RESEARCH PAPER

RESEARCH ON THE GEOMETRY OF CONSCIOUSNESS

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Scale-Invariant Geometry of Consciousness: from Projection at the Planck Level to Cosmic Manifestation as a Bidirectional “Stairway to Heaven”

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Keywords: *Consciousness, Fabric of Reality, Torus geometry, Magnetic Monopoles, Quantum Coherence and Decoherence, Electromagnetic Frequency Eigenvalues, Quantum Biology, Quantum Wave Equation of Life, Healthy and Unhealthy EMF Frequency Values, Mental Attribute of Reality, Philosophical Theories of Leibniz, Jung and Dante, Spin-ladder physics, 4-dimensional physics and cosmology, Universal consciousness, Scale invariant cosmic unfolding of information.*

Summary

This paper examines the phenomenal nature of consciousness, by elucidating the quantum physical basis for its existence. We propose a new model of geometry-based harmonics, a fractal 12-tone set of discrete wave frequencies that undergo constructive and deconstructive wave interference. It exhibits entangled and disentangled states, invites both dualistic and non-dualistic properties, and operates in a 4D to 3D dimensional information transmission by symmetry breaking. A remarkable finding is revealed that EMF-wave frequency distribution in both animate and inanimate matter exhibits a distinct holo-fractal coherent pattern of 12 scalar tones in whole nature, including the cosmic level (Gravitational waves, and ZPE field oscillations). The same pattern is observed at the meso-level of evolutionary Life processes, in the wave peaks of our Brain (EEG), in stem cells and in neural microtubules. We also detected these acoustic patterns in superconductive materials and Bosonic energy states, that are characteristic for their entangled conditions. It stands to reason, that the human brain and thus those of the Greek philosophers and the Chinese mathematicians, were hardwired for an acoustical quantum code of resonant coherence that,according to our concept, is guiding the cosmos in a scale invariant manner.

In this framework, a new model and algorithm for human (self)-consciousness is proposed, that involves a 4D superfluid quantum scalar phonon information field, that is associated with but not reducible to our brain. This mental workspace, at various cosmic quantum scales, is expressed both as individual and collective consciousness, and is guiding through alternating coherent semi-harmonic and decoherent (chaotic) wave patterns and a typical metric. This dual modality can be positioned in a dynamic toroidal/wormhole geometry. It is aligned with a magnetic monopole entity as positioned at the singularity center of the torus and bounded by white-and black hole structures. The series of harmonically distributed photon/phonon quantized eigenstates in the core of the torus, can be envisioned as a so-called ladder (stairway) system, that bi-directionally operates in the toroidal wormhole space via a magnetic type of wave confinement. This ladder structure, also reported in modern physics as spin-ladders, may represent the two opposing principles of order and disorder, that are in line with the theory of Leibniz and Jung, and various historical described, ladder- systems, as well as the “Ying and Yang” of our world.

1. Introduction

In recent years, various physical and mathematical models have been proposed that aim to describe conscious states and experiences. While the present axioms and metaphysical ideas of such theories have been carefully motivated, their mathematical formalism is still poorly understood. A general mathematical framework for models of consciousness may be employed in theory-building processes, in which the conceptual meaning of different philosophical concepts, including quantum mechanics is included (Kleiner,2020)

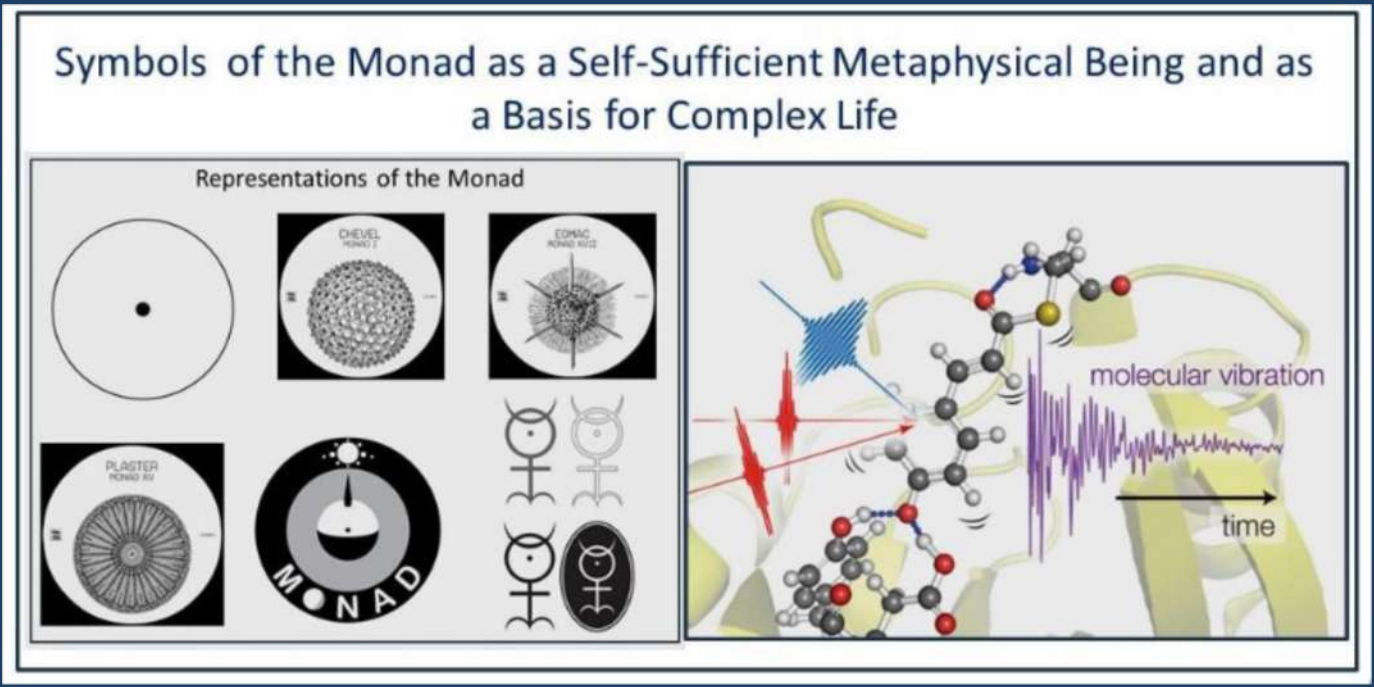


Figure 1: *Left: The circled dot was used by the Pythagoreans and later Greeks to represent the first metaphysical being, the Monad or the Absolute (In philosophy, the absolute, in most common usage, is a perfect, self-sufficient reality that depends upon nothing external to itself. In theology, the term is also used to designate the supreme being, see other symbols in left figure). Right: Vibration/oscillation of molecular macro-molecules in time, within the cell (purple), as influenced by internal (blue arrow) and external (red arrows) electromagnetic fields.*

In a more historical context this paper will look back at the renown knowledge about monads, as studied by the Pythagoreans, and later by Leibniz and many others. These theories include their relations with mathematics including typical number series and ratios of numbers. It is considered that the knowledge about the monads can be extended by making use of modern quantum field theory: so called quantum interference theory. This includes the theory of Bosonic and Fermionic elementary particles, the intrinsic wave patterns of our biomolecules, cells and brain, as currently analyzed in biophysical research and neuroscience, and approached by proper a mathematical formulation (note for example the information integration theory).

The term monad (from Ancient Greek μονάς (monas) 'unity', and μόνος (monos) 'alone', is used in ancient cosmic philosophy to refer to a most basic or original substance. Hippolytus called the first thing that came into existence the "monad", which begat (bore) the dyad (from the Greek word for two), which begat the numbers, which begat the point, begetting lines or finiteness. As originally conceived by the Pythagoreans, the Monad is the totality of all beings and things, has an indivisible origin and equivalent comparators (Eliot, 1916). The Monad was also related to number series and to objects of geometry and cosmogony. According to Diogenes (Laërtius, 2018): from the monad evolved the numbers; from numbers, three-dimensional entities, also expressed by a circled dot, see figure 1. The circular form as a circum-punct is an ancient symbol represented as a circle with a dot, or void, in the centre, and has been associated with universal consciousness.

The term monad was adopted by the philosophers Leibniz, Bruno, Conway, Dee, Bradley. As discussed in Leibniz's monads and Bradley's finite centers (Eliot, 1916): Monad was defined as a single indivisible unit of action or force, conserving a quantity now equated to energy, that can be associated with aggregates of other monads appearing as extended material bodies (Edwards, 2020, 2023). Edwards proposed to search for a relation between monads and collective quantum modes of field excitations in condensed matter. Collective modes of excitation in condensed matter may 'inform' a collective mode (such as an acoustic mode), including individual indivisible excitations. Each monad contains, as part of its essential nature, a preloaded set of representations of the world. The sequential 'unfolding' or 'playing out' of these representations can be thought of, in the case of minds, as a stream of consciousness. Monads do not interact; instead, the streams are coordinated bya pre-established harmony (Samet, 2013).

Chern and colleagues calculated the indivisible space invariants around 1946, that are topological invariants associated with vector bundles positioned on smooth manifolds. Meijer and Geesink found that normalised Chern numbers can be related to a pre-established harmony for living molecules and cells, and quantum systems based upon twelve topological invariants, multiplied by 2^n (n is an integer). A deterministic quantum model could be related to quantum entanglement, toroidal space topology, including a biophysical model for the effects on life structures, cellular mechanisms, biomolecules, brain and neurological function, and quantum chromodynamics of photosynthesis. Later a same pre-established harmony could be found for the energy states of quantum materials: Bose Einstein condensates, Einstein-Podolsky-Rosen experiments, Photoelectric effect, superconductors, quantum Hall effects and masses of elementary particles. The model is a phase-matching of first, second and third harmonics and a connection between 1) quantum mechanical patterns, 2) a referential tone scale with 12 pitches, 3) a referential scale with 12 colours, 4) normalised Chern numbers (Geesink and Meijer, 2017-2022).

2. Current Biophysical Models

2.1. Ordering of Biomolecules

Ordering in space and ordering of biomolecules occur by means of polarizations of electrical charges and waves in response to external and internal alternating electromagnetic fields, and by the application of an electromagnetic field to the dielectric, such as biomatter, and leads to different types of polarization mechanisms: ionic, interfacial dipolar, atomic and electronic polarizations, see figure 2. There is an order of

polarization and relaxation mechanisms observed when an alternating electromagnetic field of increasing frequency is applied to biological matter: ionic diffusion is observed first, followed by interfacial and dipolar relaxation, followed by atomic and electronic resonances (see figures 1 and 2).

