



CONSCIOUSNESS MEDIATED QUANTUM GRAVITATIONAL COLLAPSE VIA GENERATED WORMHOLES: FROM MACROSCOPIC BIOPHYSICAL TO MICROSCOPIC QUANTUM ARGUMENTS

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Abstract. The key problem of the future theory of consciousness is how to incorporate altered states of consciousness within a new paradigm, as purely biochemical mechanisms are not accelerated up to several orders of magnitude, in comparison with subjective time sense dilation in altered states of consciousness - in respect to the normal awake state. The electromagnetic (EM) component of ultralowfrequency (ULF) "brainwaves" appears to enable perfect fitting with narrowed down limits of conscious capacity in normal awake states and very extended limits in altered states of consciousness - due to the biophysical relativistic mechanism of dilated subjective time base. It also enables the mixing of the normally conscious and unconscious contents in altered states, due to the relativistic Doppler mapping of the EM component of the "objective" ULF brainwave power spectrum on the zero-degenerate-frequency "subjective" one. An additional low-dielectric ($\epsilon_r \approx 1$) weakly ionized gaseous neural network is necessary in these processes, which can be related to a displaced (from the body) part of acupuncture EM/ionic "optical" microwave (MW) quantum holographic neural network-like system modulated by ULF brainwave currents $\sim 10^{-7}$ A, inside the conductive channels of the initial ionic concentration $\sim 10^{15} \text{ cm}^{-3}$, with a tendency of deterioration during a period of ~ 1 hour. The displaced ionized gaseous part of "optical" MW quantum holographic neural network-like acupuncture system, with embedded EM field of ULF brainwave currents, enables that "objective" distances can be "subjectively" optically recognized as much closer in altered states - due to the relativistic mechanism of the length contractions. Even most peculiar space-time transpersonal interactions are predicted in nonstationary ($\epsilon_r \neq \text{const.}$) transitional states during the interchange of normal and altered states of consciousness, due to the relativistic generation of wormholes in highly noninertial "subjective" reference frame, fully equivalent to extremely strong gravitational fields according to Einstein's Principle of equivalence. Furthermore, as the EM field is only one out of four manifestations of the unified physical field, it can be tentatively

generalized that the unified field may be internal conscious display for various physical processes, implying that Nature itself has consciousness at all structural levels - which is supported by analogous mathematical formalisms of Feynman's version of the Schrödinger equation and Hopfield's holographic neural network dynamics, implying similar information processing on both microscopic quantum and macroscopic biophysical levels. This bizarre nonlocal pantheistic idea of consciousness can naturally help in resolving the fundamental difficulties of quantum collapse: for instance, in Penrose's gravitationally induced wave function reduction of measurement-like processes with highly noninertial microparticles interactions, the very mechanism for this process could be continuous opening and closing of local microparticles' wormholes, addresses of their exits being related (probabilistically) to one of the possible eigenstates of corresponding microparticles - and everything being coupled to corresponding probabilistic addressing of the "nonlocal consciousness". It is important to note that there is unifying element for the two levels, microscopic and macroscopic, appearing in the theory expounded: this is the possibility to deal with the individual systems in both dynamical and interpretational context of the theory.

Keywords: *Consciousness, transitional states of consciousness, Principle of equivalence, wormholes, quantum collapse, biophysics, relativistic & quantum physics, brainwaves, neural networks, ionic structures.*

1. INTRODUCTION

The key problem of the future theory of consciousness is how to incorporate altered states of consciousness [1] (REM sleep, meditation, hypnosis, psychedelic drug influence, some psychopathological states, and near-death experiences) within a new paradigm. It should be pointed out that purely *biochemical* mechanisms of the Baars' extended reticular-thalamic activating system (serving as a selector and amplifier of the conscious content out of many other currently processed nonamplified contextual unconscious contents) are not accelerated up to several orders of magnitude, as the subjective time sense is dilated in altered states of consciousness - in respect to the normal awake state.

