Z^0 bosons of the weak interaction, while the fourth one preserves the initial characteristics still present in the current universe and is the massless field of the “photon”, responsible for electromagnetism (Figure 3) [15].

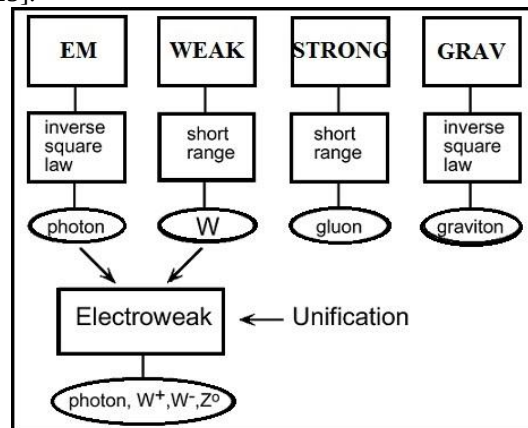


Figure 3. Electroweak unification

Similarly, if we reason with the symmetry theory of SU(11), there are five neutral particles of the latent energy group SU(6), in which two pairs are interchanged without any colour changes, and there is a neutral particle like Z^0 . So the electromagnetic interaction through the framework $SU(6) \times U(1)$, called “pseudo-electromagnetic interaction”, may be responsible for the consciousness sensory with material weak electromagnetic interaction achieved by the framework of $SU(2) \times U(1)$. Thus Z^0 -like neutral particle of SU(6) interacts with other particles of SU(5), creating strong neutral current with conscious sensory information system.

In theoretical physics, we observe the “flavour-changing neutral currents” (FCNC’s), hypothetical expressions that change the flavour of a fermions current, without altering its electric charge. If they on fact occur in Nature, these processes may induce phenomena not yet observed at experimental level [16]. FCNC’s are generally predicted by theories going beyond the standard model, such as supersymmetric models [1].

In relation to the electromagnetic theories of consciousness, the “conscious electromagnetic information (CEMI) field theory” conceives that the electromagnetic field in the brain fine-tunes the probabilities of neuron firings. The affected neurons may be a part of the larger connected assemblies, and this

leads to memory and learning. In simulated networks, non-synaptic neuronal interactions via the electromagnetic field and also gap junctions enhance learning [17-20].

4. Conclusions:

Quantum physics indicates that consciousness is related to the awareness that an electron appears to show in the wave/particle duality; but the electron behaves differently when being observed by a human. This may indicate that the electron will change its behaviour/reality depending on whether or not is observed, as if it would aware that is being observed. This awareness is very similar (if not the same) as human awareness and may be related to the same consciousness. Thus consciousness seems to work silently for the formation of our universe and then behaves like entanglement.

Consciousness may be, therefore, a non-material entity capable of independent, eternal existence, and not a property, but in some sense may be used as property. It can remain localized in the human brain and interact with it, and thereby, control the activities of the human body.

Whenever the electron's wave function collapses, experiences as the OBE (Out of Body Experience) (Figure 4) and NDE (Near Death Experience) end, the person returns to their physical body and her/his perception of reality is similar to the collapsing of the wave function in the double slit experiment in quantum physics [21-23]. During OBE and NDE, consciousness can leave the brain and go into an independent floating existence outside the human body where it can travel independent of space-time, similar to the entangled electron.

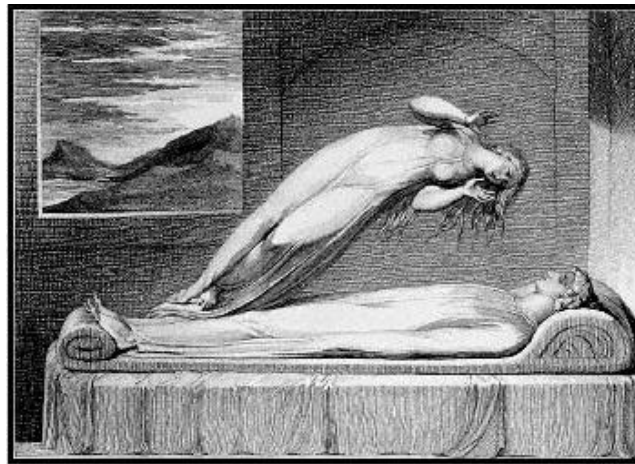


Figure 4. Illustration of Robert Blair's poem "The Grave", depicting the soul leaving the body.

How does the "I" or "self" or the perceived wholeness of one's world emerge from a system consisting of so many parts, billions of neurons? What creates the "oneness" of thought processes? What creates the individuality and "self"? What creates feelings, free will, and creativity?

A possible solution is by considering a complete total body as an entity with the combination of two different characters of electromagnetic wave functions produced in two different phases by the symmetry breaking of SU(11) and SU(5).

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