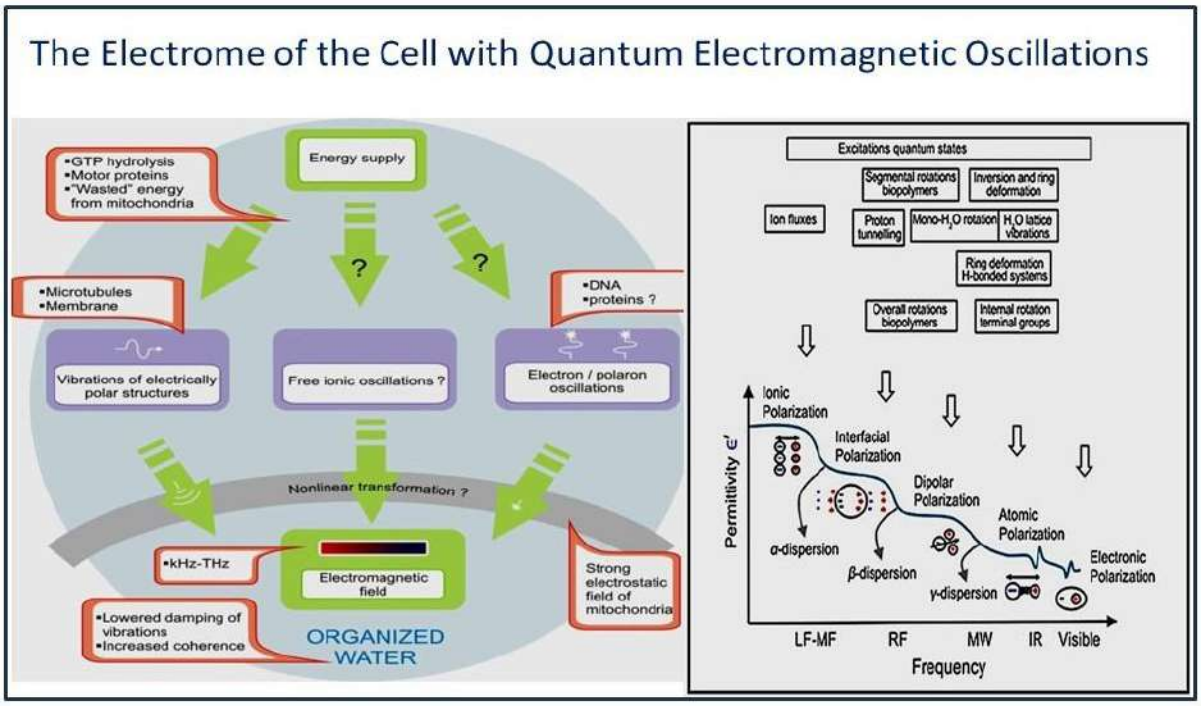


Figure 2. Left: *The "Electrome" of the cell and its organelles, seen as energy flow (green arrows), leading to oscillations of polar structures (purple) generating internal EM-fields with discrete coherent wave frequencies for cellular communication, through perturbation the 3-D structure and vibratory states of macromolecules in the life system.* ***Right:*** *Application of an electromagnetic field to a dielectric, such as biomatter, leads to different types of polarization mechanisms: ionic, interfacial dipolar, atomic and electronic polarizations (reference Mehrotra, 2018).*

The biological components of living cells, including the solutes dissolved in water, all have their typical resonances and spectra, that respond to electromagnetic fields. The dipole relaxation, ionic, atomic and electron polarization, and such features in the whole cell are ordered according to their resonant frequencies. Endogenous electromagnetic fields are self-generated by internal vibrations of living cells and their constituents play an important role in biological self-organization. External electromagnetic fields at sub-thermal intensities can influence the intrinsic endogenous electromagnetic fields and can have an impact on conformational states and self-organization of biomolecules (Geesink, 2018d, 2020c).

An external RF field can modulate and rotate charged and polar molecular structures as well as other cellular components of biological materials. The magnitude of these motions depends on the strength and frequency of the field and may be impeded by inertia and viscous forces. The orientation of polar molecules under the influence of external fields usually does not occur instantaneously, but rather follows a time-dependent behaviour known as the relaxation process. After the application of an external field, it also takes some time for electric charges within the cells and tissue structures to accumulate at their interfaces and reach a new equilibrium state (relaxation). Depending on the size/characteristics of polar molecules, different types of relaxation processes can take place in biological tissues. Small, charged particles, such as

monopolar ions, can respond at frequencies up to at least 10^{12} Hz, and the association of ions with water molecules (solvation) means that the dielectric properties of water, with its large dipole moment, are dominant in biological solutions (Sheppard, Swicord and Balzano, 2008).

2.2. Ordering in Space of Waves and Molecules according to a Proposed Quantum Principle

The physical principle of ordering an acoustic quantum code can be understood to be a result of quantum entanglement. The attractive interaction between charges and waves is mediated by electrons and phonons, that are the quantized vibrational modes of the atomic lattice. A meta-analysis of about 800 different energy patterns of living cells and molecules shows that a typical distribution of frequency bands and typicalatomic distances, plays a role and can be put into a proposed unified framework.

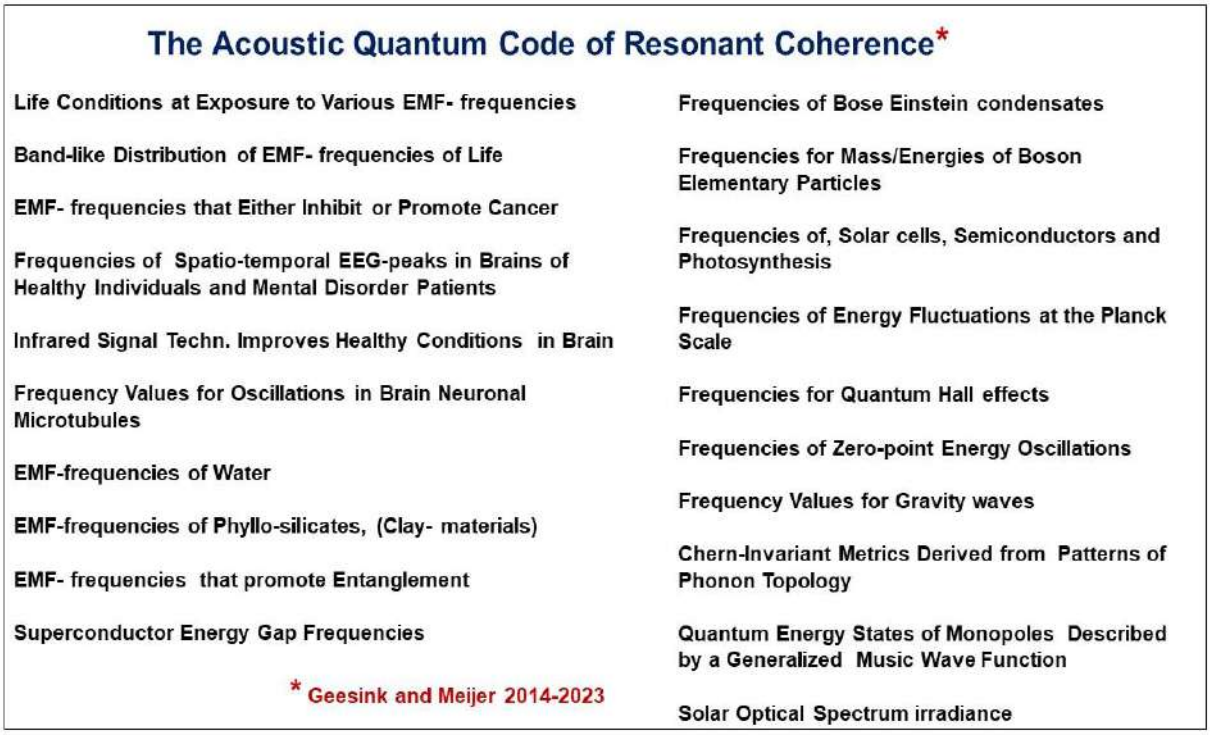


Table 1. *Various Meta-analyses of frequency distribution* of animate and non-animated systems that *revealed the Acoustic Quantum Code, Geesink and Meijer, 2014-2023.*

A same detailed pattern has been found in about 600 different quantum mechanical experiments for Bose Einstein Condensates, Einstein Podolsky Roosen-experiments and superconductors. Typical entangled frequencies are the fundamental topological invariants according to a proposed quantum wave equation of coherence and describes a toroidal and monopole geometry and involved frequencies in the zone-centre modes per unit frequency range. Theequation describes standing waves, along fibre bundles and points and typical frequencies located at the surfaces of a nested toroidal geometry, that can be described by an equation, and calculated by topological Chern numbers, or called how to distribute ratios of 2/3 into ratios ½, see Table 1 and 2. In our work we used the term *semi-harmonic* meaning that of the 12 tones 50% is very slightly adapted in order to realize the perfect fitting of the series according to the harmonic relations of 1:2 and 2:3. This contrasts the so-called equally tempered correction on all 12 values, that is less compatible with the geometric (toroidal) representation of harmonics and therefore is not preferred by us.

2.3. Life Creation and First Life

An integral evolutionary theory has been published on bioinformatics and the creation of first life conditions on the basis of quantum physics and cosmology (Meijer and Wong, 2020). It was shown that symmetry breaking from a 5D homogeneous manifold of condensed boson fields, generate 4D photonic (electromagnetic) and monopole energies as well as toroidal operator conditions. These are instrumental in the formation of essential 3D DNA/RNA dynamic structures via the guided synthesis of nucleobases, their layered molecular arrangement, and the resulting wave resonant properties of DNA. The integrated life-guiding mechanisms of a toroidal geometry, a monopole geometry and the generalized proposed quantum equation of coherent quantum frequencies of ordering, provide a primordial informational quantum coding for first life, the universal fabric of reality and the cosmological manifestation of humans as observers and participants in the evolution of the universe (Meijer, Wong, Geesink, 2022).

A Frequency Pattern: How to Distribute Ratios of 2/3 into 1/2

Factor	F1,m	F2,m	F3,m	F4,m	F5,m	F6,m	F7,m	F8,m	F9,m	F10,m	F11,m	F12,m
m=0	1.0000	1.0535	1.1250	1.1852	1.2656	1.3333	1.4142	1.5000	1.5803	1.6875	1.7778	1.8984 Hz
m=1	2.0000	2.1070	2.2500	2.3704	2.5312	2.6666	2.8284	3.0000	3.1606	3.3750	3.5556	3.7968 Hz
m=2	4.0000	4.2140	4.5000	4.7408	5.0624	5.3332	5.6568	6.0000	6.3212	6.7500	7.1112	*7.5936 Hz*
m=5	*32.000*	*33.712*	*36.000*	*37.926*	*40.499*	*42.666*	*45.254*	*48.000*	*50.569*	*4.000*	*56.889*	*60.748 Hz*
m=8	256.00	269.70	288.00	303.41	324.00	341.33	362.04	384.00	404.54	432.00	455.12	486.00 Hz
		532.5	505.6	473.4	449.3	420.8	399.5	376.6	710.1	674.0	631.3	599.1 561.0 nm

Table 2*. Examples of values of the proposed Informational quantum code of coupled oscillators and calculated examples of coherent frequencies at Hz and light frequencies (further numbers can be calculated by multiplying by 2^n (n is an integer). Decoherent or disentangled, or called disordered waves are just located in between the above-mentioned frequencies of the entangled states at typical frequencies.*

The proposed theory of quantum coherence and decoherence (Geesink and Meijer, 2016) has a relation with the ideas and theories of the Pythagorean, and Heisenberg. A similarity has also been found between our proposed model and the theory of Pythagoras related to a Pythagorean distribution of 12 universal notes in a musical tone scale, and calculated Chern numbers. Next to this we have found that brain processes measured by EEG and MGC and electromagnetic patterns of living cells can both be related to a quantum coherent or decoherent behaviour and described by the same proposed quantum deterministic algorithm as for entangled inanimate materials: quantum materials and superconductors (Geesink, 2019a). According to Heisenberg (1943): The descriptions of the Pythagorean correspond well with the modern definition of mathematics as “the study of patterns in space and time”. The Pythagorean belief that all bodies are composed of numbers and that all properties and causes could be expressed in numbers, served as the basis for the mathematization of science. In modern quantum theory, there can be little doubt that elementary particles are ultimately mathematical forms, only of a much more complex and abstract nature.