The only mechanism that can account for the extremely dilated subjective time base in altered states of consciousness is the relativistic *biophysical* one, if only the "subjective" observer can be associated with an EM field of the ultralowfrequency (ULF) brainwaves which can move through the brain with relativistic velocities, as it was extensively elaborated in our biophysical model of altered states of consciousness for the past ten years [2]. However, it is necessary that complete information (both conscious and unconscious) is permanently coded from neural network to brainwaves, as a spatio-temporal pattern resulting from changes of the synaptic interconnections in the neural networks of the brain. To be more specific, the ionic medium supporting propagation of the brainwave ULF ionic currents must be unhomogeneous, to ensure that the "subjective" observer (associated with the EM component of reference ULF brainwaves), moving through the part of medium of greater ϵ , could register time-dilated information from faster EM component of brainwaves moving through the neighboring part of medium of lower ϵ' . Then, at every moment the "subjective" observer is associated with the EM component of brainwaves in the dielectrically "denser" medium, and the whole such system behaves like some "center of consciousness". The informational content of such "subjective" observer is continuously replaced by a new incoming EM component of brainwaves. So, we have permanently some "stream of consciousness". More precisely, for inflowing information (in the form of ULF brainwave ionic currents, coded in spatiotemporal patterns from the brain neural networks) to be recognized by the structured ionic medium, that medium itself must have a form of some kind of "optical" neural network - thus the "subjective" observer being associated with the EM component of brainwaves in dielectrical "condensations" (of greater ϵ), behaving like "distributed centers of consciousness"!

The model [2] perfectly fits with the narrowed-down limits of conscious capacity in normal awake state (when brainwaves are predominantly located in the brain tissue with relative dielectric permittivity $\epsilon \gg 1$), and very extended limits in altered states of consciousness

(characterized by low-dielectric $\epsilon \approx 1$ states, when the relative velocity between the "objective" laboratory reference frame and the "subjective" one is highly relativistic, $v = c_0 / \sqrt{\epsilon}$, where c_0 is a velocity of EM waves in vacuum) - due to biophysical relativistic mechanism of *dilations of the subjective time base*. This relativistic mechanism also enables the *dream-like mixing* of the normally conscious and unconscious contents in altered states, due to the relativistic Doppler mapping of EM component of the "objective" ULF brainwaves power spectrum on the zero-degenerate frequency "subjective" one. The biophysical nature of *low-dielectric* ($\epsilon \geq \epsilon' \approx 1$) structure has also been analyzed: this structure could be related to partly displaceable (from the body) unhomogeneous ionic acupuncture system, which can conduct ULF brainwave currents $\sim 10^{-7}$ A, inside the conductive channels of the initial ionic concentration $\sim 10^{15}$ cm $^{-3}$, with a tendency of deterioration during a period of ~ 1 hour. Additionally, ionic acupuncture currents, and accompanying electromagnetic (EM) fields, have both ultralowfrequency (ULF) and microwave (MW) components, i. e. the very fast and very coherent quantum-like resonance MW component [3,4] is amplitude-modulated by significantly slower ULF component, which also support the EM/ionic "optical" MW/ULF quantum holographic neural network-like function of the acupuncture system, and its essential relation to consciousness, as strongly suggested from modeling of altered states of consciousness [2].¹

It should be noted that some peculiar *spatial* relativistic effects in altered states of consciousness (when $\epsilon \approx 1$) are predicted by the model [2]: the weakly ionized gaseous neural network, with embedded ULF brainwave currents, enables that even long "objective" distances can be "subjectively" optically recognized *contracted*; and, such displaced ionic "optical" neural network can perceive an environment *panoramically*, as reported by reanimated patients. Even more peculiar *spatio-temporal transpersonal interactions* are predicted in *transitional* (nonstationary) states of interchange of normal and altered states of consciousness (when brainwaves traverse from high-dielectric ($\epsilon \gg 1$) to low-dielectric ($\epsilon \approx 1$) state or vice versa, the relative velocity $v = c_0 / \sqrt{\epsilon}$ of "subjective" reference frame being subjected to abrupt change in short transitional period $t \sim 0.1$ s, with "subjective frame" acceleration $\sim c_0 / t \sim 10^9$ m/s 2). Deeper understanding of physical mechanisms of these processes obviously sinks into the General theory of relativity, applied to highly noninertial reference frames (like in enormously strong gravitational fields of wormholes, where similar phenomena are expected [12]). From the point of view of General theory of relativity, physical processes in accelerated reference frame outside gravitational field and in that one inside gravitational field with equal (gravitational) acceleration - are identical (so-called *Principle of equivalence*, being one of the fundamentals of Einstein's theory of gravitation). Theoretical analyses show that in enormously strong gravitational fields so-called wormholes (or Einstein-Rosen space-time bridges) are created, whose entrance and exit could be in very distant space-time points. As in transitional states of consciousness the "subjective" reference frame, related to EM field of brainwaves, is subjected to quick change of velocity, with equivalent acceleration comparable with that one in enormously strong gravitational field of wormholes, according to the Principle of equivalence one could expect, in such brief states, the creation of Einstein-Rosen bridge and tunneling of "subjective observer", i. e. consciousness, in previously "mentally addressed" exit in space-time (to support this, one can cite the technique adopted by "extrasenses" when they want to exert some distant influence: they always intensely visualize the person or place, as mental targets; on the other hand, this could be deeply connected with the role of consciousness in quantum theory of measurement, where consciousness with its act of observation affects the final collapse of the initial wave function into one of possible probabilistic eigenstates - which implies that the collapse could be related with generation of local Einstein-Rosen bridge [13,14], as it is elaborated further on). Reminiscences on passing through some tunnel have been really reported by many patients reanimated from clinical death! It should be pointed out that apart from the EM field, the displaced part of ionic acupuncture system (in the form of ionic neural network, having the "optical" sensory function), must also be tunneled in such (acausal) interactions of consciousness with distant events in space-time! This could be a biophysical mechanism of the so-called *astral projections* of consciousness, those presumably being the basis of most *psychic phenomena* [15] (providing also explanation for transitional nature and difficult reproducibility of these phenomena); the mentioned astral projections are presumably

also the basis of *religious experiences*, with mental addressing on spatio-temporally distant abundant ionic archetypic structures from religious traditions, being the target of prayer in transitional states of consciousness.

Finally, if the EM field of ULF ionic currents represents sophisticated internal display (related to consciousness) of neural network information processing, it seems that consciousness is not privilege of humans - but can be also a characteristic of higher animals. Even more, if microtubular cytoskeletal structures have neural network-like electrical activities on subcellular level, it seems that consciousness can be descended down to the cellular and even subcellular level. Naturally, the conscious content displayed in such EM internal displays depends on the complexity of corresponding neural network information processing at different levels, from subcellular to brain ones. Furthermore, as the EM field is only one out of four manifestations (electromagnetic, gravitational, weak and strong nuclear forces) of the unified physical field, it can be tentatively generalized that the unified field itself may be internal conscious display for various physical processes at different structural levels, from macroscopic cosmic to microscopic subnuclear ones. As a consequence, one could conjecture that Nature itself has consciousness at different structural levels, both animate and inanimate, as it is widely claimed in esoteric traditional knowledge. In that context, all local consciousnesses might be interconnected (through previously described interactions in altered and, especially, in transitional states of consciousness) making the giant cosmic informational network with delocalized consciousness, implying again the crucial significance of *morals*, both on the level of thoughts and feelings!

2. CONSCIOUSNESS AND QUANTUM GRAVITATIONAL COLLAPSE: FROM BIOPHYSICAL TO QUANTUM ARGUMENTS

Although such nonlocal pantheistic idea of consciousness is rather bizarre, it can naturally help in resolving the fundamental problem of the *wave function reduction* in the quantum theory of measurement, where in an act of measurement (including finally the very act of conscious observation of the act of measurement) the macroscopic measuring apparatus (including consciousness as a "subjective" observer) makes reduction of the initial wave function into one of the possible eigenfunctions of the system. The problem of the wave function reduction (collapse) in an act of measurement is "orthodoxly" interpreted in quantum theory of measurement as the discontinues change induced by the observation of a quantity with eigenstates Y_1, Y_2, \dots , in which the initial wave function $\Psi = \sum_i a_i \Psi_i$ will be changed to the

state Y_j with probability $|a_j|^2$. The collapse of the wave function and the assignment of statistical probabilities do not follow from the Schrödinger equation - they are consequences of an external a priori metaphysics, which is allowed to intervene at this point and suspend the Schrödinger equation, or rather replace the boundary conditions on its solution by those of the collapsed state function. The problem of quantum theory of measurement has not been consistently resolved to date, and has been the subject of many serious theoretical efforts, from the very beginning of Quantum mechanics [16].