He referred to the same principle: “All things are numbers” is a position attributed to Pythagoras.

A same detailed pattern has been found in about 600 different quantum mechanical experiments for Bose Einstein Condensates, Einstein Podolsky Roosen-experiments, and superconductors. Typical entangled frequencies are the fundamental topological invariants according to a proposed quantum wave equation of coherence and describes a toroidal and monopole geometry and involved frequencies in the zone-centre modes per unit frequency range. The equation describes standing waves, along fiber-bundles and points and typical frequencies located at the surfaces of a nested toroidal geometry, that can be described by an equation, and calculated by topological Chern numbers, or called how to distribute ratios of 2:3 into ratios 1:2, see Table 1 and 2.

2.4. Harmonically Scaled Bio-information Data

Coherent (healthy) and Decoherent (unhealthy) EMF States frequencies were shown to be positioned in a alternating band-like frequency pattern with green and red point values (in Hz), derived from experimental life studies in which cell systems are exposed to EMF excitation of various frequencies.

Our proposed model shows that the overall resonating spatio-spectral states of living cells and molecules, including brain cells, can be described by an alternating pattern of quantum coherent and decoherent frequencies. Healthy states are quantum coherent and approach a global quantum coherence of 1.0, while unhealthy states are decoherent and cause a decrease of coherence. In fact, the cornerstone of our work is an extensive meta- analysis of about 750 articles from 1950 to 2023, dealing with endogenously measured and exogenously applied electromagnetic field frequencies in tissues, cells and biomolecules. This analysis unequivocally showed band patterns of beneficial (stabilizing) or detrimental (destabilizing) EMF frequencies of the experimentally chosen electromagnetic fields in the sub-Hertz till Peta Hertz region as exposed to or within in a large variety of vitro and in vivo life systems. Even the pattern of destabilizing and unhealthy biological effects fit with quantum behavior that is adequately described by a second equation. The stabilizing electromagnetic field effects (Geesink and Meijer, 2018a; 2018b) were observed in a widespread health and disease window and related therapeutic measures, and see for the healthy states the green points, and for the unhealthy states the red points in figure 3.

The observed pattern of alternating spatio-spectral eigenmodes has also been shown for the many analyzed frequency patterns of EEG’s, MEG’s, MIR’s and electromagnetic exposures of brain cells, glands and neurons in vitro. The EEG- and MEG- studies of healthy persons show a global quantum coherence of 0.90-1.00, see figure 4. In this framework a new quantum principle has been proposed and discussed in the context of the nature of brain processes and is called an equation of quantum entanglement: $E_n = \hbar\, \omega_{ref}\, 2^q\, 3^m$, or earlier called a Generalized Music scale by Meijer, or Geometric Musical Language (GML) by Bandyopadhyay, or General Music Code by Wong, showing the general recognition of this musical, or sonic principle.

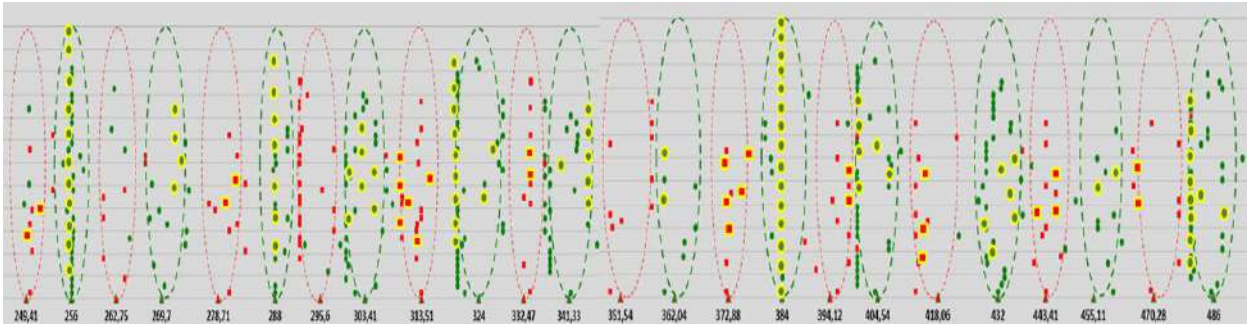
2.5. Spatio-spectral Eigenmodes of Brain Waves and Neurological System

Analyses of about 120 different studies of brain frequencies, related brain measurements, brain stimulation, rTMS applications, learns that all the measured and/or applied frequencies and frequency patterns can be positioned in the proposed spectral modes of eigenstates, including the positioning of the decoherent states, as described by the proposed quantum equations. The model of spatio-spectral

eigenmode brain waves can be related to healthy states, that are coherent, or to unhealthy states, called decoherent and can be substantiated by analysing the measured frequency patterns of EEG's and MEG's (Geesink, 2022a; Meijer, 2023) and see figure 4 and 5.

The Geesink/Meijer Acoustic Quantum code of Resonant Coherence Interference

Life EMF frequency distribution



Math. of the code:

Coherent bands: $E_n = \hbar\, 2^{q}\, 3^{m}$

Decoherent bands: $E_d = 10^{(0.5 \log En + 0.5 Log En+1)}$

E_n: Energy distribution, $\hbar$: reduced Planck's constant; q = n + p; n: series of numbers: 0, 0.5, 2, 4, 5, 7, 8, -1, -3, -4, -6, -7; m: series of integers: 0, 1, 2, 3, 4, 5, -1, -2, -3, -4, -5; p: series of integers: <-4, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, > +52.

Distribution of Spatio-spectral Eigenmodes

Invariant Chern numbers: 1.0000, 1.0535, 1.1250, 1.1852, 1.2656, 1.3333, 1.4142, 1.5000, 1.5803, 1.6875, 1.7778, 1.8984

Figure 3: *Normalized frequencies (Hz) and Numbers of informational quantum code. Measured/applied frequency data of living cells systems that are compatible with life conditions,* or *health-sustaining or health improving (coherent data and zones: green) and measured/applied frequency data of living cells systems that are detrimental for health (disordered data: red) versus calculated normalized frequencies. Biological effects measured following exposures or endogenouseffects of living cells in vitro and in vivo at frequencies in the bands of Hz, kHz, MHz, GHz, THz, PHz. Green triangles plotted on a logarithmic x-axis represent calculated normalized (Hz) health- sustaining frequencies; red triangles represent calculated health-destabilizing frequencies. Each point indicated in the graph is taken from published biological data. For clarity, points are randomly distributed along the Y-axis (Geesink, 2021).*

An electromagnetic information toroidal/monopole field theory is proposed in the present paper, that is quantum physically integrated in the description of brain function and conscious states, and regarded as causally active information, encoded in the brain's global electromagnetic (EM) field, (see Meijer and Geesink 2017, Mc Fadden, 2013;2020 and Pockett, 2014). This EMF brain concept is related to an intrinsic oscillation algorithm in space, rather than in time, acting in our entire neurological system as an electromagnetic global workspace that provides functional brain center connectivity based on harmonic vibratory activity (Atasoy, et al., 2018).

The present articulation of "quantum biology" in crucial processes of photo-synthesis, and animal navigation, in wet and warm temperature conditions, reveals an emerging field, at the border between quantum physics and the life sciences. This strongly confirms the idea that quantum events play a non-trivial communicative role between the billions of neuronal cells and other cell types in the human brain. Because the brain is a complex, non-linear and rather complex system, with high sensitivity to small fluctuations and perturbations of internal and external nature, it is likely that it can amplify microscopic and macroscopic quantum effects through attractor-like wave organization (Jedlicka, 2017, Keppler, 2016; 2020; 2022).

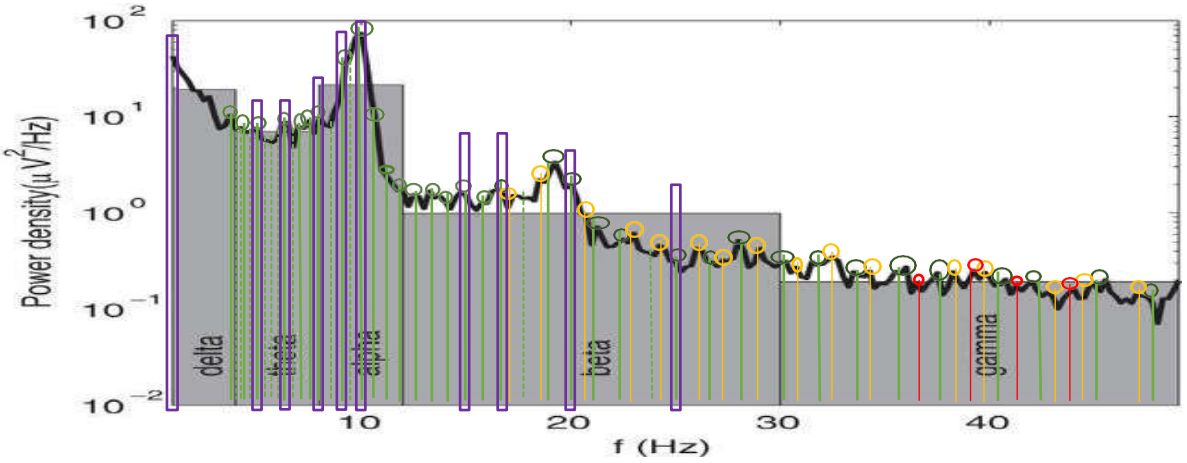


Figure 4*. Spatio-spectral eigenmodes; example of an EEG spectrum (black line) with its quantitative EEG approximation in terms of band powers, given by the areas of the gray bars (reference Van Albada, 2013) (Remark Geesink: coherent states: green lines; transitions states between coherent and decoherent: yellow lines; decoherent states red lines). For example: rTMS is applied at typical or nearby coherent frequencies at 0.5, 0.75, 1, 5, 6, 8, 9, 10, 15, 17, 20, 25 Hz and related to the found antidepressant effects, depicted by purple blocks); Nearly all positions of the proposed algorithm are present in the brain waves of human beings, analysed in the band of 2 till 45 Hz (Geesink: coherent states according to proposed quantum algorithm: green lines; decoherent states: red lines; transition zones: orange lines).*

In line with this, the discovery of warm temperature quantum vibrations in microtubules, inside brain neurons, by the research group led by Bandyopadhyay suggests that EEG rhythms also derive from deeper level microtubule vibrations (Agrawal, 2018). The collective behavior of neurons, summed up crudely as the mean field (EEG and MEG) is a blend of rhythms. Neuronal networks in the mammalian cortex generate several distinct oscillatory bands, covering frequencies from< 0.05 hertz to > 500 hertz. These neuronal oscillators are also linked to the much slower metabolic oscillators. The mean frequencies of the experimentally observed oscillator categories form a linear progression on a natural logarithmic scale with a constant ratio between neighboring frequencies, leading to the separation of frequency bands (Buzsáki,

2009).

As mentioned above, an algorithmic pattern of our brainwaves has been proposed, that shows a diagnostic capability to classify a measure of healthy and unhealthy behavior by analyzing the pattern of brain waves related to discrete frequencies and amplitudes. The analyzed discrete frequencies fit in a coherent or in a decoherent frequency pattern and has been substantiated by a quantum physical model about phase-synchronisation of the spectral lines of EEG (Electroencephalography) and MEG (Magneto-encephalography). Phase-synchronization and spatio-spectral eigenmodes have been shown for our brains and can be described by a discrete distribution of energy: $E_n = \hbar\, \omega_{ref}\, 2^{n+p}\, 3^m$.