On the other hand, Quantum mechanics is *nonlocal theory*, as even very distant parts of quantummechanical system (which cannot exchange light signals) can be physically correlated in the act of measurement (like in Einstein-Podolsky-Rosen paradox [16]). As an extreme consequence, this implies that consciousness as a "subjective" observer in such kind of experiment must have nonlocal properties. The property of *nonlocality of consciousness is automatically fulfilled* in our relativistic biophysical model, according to which consciousness is inherently and globally related to the very *electromagnetic field* of the brainwaves ionic currents! Having in mind that EM field is only one out of four manifestations of the unified physical field - it might be that the very *unified field* is nonlocal internal conscious display for various physical processes at different structural levels, from microscopic to macroscopic ones. This might be supported by *analogous* mathematical formalisms of Feynman's version of the Schrödinger equation and Hopfield's holographic neural network dynamics [10], implying similar information processing on both microscopic quantum and macroscopic biophysical levels!

This bizarre nonlocal pantheistic idea of consciousness can naturally help in resolving the

fundamental difficulties of the wave function reduction. In one of the most recent approaches, Penrose proposes gravitationally induced wave function reduction [17]. Actually, gravitational field of the state of observing apparatus F , with all possible observable outputs F_i , must be also involved in the superposition of quantum eigenstates ($\Psi_\Phi = \sum_i a_i \Psi_i \Phi_i$) - this implying different

space-time geometries superimposed. However, when the geometries become sufficiently different (on the Planck-Wheeler scale $\sim 10^{-35}$ m), thus implying ill-defined standard superposition of the matter eigenfunctions in strictly separate spaces - Nature must choose between one of them and *objectively affects* wave function reduction. Moreover, as microparticles are continuously subjected to fantastic accelerations ($\sim v^2/r \sim 10^{23}$ m/s² for electrons bounded in atoms, and $\sim 10^{29}$ m/s² for protons and neutrons bounded in nucleus, ...), which can be met also in extremely strong gravitational fields - according to the Principle of equivalence one should expect [2] continuous opening and closing of local Einstein-Rosen bridges, addresses of their exits being related (probabilistically) to one of the possible eigenstates of corresponding microparticles. This process might yet be the mechanism for some sort of the wave function reduction, implying why so important the *mental addressing* is in transitional states of consciousness, related to space-time tunneling of consciousness, described above! It also reveals that Quantum mechanics and the General theory of relativity seem to be deeply interconnected on microparticle level, showing that microparticles are continuously vanishing and reemerging (subjected obviously to corresponding conservation laws) in measurement-like interactions, throwing a new light on wave-particle dualism and other quantummechanical phenomena.

In that framework, the role of consciousness in quantum theory of measurement turns out to be extremely important [2]! For instance, in gravitationally induced wave function reduction, the very mechanism for this process could be continuous opening and closing of local microparticles¹ Einstein-Rosen bridges, addresses of their exits being related (probabilistically) to one of the possible eigenstates Y_i of corresponding microparticles - and everything being related to corresponding probabilistic addressing F_i of "nonlocal consciousness".

It is important to note that there is unifying element for the two levels, microscopic and macroscopic, appearing in the theory expounded. This is the possibility to deal with the *individual* systems in both dynamical and interpretational context of the theory. For the completeness, let us distinguish the different aspects of "individuality" of microparticles in the standard formulation of quantum mechanics: (1) from the experimental point of view, by "individual systems" one should admit *each single run* of the (quantum) measurement; (2) from the conceptual point of view, the same should be understood as an element of an ensemble of (mutually identical) microparticles. To this end, the practical (laboratory) realization of ensemble completely fits with the (standard) concept of the Gibb's ensemble, thus providing the possibility to deal with a (quantum) state of an individual microparticle (i. e. with an element of ensemble).

It should be added that physical interaction of the displaced gaseous ionic "optical" neural network with *possible* "objective" system (described by possible wave function Y_i) or corresponding *possible* state of "nonlocal consciousness" (F_i), in space-time tunneling of consciousness during transitional states of consciousness - opens also a question on the nature of wave functions - which should provide a picture of quantum-level physical reality (not only serving as a calculational device, useful merely for calculating probabilities, or as an expression of the experimenter's "state of knowledge" concerning physical system)! Then by changing initial state of "nonlocal consciousness" (F) one can influence probabilities of realization of corresponding states F_i , i. e. possible objective states Y_i . As the state of "nonlocal consciousness" (F) is a composite state constituted of (noninteracting) states of all "individual

consciousness" (j_k), $\Phi \sim \prod_k \varphi_k$ it follows that the change of state j_k of "individual consciousness" can affect the state F of "nonlocal consciousness", and therefore the probabilities for realization of possible objective states Y_i . This is particularly true if the state F

is very sensitive on small changes of initial conditions, which is the case for physical systems described by deterministic chaos. Having in mind that the brain and corresponding state j_k of "individual consciousness" is such kind of system, then the composite state F of "nonlocal consciousness" is also described by deterministic chaos - and therefore very sensitive on small changes in initial conditions! Such a conclusion implies extraordinary practical significance of contents of our "individual consciousness", as they directly determine the probability of realization of possible objective states Y_i , i. e. the future events, no matter how bizarre this conclusion looks like [2]!

In this framework, it might be also said that (complex-valued) EM/ionic "optical" MW/ULF acupuncture quantum neural network of "individual consciousness" triggers the "collapse" of (complex-valued) quantum wave-function - via relativistic wormhole (real-valued) classical environment in transitional states of consciousness [13] - and thus transform the (complex-valued) probabilistic dynamics of quantum world, related to (complex-valued) consciousness, into the (real-valued) deterministic dynamics of classical world, related to (real-valued) biological neural networks [10] - which might offer biophysical prospects for hypothetical conscious brain-like computers [14]. In support to this, there are strong indications [18] that biological neural networks essentially cooperate with quantum networks in the brain.



REFERENCES

- [1] In C. Tart, ed., *Altered States of Consciousness* (Academic, New York, 1972); K. Jaspers, *Allgemeine Psychopathologie* (Springer, Berlin, 1953); R. A. Moody, jr., *Life after Life: The Investigation of a Phenomenon - Survival of a Bodily Death* (Bantam, New York, 1975).
- [2] D. Raković, Brainwaves, neural networks, and ionic structures: Biophysical model for altered states of consciousness, in D. Raković and Dj. Koruga, eds., *Consciousness: Scientific Challenge of the 21st Century* (ECPD, Belgrade, 1995), pp. 291-316; D. Raković, Hierarchical neural networks and brainwaves: Towards a theory of consciousness, in Lj. Rakić, G. Kostopoulos, D. Raković, and Dj. Koruga, eds., *Brain & Consciousness: Proc. ECPD Workshop* (ECPD, Belgrade, 1997); and references therein.
- [3] S. P. Sit¹ko and L. N. Mkrtchian, *Introduction to Quantum Medicine* (Pattern, Kiev, 1994).
- [4] N. D. Devyatkov and O. V. Betskii, eds., *Biological Aspects of Low Intensity Millimeter Waves* (Seven Plus, Moscow, 1994).
- [5] B. Pomeranz, Acupuncture research related to pain, drug addiction and nerve regeneration, in B. Pomeranz and G. Stux, eds., *Scientific Bases of Acupuncture* (Springer, Berlin, 1989), pp. 35-52.
- [6] G. Fischer, *Grundlagen der Quanten-Therapie* (Hecataeus Verlagsanstalt, Triesenberg, 1996).
- [7] S. P. Sit¹ko, Ye. A. Andreyev, and I. S. Dobronravova, The whole as a result of self-organization, *J. Biol. Phys.* 16 (1988), pp. 71-73; S. P. Sit¹ko and V. V. Gizhko, Towards a quantum physics of the living state, *J. Biol. Phys.* 18 (1991), pp. 1-10; V. V. Gizhko and S. P. Sit¹ko, Coherent microwave electromagnetic fields as a physical model of macroscopic quantum states of the multicellular organism, *Journal of Physics of the Alive* 1 (1993), pp. 103-109; S. P. Sit¹ko, Quantum physics of the alive: Medical aspects, in Lj. Rakić, G. Kostopoulos, D. Raković, and Dj. Koruga,

eds., *Brain & Consciousness: Proc. ECPD Workshop* (ECPD, Belgrade, 1997).

[8] Z. Jovanović-Ignjatić and D. Raković, A review of current research in microwave resonance therapy: Novel opportunities in medical treatment, *Acup. & Electro-Therap. Res., The Int. J.* (1998), submitted.