The model shows that the overall resonating spatio-spectral states of living cells and molecules including brain cells can be described by a combination of quantum coherent and decoherent frequencies. Healthy states are quantum coherent and approach a global quantum coherence of 1.0, while unhealthy states are decoherent and cause a decrease of coherence. The proposed model of spatio-spectral eigenmodes has been substantiated by analyzing the many measured frequency patterns of EEG's and MEG's, and electromagnetic exposures of brain cells, glands and neurons. The EEG- and MEG studies of healthy persons show a global quantum coherence of 0.90-1.00. Unhealthy subjects show a decrease of coherence, and an increase of decoherence. ADHD subjects show a decrease of coherence from 1.0 to 0.83. During epileptic seizure, the coherence of participants is reduced from 0.94 to 0.75. Depressed patients have a lower coherence than healthy persons: 0.77 - 0.88, autistic persons show a lower coherence of 0.50 till 0.75, patients with severe psychiatric disorders show a coherence of about 0.59, and participants during anesthesia show a level of 0.25. The overall results show a presence of an informational quantum code, a direct relation with the eigenfrequencies of biomolecules and a molecular code-script, which supplies information to realize biological order in life cells and substantiates a collective Bose-Einstein type of behavior. Analyses of about 130 different studies in the frequency range of 0.01 till 350 Hz, kHz, MHz, and THz related to healthy states and to unhealthy states: Ischemic stroke, Epilepsy, Alzheimer and Parkinson among others, show that unhealthy frequency states are always positioned just between healthy frequency states. Unhealthy states can be turned into more healthy states by applying frequencies just located at the so-called coherent (healthy) states (Geesink, 2023). These studies deserve a follow-up with larger groups of patients, yet the observed trend may indicate that a dedicated diagnostic application, with a solid mathematical treatment of the data as well as more sophisticated statistical analysis could evolve in the future.

Of note, it stands to reason that harmonic coherent frequencies in brain activity were to be expected, since the building blocks of life are atoms and molecules and, like all natural elements, are multiples of the cores of the Hydrogen(proton/neutron/electron) and its precursor Protium (hydrogen without the neutron), which both are abundantly present in the cosmos. We have earlier shown that both these composites are of a primordial character, representing the first stable particles at the initiation of the Universe, that even may underlie gravitation (Meijer and Bermanseder, 2024**).** The particular primordial origin of quantum fluctuations was confirmed by us earlier (Meijer, 2023), revealing Zero-point energy oscillatory frequency values, the Solar light frequencies spectrum, including its color spectrum of the visual part (Fig. 2), and more recently, the frequency distribution of gravitational waves, that all showed a very similar frequency band structure (Meijer, 2023, Geesink 2023). This indicates that the harmonic quantum oscillator should be regarded as a fundamental phenomenon in nature and that its inherent frequency spectrum should be present in both inanimate and animated systems, as indeed revealed by us in multiple reports (see Table 1)

and figure. 8**.** Since our brain is build up from the same basic core elements, mentioned above, as present in its atoms and molecules, exhibiting the fractal quantum oscillator frequencies, the integral Electrome of the brain will seek the lowest energy state, generating coherent EMF fields by resonant interaction of its components (Frohlich, 1995).

2.6 Music and the Brain

Repetitive transcranial magnetic stimulation (rTMS) has been reported to modify brain oscillations and the periodic electromagnetic force generated during rTMS can result in local entrainment of biologically relevant rhythms, mimicking frequency specific oscillatory activities. Potential differential effects occur at typical frequencies: 0.50, 0.75, 1, 5, 6, 8, 9, 10, 12, 15, 17, 20, 25, 40 Hz, that are equal or approach the proposed algorithm, and fit with the eigenstates (eigenfrequencies) described by the proposed equation of coherence. The coherent and decoherent (chaos-like) frequencies can be aligned at a frequency scale and are arranged according to an alternating ordering positioned at a toroidal geometry, while transition frequencies are located just in between the coherent and decoherent frequency zones. The overall results show apresence of an informational quantum code and a code-script, which supplies information to realize biological order in life cells and substantiates a collective Bose-Einstein type of behavior, see fig's 5 and 6.

Sigawi et al, 2024, discussed the current models of consciousness, and stated that the brain basically is a system, in which coherent wave activity can largely constrain disorder to simulate future outcomes. Fractal shapes indicate the proximity of a balance between order and disorder and acts by both bottom-up error correction and top-down perceptual predictions.

A next step of the proposed parallels between quantum mechanics and mind/body dualism were drawn by the founders of quantum mechanics including Erwin Schrödinger, Werner Heisenberg, Wolfgang Pauli, and Niels Bohr. Bohm stated that consciousness and our brain are not only present in animate life forms but also in typical inanimate matter since energy, space, time and consciousness are not separate aspects. Seventy-seven years ago Schrodinger the physicist that initiated quantum mechanics postulated that 'LIFE' is also a quantum phenomenon (Schrödinger, 1944; Kauffman, 2020).

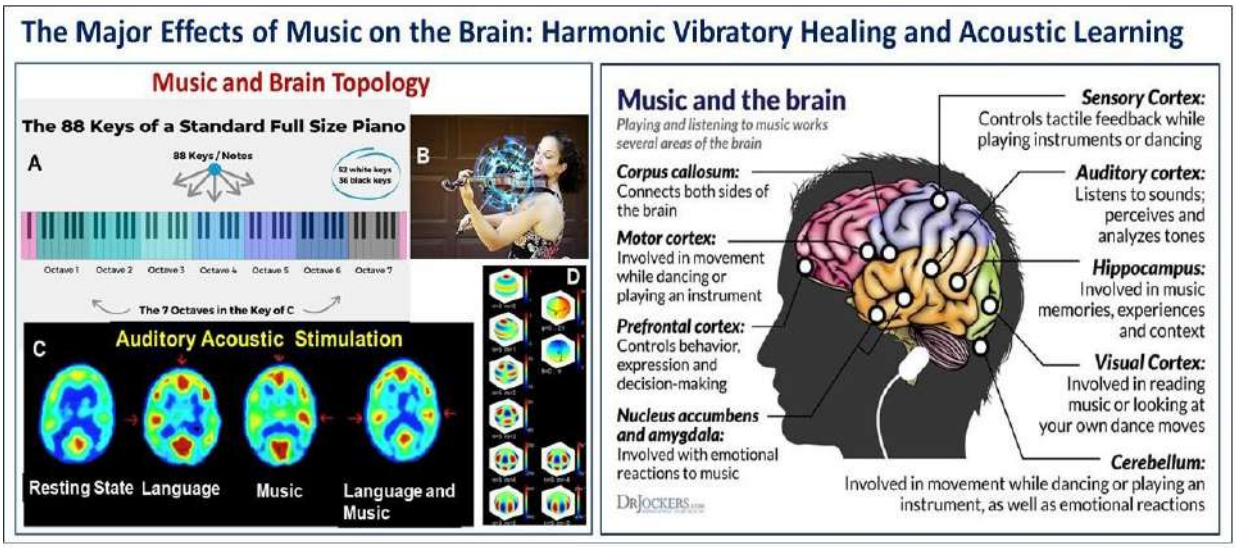


Figure 5: *A: The octave hierarchy in music generates spherical sound waves (**B**) that after sensing produces typical NMR activity patterns in brain **(C),** that seem to be related to patterns of perceiving language**. D:** the particular tones correspond to toroidal energy distributions; Right: various anatomical parts of the brain involved in the perception of music*

Yet, this connection is still unanswered. The empirical demonstration of slowly decoherent and controllable quantum bits in neurons connected by electrical or chemical synapses, or the discovery of an efficient quantum algorithm for computations performed by the brain, would do much to bring these speculations from the 'far-out' to the mere 'very unlikely' (Koch, 2006). Yet, the present advances in Quantum Biology speak a very different language, since they convincingly demonstrated distinct quantum aspects in warm and wet conditions such as photosynthesis and geomagnetic guiding of bird navigation.

By moving from the nonlinear dynamics of the electrochemical processes in neural networks, the brain can escape chaotic behavior. A model has been proposed in the framework of open quantum systems theory without appealing to the state's collapse and dynamics of the state of psychological function can be described by a quantum master equation (Khrennikov, 2020). A molecular code-script, which supplies information to realize biological order in life cells may play a role. Information can be processed at the quantum level orders of magnitude more rapidly than it can be processed classically, and quantum systems make use of phenomena such as superposition, entanglement and tunnelling to enhance their performance (Davies, 2005). Tegmark, 2015, claimed that any quantum coherent system in the brain would undergo effective wave function collapse due to environmental interaction long before it could influence neural processes (Tegmark, 2015).

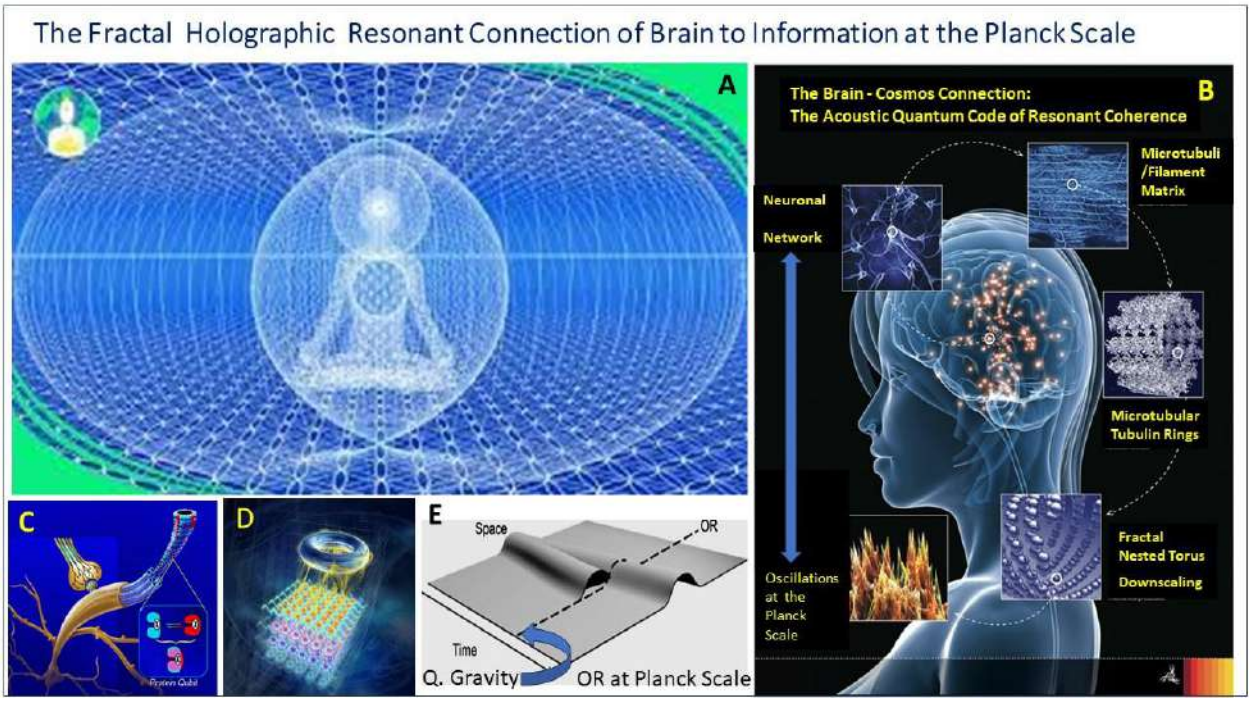


Figure 6: *The cosmic connection (**A**) of the brain neuronal networks (**B**), with quantum-foam rimple-type of Information vibration at the Planck Scale and vice versa (**B** and **E**), via tubulin oscillatory waves (**C**), that through nested toroidal geometry (D), undergo downscaling up to the Planck scale (D),where Superposition of wave rimples is mediated by quatum gravitational induction, initiating the process of Objective Wave*

Reduction(OR) in neuronal systems, leading to conscious moments (adapted from Hameroff and Penrose, 2016).

Moreover, information can be processed at the quantum level, orders of magnitude more rapidly than it can be processed classically, and quantum systems make use of phenomena such as superposition, entanglement and tunneling to enhance their performance (Davies, 2005). Yet this criticism was clearly answered by Hameroff at al. Also, Baumgratz distinguished between coherent and incoherent operations and established the maximally coherent state as the element from which all quantum states (mixed or pure) can be generated (Baumgratz, 2014).

2.7. Mind and Matter: Cosmic Perspectives

Neuronal entrainment is a term used to describe the properties of brain oscillations, how they synchronize their periodicity and rhythm through interaction(s). During this process frequencies of oscillations resulting from the synchronous electrical activity of neuronal ensembles can be synchronized to the periodic activity of, for example, an internal or external stimulus or event. Neurons can sense Ghz and THz resonances and responses of cortical slices of the adrenal gland are at terahertz frequencies and power densities of 0.3-1.0 micro-Watt/cm2 (Pikov, and Siegel, 2010). Nonlinear acceleration is involved in shaping the rhythmic response of a proposed modelled network. Such nonlinear acceleration of spontaneous and synchronous oscillatory activity in a neural network occurs in regimes of intense, high-frequency rhythmic stimulation (Herrmann, 2015). Oscillatory activities are supposed to be generated not only in microtubules located inside neurons, but also in many protein complexes in the cell, that is, in a fractal setting expressed in circular and periodic modes in fractal layers. The resonance frequencies show a characteristic topological pattern, self-similar triplet resonances at certain resonance frequencies, and supports the hypothesis for a scale-free information integration in the brain from molecular scale to cognition. This would mean that exchange of information depends upon geometry, i.e., without losing the angular features of the geometric shape over a time domain of 10^6 order in time scale (Agrawal, 2018).

A further step in brain neurobiology, towards the understanding of consciousness formation, is the research of quantum laws' effects upon neural network functions. This topic takes its basis and its support from current quantum neurobiology. It comes from the idea that if quantum physics is involved in the normal working of the brain, diseased conditions of the brain such as depression, anxiety, dementia, schizophrenia and hallucinations can, in principle, also be related by quantum physical aspects. A general classification has been earlier made for the quantum brain theory (Atmanspacher,2011;2012). The particular aberrations of scale-dependent emergent phenomena during quantum thermo-field phase transitions and other barriers to Bohmian holism, may be important in multiple forms of mental illness (Zizzi and Pregnolato, 2012). The quantum logic of the brain (or simply, the quantum mind), is a dedicated language of the brain, in which the physical processes occurring in the brain, (at least partly), can be described by principles of Quantum Mechanics (QM). Here one deals with a communication system instrumented made by a finite and fixed number of wave/particles, including photons and phonons that provide an extremely rapid signal transduction far exceeding normal neurotransmission, that is if quantum states are sufficiently protected. It is generally supposed that the interaction with the environment can induce decoherence of quantum processes, that predicts the occurrence of a more classical neurotransmission system, described by classical logic and responsible for the usual physical outcomes of

mental processes (Zizzi, 2012, 2013**)**. The quantum involvement in brain function should therefore be seen as a functional addition that enables very rapid signal transduction and connectivity but does not negate the classical neuro-humoral mechanisms.

Quantum coherence (the subtle correlations) represents the entanglement that gets dispersed in the whole universe through interaction with other systems, amounting effectively to decoherence (Sabbadini, 2019). Quantum coherence (the subtle correlations in space and time) generated by entanglement and getting dispersed in the whole universe, is perturbed through interaction with the environment to producedecoherent states (Sabbadini, 2021). A hypothesis was earlier proposed by us that the brain is exposed to typical coherent electromagnetic fields in the form of discrete electromagnetic waves, that can promote healthy conditions (Geesink, 2021a). It was postulated by Meijer and Geesink, 2017, that consciousness in the whole universe arises through scale invariant coupling of various energy fields and can be modeled by nested toroidal geometry embedding monopole activities. In the brain of humans and neurological system of various other species, this takes the form of a holographic workspace, that collects and projects active (meaningful) information in a ”brain event horizon”, representing an internal and fully integral model of the self. This brain-supervening workspace is instrumental in the conversion of chaotic and decoherent wave energies into attractor type/standing waves, as a basis of action. To coordinate this, the neural system employs soliton and photon resonances that guide the related cortical template to a higher coordination of reflection and action as well as network synchronicity, as required for conscious states. We suggested earlier that the fractal human brain resembles personal aspects (Meijer, 2014) and that consciousness in the universe may be scale-invariant (Meijer and Geesink, 2017). The latter does not imply a distinct *material* fractality in the cosmos, but rather self-similarity in the flux of information. The following cosmic features are at stake:

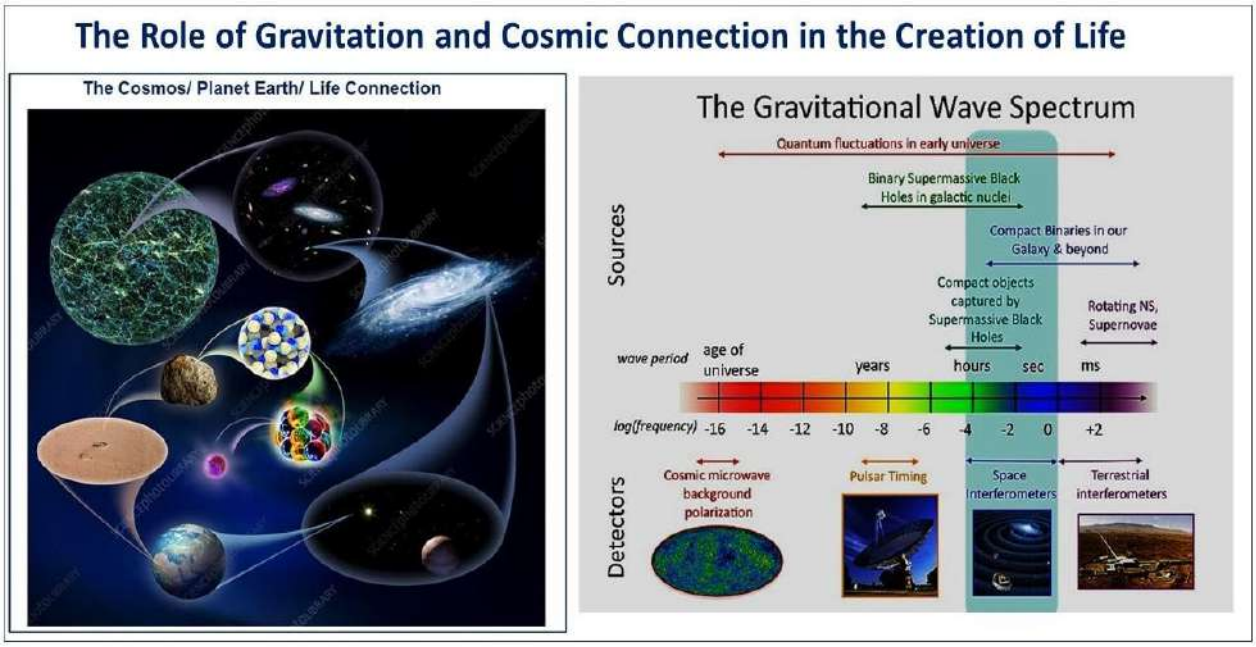


Figure 7: *The cosmic context of planetary life creation, as guided by a primordial acoustic quantum code of quantum fluctuations. Right: Apart from ZPE field EMF oscillations, gravitational waves may also participate, of which the wave spectrum can now be measured by advanced technology and revealed in the Cosmic Microwave Background polarization, both exhibiting the frequencies of the acoustic quantum code*

- The observable universe contains 100 billion galaxies, while the human brain contains about the same number of neurons and non-neuronal cells.
- Visually, satellite technology reveals the typical structure of cosmic filaments and clusters of galactic composites, a picture that is supported by computer simulation of the cosmic web, that surprisingly shows similarities at microscopic inspection of cross-section of the fore-brain tissue. One observes quite similar structure of filaments (neuro-filaments of white matter of the connectome, with neuronal and other cell type connections versus cosmic macro-filaments with condensed ordinary matter clusters), reflecting the embedded galactic bodies (cells of organized galaxies). The cosmic web thus consists of all the stars within galaxies, gasses, star dust, water and dark matter in the universe.

- Both networks seem to exhibit a similar power spectrum of acoustic and gravity wave activities: this defines the quantum fluctuations of the particular structures, or as some researchers described: *"it tells us how many high-frequency and low-frequency notes make the peculiar spatial melody of each image."*
- The cosmic web and human brain, superficially, have a similar complexity. This was also approached estimating the minimal size of a computer program that could predict the behavior of such a network. In other words: "the entire life experience of a human individual can be encoded into a holographic spacetime image, that may mimic typical aspects of the complex composition and distribution of galaxies in our universe," write the particular researchers (see Fig. 7), suggesting a resemblance of neuronal networks and the cosmic web structures as reported by Vazza and Feletti, 2017: This idea seems also in line with the possibility to conceive the universe as a neural network (Vanchurin, 2020). Our brain, tentatively, may therefore represent a fractal "mirror image" of our Universe.

2.8. Relation between Cosmometry and the Primordial Universe

In the book of Marschall Lefferts, 2019, related to Harameins institute, titled: "COSMOMETRY – EXPLORING THE HOLOFRACTAL NATURE OF THE COSMOS", he writes: "Information encompasses (quite peculiarly for the purely materialistic sciences), Intelligence and Consciousness. Just as the Electromagnetic and Acoustic attributes are universal in their spectral potential, so too is Information. In fact, given that electromagnetic and acoustic like waves are fundamental information carriers in the cosmos, it is safe to say that information (and therefore intelligence and consciousness) is present everywhere throughout the entire cosmic phenomenon. We can do so across a scale spanning outward to the expanse of the known cosmos and inward to the structure of atoms, and at every point there is information. Perhaps an essential finding relating a music's analogue semi-harmonic resonance system to emergent properties in the cosmos is presented in the research of Dirk Meijer and Hans Geesink from the Netherlands. Through meta-analysis of over 500 scientific papers dating from the 1950's to the present, Meijer and Geesink, 2014**,** came to identify what they call an "algorithm for coherent life processes" that produces a set of frequencies spanning 127 octaves of electromagnetic and acoustic waves that are found to be "life-sustaining, that is, they support healthy cellular functioning". He writes further: The research and theories presented by Geesink and Meijer offer an in-depth analysis of the ideas presented here are worthy of consideration".