[9] J. J. Hopfield, Neural networks and physical systems with emergent collective computational abilities, *Proc. Natl. Acad. Sci. USA* 79 (1982), pp. 2554-2558; H. Haken, *Synergetic Computers and Cognition: A Top-Down Approach to Neural Nets* (Springer, Berlin, 1991).

[10] M. Peru", Neuro-quantum parallelism in mind-brain and computers, *Informatica* 20 (1996), pp. 173-183; M. Peru", Multi-level synergetic computation in brain, *Advances in Synergetics* 9 (1998), in press; and references therein.

[11] R. P. Feynman and A. R. Hibbs, *Quantum Mechanics and Path Integrals* (McGraw-Hill, New York, 1965); J. D. Bjorken and S. D. Drell, *Relativistic Quantum Fields* (McGraw-Hill, New York, 1965), Ch. 6.

[12] K. S. Thorne, *Black Holes and Time Warps: Einstein's Outrageous Legacy* (Picador, London, 1994), Ch. 14, and references therein.

[13] D. Raković, Consciousness and quantum collapse: Biophysics versus relativity, *The Noetic J.* 1 (1997), pp. 34-41.

[14] D. Raković, Prospects for conscious brain-like computers: Biophysical arguments, *Informatica* 21 (1997), pp. 507-516.

[15] R. G. Jahn, The persistent paradox of psychic phenomena: An engineering perspective, *Proc. IEEE* 70 (1982), pp. 136-170.

[16] In J. A. Wheeler and W. H. Zurek, eds., *Quantum Theory and Measurement* (Princeton Univ., Princeton, 1983).

[17] R. Penrose, *Shadows of the Mind: A Search for the Missing Science of Consciousness* (Oxford Univ., Oxford, 1994), Part II, and references therein.

[18] K. H. Pribram, *Brain and Perception* (Lawrence Erlbaum A., Hillsdale, 1991); K. H. Pribram, ed., *Rethinking Neural Networks: Quantum Fields and Biological Data* (Lawrence Erlbaum A., Hillsdale, 1993).

ENDNOTE

¹ In support of the ULF nature of ionic currents in acupuncture channels, one can cite the resonance ULF stimulation of the acupuncture analgesia endorphin (at ~ 4 Hz) and serotonin and/or norepinephrine (at ~ 200 Hz) mechanisms [5], as well as the efficiency of the German school of the resonance ULF therapy [6]; on the other hand, the evidence for the MW component of ionic acupuncture currents is provided by the efficiency of the Ukrainian-Russian school of the resonance MW (~ 30-300 GHz) therapy [3,4]. The quantum-like coherent characteristics of the resonance MW therapy (sharply-resonant sensory response of the disordered organism, extremely low-intensity and low-energy non-thermal biologically efficient MW radiation, and negligible MW energy losses down acupuncture meridians) might be a consequence of the existence of biological nonlocal selfconsistent macroscopic quantum potentials [7], which can give rise to nonlinear coherent EM MW long-range maser-like excitations of biological nonlinear absorption medium with the cells as active centers - with acupuncture meridians related to eigenfrequencies and spatio-temporal

eigenwaves distributions of every individual biological quantum system. This suggests that healthy condition might be considered as an absolute minimum (ground state) of the nonlocal selfconsistent macroscopic quantum potential of the organism, some disorders of an acupuncture system corresponding to higher minimums of the (spatio-temporally changeable) potential hypersurface in energy-configuration space [8], which possibly explains the higher sensory responses of the more excited (more disordered) acupuncture system, and poor MRT sensory response of the healthy acupuncture system being already in the ground state. Such a picture is very close to those of associative neural networks in their energy-configuration spaces [8], and to pattern recognition as convergence of the neural networks to the bottoms of the potential hypersurfaces, being the attractors of neural networks memory patterns [9,10]. This similarity of the quantum and neural network pictures might not be only superficial, as (real-valued) mathematical formalism of Hopfield's and Haken's associative neural network models [9] is analogical [10] to the (complex-valued) mathematical formalism of Feynman's propagator version of the Schrödinger equation [11]. This also supports the EM/ionic "optical" MW/ULF quantum holographic neural network-like function of the acupuncture system (similar to complex-valued oscillatory holographic Hopfield-like neural networks [10]), and its essential relation to (complex-valued quantum relativistic) consciousness, as strongly suggested from modeling of altered states of consciousness [2].

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