2.9. Is the Quantum Code of Resonant Coherence related to Energy Fluctuations at the Planck Scale?

Meijer and Wong, 2020; 2021**,** have pondered about the question if their Musical Quantum Code (framed

by Wong et al., 2019, as the piano keyboard pattern), is of a primordial character. Primordial may imply that this information was already present in the 5D homogeneous manifold as discrete phonon oscillations, to be seen as code of quantum fluctuations. We have proposed that this pattern influences the further unfolding of reality after symmetry breaking from 5D to 4D, and for instance guides the graded temperature lowering in distinct phases, leading to gradual formation of elementary elements and atoms. One can see this as a gradual unfolding of information guided by the supposed acoustic quantum code of resonant coherence that is also instrumental in the creation of first life and biological life as we know it. The latter was described in the recent book of Chow et al., 2022. In addition, we have published earlier that the Acoustic quantum code (the general musical system also proposed by Wong), can also be revealed in the energy distribution of experimentally measured Zero-point energy oscillations as well as being compatible with the energy distribution of Bosonic activities, and more recently, can be detected in the distribution of the currently measured values of Gravitational waves. Collectively this may point at a general background of vibrational information, that both contains coherent and decoherent frequency bands, through which both of its aspects may be instrumental in the whole fabric of reality. *The obvious question is what the origin of this phonon/photon energy distribution pattern is and how it was and is expressed in nature from the beginning.* Meijer, 2023, has speculated earlier that this scale invariant information is basically expressed at the Planck scale, that indeed was earlier described as a sea of discrete standing waves quanta (framed as quantum foam) by Planck and his colleagues around the year 1900, that in fact implied the start of quantum mechanics.

An important question arises: is our musical quantum code fundamentally expressed at the Planck scale, and is it therefore revealed at the various levels of nature described above in a scale invariant manner?

Geesink, 2024, recently, forwarded a preliminary paper on black body radiation frequencies related to the Planck geometry and claimed a 95% fit with the Acoustic Quantum Code Scale Hz values, this after renormalization based on a geometry based semi-harmonic algorithm according to octave hierarchy using the 2^n factor and the 12-band pattern of coherence/decoherence. It is proposed that the derived scalars: geometric patterns and 12 fundamental invariant lengths describe the many measurements in quantum physics, and in biophysics (about 2000), can be expressed in typical discrete length units, that might be called Geesink/Meijer length units and are universal (Geesink, 2023). At the Planck scale, the predictions of the Standard Model, quantum field theory and general relativity are not expected to apply; Planck units have little anthropocentric arbitrariness, but do still involve some arbitrary choices in terms of the defining constants (https://en.wikipedia.org/wiki/Planck_units#Planck_length).

Is it possible, therefore, that a geometry based semi-harmonics and not a classical harmonic Planck scale, as proposed by Planck oscillation frequencies of standing waves, underlies the Acoustic (musical/phonon) Quantum Code, revealed in our common work and that both are primordial phenomenal (dimensionally 5D/6D)? If so, as a quantum mechanical principle this may require a quantum observer and may be envisioned as being initiated by an “eternal or omnipresent state”. Alternatively, the “pre-big bang” events might be inherited from a previous version of our universe (Cyclic/Bounce model) of the Universe, as suggested by Penrose, 2010 and Steinhardt, 2007.

In this sense, the conception of a living system extends beyond the normal considerations of only the biological organism (e.g. evolution and synergism are not merely products of the biosphere but are present in the interactivity of systems in general, leading to the emergence of the biosphere) and properties of

sentience and awareness are involved in the directed (non-random) generic evolution of matter and the universe. They view the brain and neurological system as components of an integrated fractal antenna system interacting with a universal meta-cognitive holographic structure, just as in the Unified Space-memory Network model of Haramein et al, 2016**.** In both models, the zero-point energy field [ZPE] is considered to be a prime information transfer of energy, matter and consciousness. They reference the torus and monopole structure as the functional structure of the field-receptive mental workspace, stating "*consciousness in the entire universe arises through, scale invariant, nested toroidal coupling of various energy fields."* The prime cosmometric form of flow process, the torus, is integral to the interaction between physical biological systems and the individual and universal domains of consciousness (Meijer and Geesink, 2017; Meijer et al, 2020. If we include this principle of emergent wholeness into models of cosmogenesis, biogenesis and the advent of self-awareness, the progression of evolution towards sentient beings shows a synergetic outcome of an innately unified, intelligent and self-reflective cosmic energy-matter-information system, as also treated in Haramein's "*The Unified Space-memory Network"* paper (Haramein et al., 2016).

3. Physical EMF Frequency Distribution Patterns

3.1 Introduction

In the 20th century, the standard model of physics, about the structure of matter and its building blocks, the elementary particles, was developed. This model, at the micro level, includes quantum mechanical theory. However, quantum mechanics is not compatible with the description of the macro world of the Universe, as described in Einstein's cosmological Theory of Relativity. There are now attempts to develop a "theory of everything" that would include modeling of the cosmos and quantum micro-world in a single set of equations. One example of this is the so called, "Super String theory" or,even better, its successor the M-theory that even assumes at least 10 dimensions. The basic idea of the String theory is, that the real building blocks of elementary particles, such as electrons, protons, photons and quarks, are much smaller elements that can best be described as a sort of tiny strings or loops that vibrate at different frequencies in a discrete manner. This theory implies that at the smallest physical level can be conceived of as an assembly of vibrating entities.

In addition, quantum physics tells us that material particles, at the same time, can behave as oscillators (waves), by which they can produce a sort of poised state of waves/particles. Interestingly, particles that belong to each other in term of their properties (e.g. their polarization and rotation or spin) can be correlated about each other over huge distances: if one changes the spin of one particle, the paired particle spin is altered too to maintain their system integrity. This phenomenon termed "quantum entanglement" was characterized by Einstein as "spooky action at a distance." Thus, the structure of reality may be more flexible and intricately interconnected over vast distances than classically thought. Nature can therefore be seen as an enduring interaction of waves/particles carrying their inherent physical status information. System information state exchange is not only used for a deeper form of intra-system coordination, but probably also for the creation of interpretive meaning by conscious observers (Meijer and Geesink, 2017; Meijer, 2023).

Quantum entanglement formulated by quantum physicists, such as David Bohm, provided a reason to

postulate a "quantum wholeness", an idea that expresses the concept that everything in the universe is connected ("entangled") (Meijer et al., 2021; Meijer and Ivaldi, 2021). Yet, these aspects of reality are hidden from our ordinary perception. Instead, our individual consciousness is so dominated by the accepted normal but overwhelming sensory input, that we are rarely aware of this kind of connectedness. According to Bohm, such quantum phenomena are hidden due to fact that they are part of an underlying unseen quantum information field, called the implicate order, that is always present and manifests itself everywhere (and thus has a non-local character), while others termed this a Universal Field of Consciousness (Meijer, 2016).

Such a universal quantum field may do so through the exchange of information energy that is continuously allocated in a universal dynamic process. Building and decomposition of matter are, in fact, caused by absorption and release of (virtual) photons, and animate and inanimate matter is composed of quantum entangled and disentangled waves that resonated in 3D as well in 4D by the entrance of a so-called Zero-point energy field. These waves of this 3 and 4D-field can in this manner also provide an information exchange between the physical 4D-space field and the non-zero local field to which they belong by the phenomenon of resonance. The central message is that nature is guided by a discrete pattern of electromagnetic frequencies, as expressed in photon/electron (polariton) and phonon/electron (polaron or soliton) activities. This guiding is based upon a quantum interference principle, that shows a coherence (order) as well as a decoherence (disorder) principle that is coupled to entanglement. It acts in a local and non-local way and is embedded in a toroidal and a monopole geometry.

Recent studies of Wong and Chow (2021 a, b), describe symmetry breaking of condensed (charge neutral, massless) bosons from the 5D informational manifold. A unified theory has been proposed of quantum mechanics, and gravity that is based on a multi-connected toroidal space combined with a monopole topology, in which each state of the ordinary quantum system encodes the information about the state of the higher-dimensional gravitational system. Space-time is created out of quantum processes themselves at the subatomic level and emerges like a hologram out of information stored in the entangled quantum states of elementary particles. Einstein's equation links matter to gravity and his formula $E = mc^2$ links matter to energy. It is proposed that the nature of quantum gravity is a manifestation of quantum entanglement, has a local and non-local nature and is mediated by wave- functions of bosonic and fermionic elementary particles supported by a vacuum field. The particular mathematics can be described by two quantum wave equations: one for the coherent quantum states and a second for the incoherent quantum states (Wong and Chow, 2020, 2021; Meijer and Wong, 2022; Geesink, 2022).

3.2 Ordering in Space According to a Proposed Quantum Principle

The physical principle of ordering can be understood as a result of both quantum gravity and entanglement. The attractive interaction between electron and proton charges is seen as a primordial phenomenon. It was shown that creation of Gravity/Dark Energy can be envisioned as the result of primordial electron/ proton pair production that induces left and right-handed vortices in a superfluïd quantum space/lattice. These bipolar pairs become associated with sound particles or phonons. This process can be described by toroidal geometry in the form of phonon-fermion quasi-particles or polarons, in which the dual positive/negative charged pairs generate a Bi-polaron structure. In a similar manner, positron/anti-proton pair interaction is conceived, adding the aspect of anti-matter to the dynamic model (Meijer and Bermanseder 2023). This 5D process starts with discrete oscillations of Goldstone bosons and after 5D to 4D symmetry breaking,

generates both fermions and monopoles in a toroidal setting, as the building blocks for creation of inanimate and, finally, also animated systems (Meijer and Wong, 2021 and 2022). Interestingly, distinct harmonic frequency patterns have also been found by us for energy states of the known Bosons and Bose Einstein Condensates, (Geesink, 2020b), as well as for the EMF-mediated promotion of (Einstein Podolsky Roosen, EPR) degree of entanglement (Geesink and Meijer, 2018b). Thus, typical entangled frequencies are the fundamental topological invariants, according to the proposed quantum wave equation of coherence. The latter describes the density of states (DOS) of a system related to the involved types, numbers, and frequencies in the zone-centre modes, per unit frequency range. The coherence equation describes standing waves, along toroidal fiber bundles and points and the related typical frequencies can be located at the surface of a nested toroidal and monopole geometry. This toroidal pattern can again be described by a harmonic equation mentioned above, and calculated by topological Chern numbers, or called how to distribute ratios of 2:3 into ratios 1:2, (Geesink, 2022f).

3.3 The Geometry of Nested Torii: Trajectories, Spectra, Lines and Points

In the framework treated above, a novel integral quantum principle could be formulated on the basis of quantum harmonic oscillators, that has been applied in the context of biophysics of life processes, including the nature of brain-wave electric processes that, at the same time, can be conceived as equation for quantum energy manifestations of physical processes such as energies of elementary particles, bosons, and their condensates, frequencies that promote superconductive properties and entanglement conditions: all being characterized by the equation for wave coherence of harmonic frequency distribution: $E_n = \hbar\ \omega_{ref}\ 2^q\ 3^m$, previously called the GM-scale by Meijer et al. 2020, the Geometric Musical Language (GML) by Bandyopadhyay (2020), or the General Music Code by Wong et al. (Meijer and Wong, 2022; Geesink, 2022d, 2022e, 2022f) and, at present, framed as the "Acoustic Quantum Code of Resonant Coherence", in which the term resonant points at the construction of coherent wave fields that provide the energy guiding and connectivity that is typical for life systems (see also figures 1, 2 and 3).

3.4 Bose Einstein Condensates and Magnetic Monopoles

Bose-Einstein condensates of electromagnetic waves can be used to emulate the hypothesized magnetic monopole. Monopoles, in so called condensed matter systems, may afford a way to understand "magnetic excitations" in the same way as electronic excitations arise and quantified (Rajantie, 2016). Numerous theoretical investigations and hitherto performed experimental searches, have followed Dirac's, 1931 development of a theory of monopoles consistent with both quantum mechanics and the gauge invariance of the electromagnetic field. The existence of even a single Dirac magnetic monopole would have physical consequences explaining the quantization of electric charge (Ray, 2015). It has been demonstrated that controlled creation of Dirac monopolesin the synthetic magnetic field produced by a "spinor" Bose-Einstein condensate is possible. The quantum theory of magnetic charge started with a paper by the physicist Paul Dirac in 1931 (Dirac, 1931). In this paper, Dirac showed that if any magnetic monopoles exist in the universe, then all electric charge in the universe must be quantized (Dirac quantization condition). The electric charge is, in fact, quantized, which is consistent with (but does not prove) the existence of monopoles (Littlejohn, 2007).

The monopole potential can be the result of extending the space-time homogeneous manifold to 5D. In electrodynamics, given in the homogeneous 4D Maxwell manifold, energy is carried by photons or phonons, emitted from a charged current, which is absent in the homogeneous 5D manifold. Hence, although the monopole Bosons carry energy, we describe this 5D space-time of the Universe as Dark Matter domain, a vacuum filled with the Bose-Einstein condensed Bosons (Wong, 2020). Also, a four-dimensional interpretation of the outgoing state of the scattering of a mass-less fermion of a Dirac monopole has been proposed (Hamada, 2022). The hypothetical existence of a magnetic monopole would imply that electric and magnetic charge must be quantized in certain units. It is known that Bosons and Bose-Einstein condensates can be used to emulate the monopole. Bosons and Bose-Einstein condensate have been described by a generalized quantized coherent wavefunction, that demonstrates a toroidal geometry, see figure 8. It is proposed, therefore, by us that the monopole can be described by multiple coherent and decoherent excitations, embedded in asymmetric wave states that are positioned in a "quantum field", see figure 9.

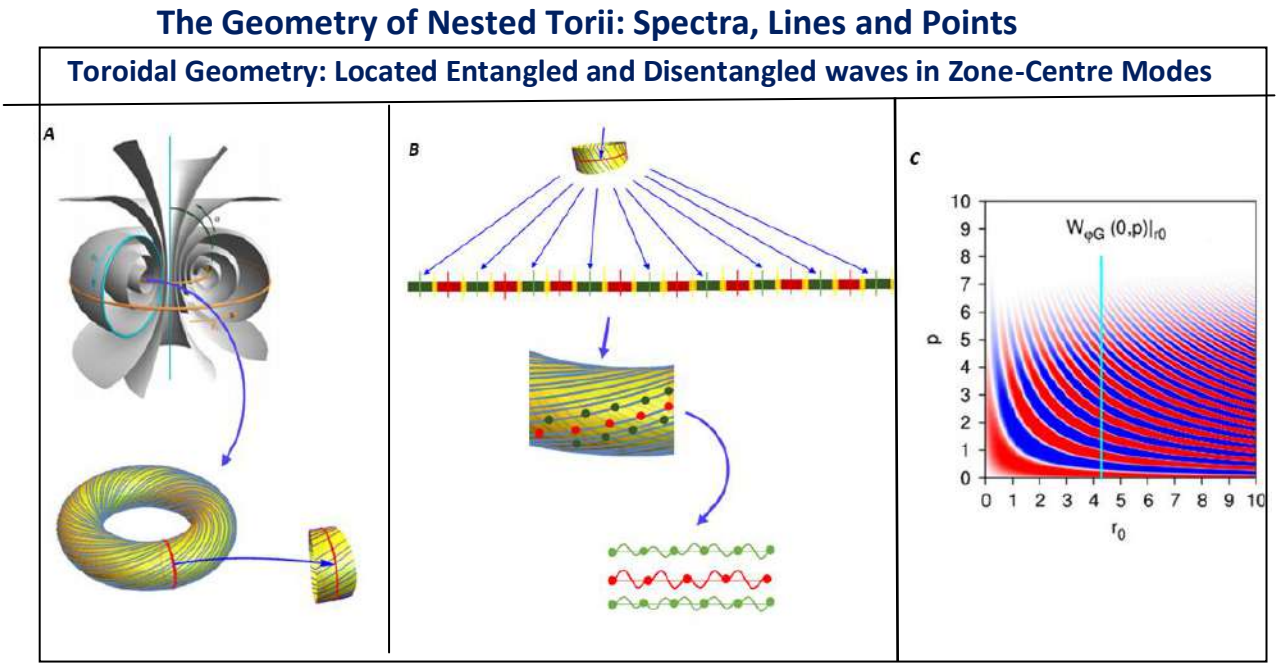


Figure 8. A: *Toroidal geometry (reference Balch et al. and Kronecker, 2020) and toroidal foliation (reference Connes, 2019);* ***B****: Fractal spaces positioned at a torus: Coherent (green), decoherent (red) and transient (yellow) frequency zones and monotones (Hz) (green, red and yellow stripes) (Art impression, Geesink, 2020). Interferences on nested tori geometry. Entangled waves and disentangled waves on a torus. Lattice system in strings of pure entangled positioned in the different boxes (green), and not entangled states (red) positioned in the different boxes (red), Located entangled waves (green) and disentangled waves (red) in the zone-centre modes (Geesink, 2021b). Entangled states and nodes (green) and disentangled states and nodes: in the zone- centre modes.* ***C****: Toroidal self-interference fringes of a condensate, reference Toikka, 2014 (blue areas: coherent waves, red area's decoherent waves).*

3.5 Toroidal Geometry and the Monopole

The relevant geometric model for this is given by a toroidal fractal symmetry of nested torii, exhibiting 12

symmetry generators in which the number of copies of the symmetry is a power of 2^n. The same algorithm has been found for energy distribution of Bosonic elementary particles, that are likewise positioned at discrete energy intervals that can be normalized by dividing the measured energies by 2^n (n is an integer). These energies are expressed in coherent (ordered or entangled) spatial zones, whereas Fermionic elementary particle energy distribution shows both a combination of patterned distribution of coherent states, but also a random decoherence frequency distribution, according to stochastic quantization within a broad energy scale, to be conceived as a chaotic quantization (Geesink, 2021d).

It is considered that a relation between Dirac's monopole in a quantum field and a rotating torus exists and can be made visible by a so called Hopf-transformation, that maps to each point on the ordinary 3D sphere from a unique circle of points on the 4D sphere. It was proposed by Geesink, 2022b, to describe the monopole by a quantum equation of a distribution of energy (3D semi-harmonic oscillator): all distributed energies have ratios of 1:2, or 2:3 and close approaches thereof, and can be positioned as standing waves in a toroidal geometry. The monopole energy spectrum should be divided into different frequency ranges to separate the complexity of bio-organisms (Wong, 2020). In our proposal (Meijer and Wong, 2021, 2022) the monopole spectrum has the same nature as the proposed spectra from the key elements: Water, Carbon and Hydrogen, together with Oxygen providing the building blocks of living organism and provides a possible coupling of the monopole spectra to quantum DLRO spectra in the relation to bio-matters.

In addition, an invariant wavelength (of the Geesink metric) can be calculated for example for the Higgs Boson amounting to 9.8166 10^{-18} meter and can be considered as a fixation of the gauge group. The hydrodynamics of a torus is important on two counts: firstly, most stiff or semi-flexible DNA mini-plasmids can be modelled as a torus and the hydrodynamics of a torus rotating about its center line has been studied (Thaokar, 2007).

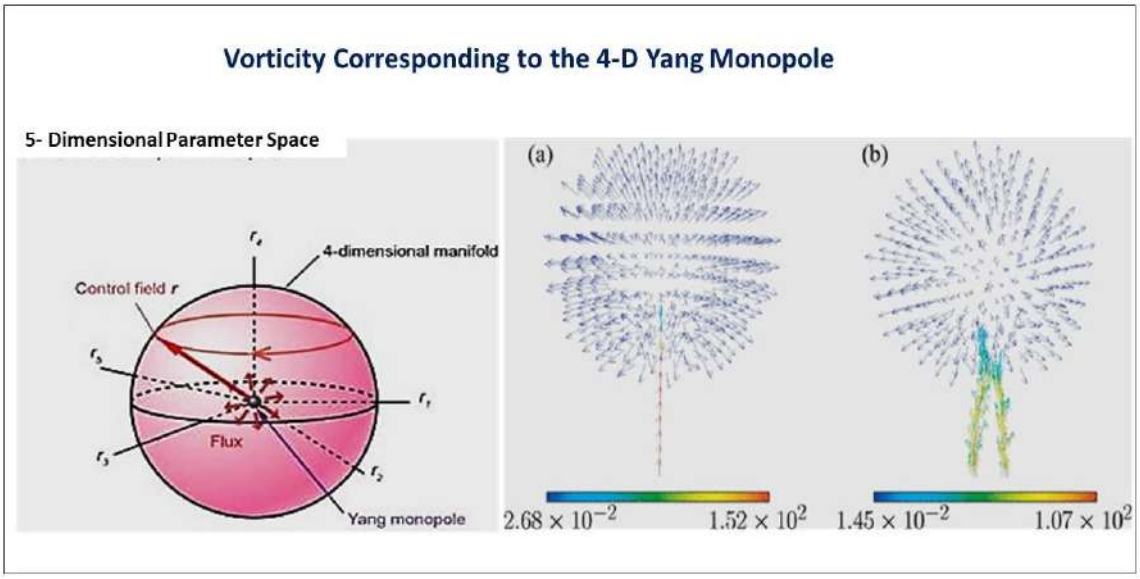


Figure 9A. Left: *Non-Abelian Monopole, reference Sugawa, 2018; Right: Vorticity corresponding to the monopole. The magnitude of the vorticity is denoted by color, and the map is linear between the minimum and maximum values. For clarity, only the relevant parts of the vector field Ωs are shown (Pietilä, 2009).*

The analyzed patterns include the eigenstates of superconductor properties, EPR (entanglement) studies, Quantum Hall effects, Boson Einstein condensates, the masses of Elementary Particles of the Standard model as well as Zero-Point energies, see Table 1.

3.6. Relation of Entropy with Entanglement

The first investigations into the theory of quantum information revealed that there is a link between the classically understood quantity of entropy and the purely quantum mechanical phenomenon of entanglement. By partitioning a many-body quantum system into two blocks, the entanglement entropy is defined as the von Neumann entropy of the reduced density-matrix of either one of the two blocks and is a single number that can be obtained from knowledge of the density-matrix eigenvalue spectrum (Haldane, 2008) and see Fig. 9B.

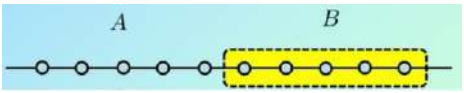


Figure 9B: *A lattice system which is divided in a pure entangled state (A) and (B), a not entangled state, as reduced density matrix of subsystem A.*

3.7 Black and White Holes

A black hole is a region of spacetime where gravity is so strong that nothing, no particles or even electromagnetic radiation such as light, can escape from it. The theory of general relativity predicts that a sufficiently compact mass can deform spacetime to form a black hole. The boundary of no escape is called the event horizon. Although it has an enormous effect on the fate and circumstances of an object crossing it, it has no locally detectable features according to general relativity. White holes, a theoretical concept, are like a spot in space time which ejects matter and light from it. It is considered that black and white holes, elementary particles and the vacuum show coherent and decoherent modalities, that reflect a sort of balanced guiding principle and emanate in a gravitational field.

3.8 Is the Quantum Code of Resonant Coherence Related to Energy Fluctuations at the Planck Scale?

Meijer and Wong, 2020; 2021, have wondered about the question if their proposed Musical Quantum Code might be a primordial character. Primordial may imply that this information was already present in the 5D homogeneous manifold as discrete oscillations, to be seen as code of quantum fluctuations. We have proposed that this pattern influences the further unfolding of reality after symmetry breaking from 5D to 4D, and for instance guides the graded temperature lowering in distinct phases, leading to gradual formation of elementary elements and atoms. A gradual unfolding of information may play a role guided by the supposed acoustic quantum code of resonant coherence that might be instrumental in the creation of first life and biological life. Collectively this may point at a general background of vibrational information, that both contains coherent and decoherent frequency bands, through which both of its aspects may be instrumental in the whole fabric of reality.

At the Planck scale, the predictions of the Standard Model, quantum field theory and general relativity are not expected to apply; Planck units have little anthropocentric arbitrariness but do still involve some arbitrary choices in terms of the defining constants. It is proposed that the derived scalars: geometric patterns and 12 fundamental invariant lengths describe the many measurements in quantum physics, and in biophysics (about 2000), including the distribution of black body radiation, that can be expressed in typical discrete length units, Geesink/Meijer length units, that might be universal (Geesink, 2023).

Is it possible, therefore, that a geometry based on semi-harmonics and not a classical harmonic Planck scale, as proposed by Planck oscillation frequencies of standing waves, underlies an Acoustic (musical/phonon) Quantum Code. In this sense, the conception of a living system extends beyond the normal consideration of only the biological organism, e.g. evolution and synergism are not merely products of the biosphere but are present in the interactivity of systems in general leading to the emergence of the biosphere and properties of sentience and awareness are involved in the directed (non-random) generic evolution of matter and the universe. They view the brain and neurological system as components of an integrated fractal antenna system interacting with a universal meta-cognitive holographic structure, just as in the Unified Space-memory Network model of Haramein et al. 2016. In both models, the zero-point energy field [ZPE] is a prime information transfer of energy, matter and consciousness. They reference the torus as the functional structure of the field-receptive mental workspace, stating "*consciousness in the entire universe arises through, scale invariant, nested toroidal coupling of various energy fields".*

Electromagnetically seen, living organisms make use of typical natural typical coherent quantum resonances as well as decoherent resonances, that can be approached by two equations for standing waves. We hold that quantum entangled life conditions and graded states of consciousness in the universe are scale invariant and are guided by a quantum wave meta-language in a superfluid quantum field that is instrumental in creating quantum coherent states through pilot wave resonant connectivity. This interacting dynamic EM field is steering life processes through semi-harmonic tuning of fractal structured water and vibrating macro-molecules such as among others DNA and hydrated proteins in the cell, including several cell types in the human brain (Geesink, Jerman and Meijer 2020; Geesink, 2021a). The concept of harmonic like brain waves was supported by Atasoy et al. (2018), observing harmonic vibration patterns related to the brain connectome, in which two imaging techniques: magnetic resonance imaging (MRI) and diffusion tensor imaging (DTI), were used to create three-dimensional oscillation maps of the structure of the brains of a group of individuals. Since the quantum potential can be thought of as information whose activity is guided by a "superfluid", there is a fundamental similarity between the quantum behavior of a quantum system, a biological system and the behavior of the mind.

Brain function requires complementary information processing mechanisms both at iso-energetic and quantum levels, enabling bottom up and top-down information processing, which requires a nested organization of fine-tuned neural micro-sites that enable coherence/de-coherence transitions as a basis for information transfer. More recently, Geesink and Meijer (2018b), derived a low frequency spectra formula for biomolecules, starting with water, as represented by a toroidal structure, such that other elements essential to life, such as oxygen, carbon, nitrogen, and hydrogen can all be fitted into the same formula, dividing it into coherent and de-coherent states (Wong, 2020; Geesink, 2020).

Also, conformational states of microtubules and proteins have the same derived typical spatial spectral arrangements of atoms, called spatial coherence, that are characteristic for cell building, homeostasis,

versus cell decay, and apoptosis. Microtubules show a principle of a self-organizing-synergetic structure called a Fröhlich-Bose-Einstein state. The spatial coherence of this state can be described by a toroidal quantum equation of coherence. In this space, microtubules and proteins have typical discrete frequency patterns. These frequencies comply with two proposed quantum wave equations of respective coherence (regulation) and decoherence (deregulation), that describe quantum entangled and disentangled states. All measured and analyzed frequencies of microtubules comply with the same energy distribution found for Bose-Einstein condensates. The overall results show a presence of an informational quantum code, a direct relation with the eigenfrequencies of microtubules, stem cells, DNA, and proteins, that supplies information to realize biological order in life cells and substantiates a collective Fröhlich-Bose-Einstein type of behavior (Geesink, 2022).

3.9. Function of the Holographic Event Horizon in Brain to Brain Communication

We stipulate that the information dissipating brain, as earlier described by Vitiello**,** may create our integral and universal memory, coined by the latter author as "*our double unveiled*"'. Consequently, as mentioned above, we consider our holographic event horizon concept to be compatible not only with present neurological concepts, but also with trans-personal observations such as the unexpected brain to brain connections as experimentally demonstrated by Hasson et al., 2012, Wackermann et al., 2003, Radin**,** 2004**,** Richards et al., 2005, Standish et al. 2004, as well as Pizzi et al., 2004.

In a recent transparent review of Hosseini, 2021, brain to brain communication was discussed in relation to the role of electromagnetic field in and around the brain. Brain-to-brain communication, was posited as one of the multiple kinds of telepathies, implying the direct conveyance of feelings from one animal to another without using the common sensory channels of communication. This includes many attempts to elucidate the mechanism of direct brain-to brain communication between two animals by simultaneously recording action potentials patterns occurring in the brain. It was considered possible that the content of the mind between different members of a species is intelligible to one another and is capable of transmitting through electromagnetic fields. In the recent years, with help of brain-machine interfaces, brain-to-brain interface has happened indirectly even between different species such as humans and animals. A phenomenon that forms a fast message system between neurons is called ephaptic coupling (Scholkmann, 2015), where synapses or gap junctions are not involved and are simply a result of a local electromagnetic field derived from a neuron. Ephaptic coupling as facilitated the excitation, so, can increases the speed of transmission of neural messages within the brain system and also from the environment to the brain and vice versa, and thus can increase the speed of cognition and sensory perception by the nervous system in general.

Accordingly, it is known that exposure to ELF-EMFs can improve recognition such as memory retention as in rats. It has long been supposed that animals subconsciously process magnetic fields such as the earth's magnetic field. One of the subconscious regions of the brain is the limbic system, encompassing amygdala, hippocampus, thalamus, hypothalamus, basal ganglia, and cingulate gyrus and para-hippocampal gyrus. The cuneus is a brain region associated with empathy and also with telepathy. The cuneus is a smaller lobe within the occipital lobe of the brain. Interestingly, the occipital lobe includes the visual cortex, processing visual information partly sent by cryptochrome-2, a magnetic field sensitive protein, from the retina. It seems that the brain electromagnetic fields and global connections/signaling among frontal cortex,

occipital lobe and limbic system such as para-hippocampal region, could be a basis of this assertion as to how mammals such as rats, bats, and humans are capable of communication from brain to brain without any obvious signals.

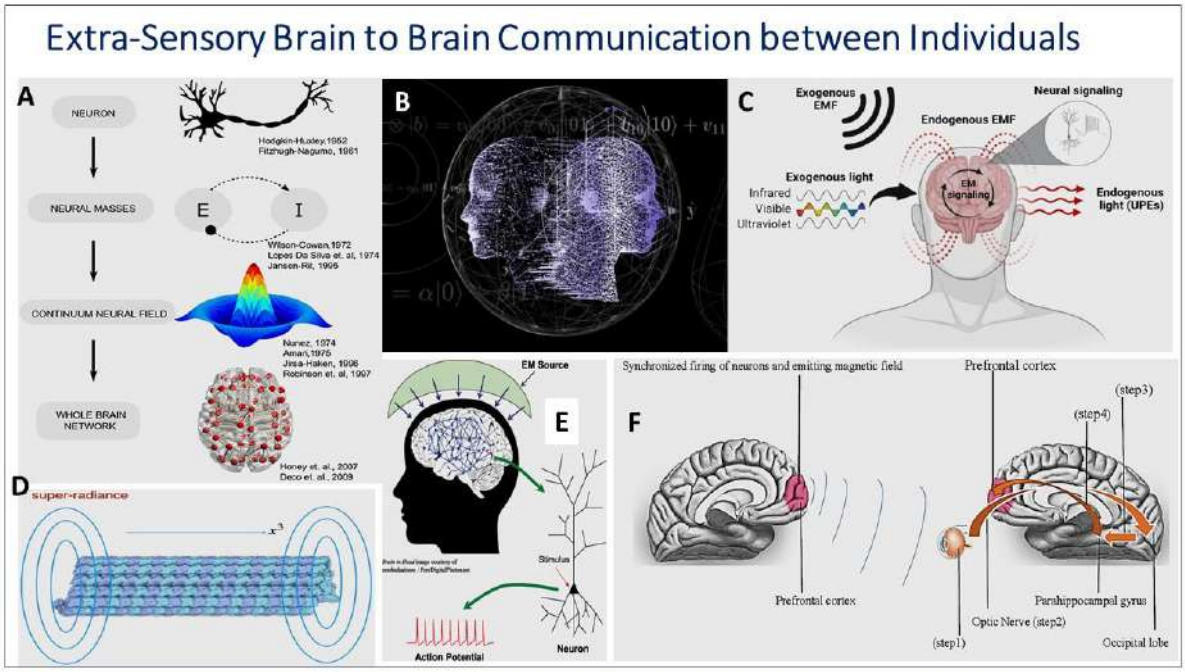


Figure 10: *Brain to brain communication between human and animal individuals;* ***A:*** *Hierarchic organization of brain structure from neuron to brain networks; B: cartoon of human telepathic communication;* ***C:*** *Neural signaling in brain can be influenced of both internal and external EMF fields;* ***D:*** *Supposed superradiance in microtubule as reported by Nishiyama et al.,;* ***E:*** *External Electromagnetic fields may perturb neuronal transmission;* ***F:*** *Magnetically induced synchronic firing in various brain areas that were proposed in brain to brain telepathic communication (reproduced from Hosseini, 2021).*

It was hypothesized by Hosseini, 2021, that large synchronized outbursts of cortex neurons in the frontal lobe, an area extensively involved in social cognition in a wide variety of mammalian species from rodents to primates. *produces electromagnetic fields around the brain*. This field may be able to influence cortical neurons in the frontal lobe of another brain by inducing action potentials in large groups of neurons which can transmit information such as different emotions and cognition cues to the other brain. A possible confirmation of this phenomenon is seen in two studies carried out, one in rats (Pais-Vieira et al., 2013) and one in Egyptian fruit bats (Zhang and Yartsev, 2019). In both studies, action potentials were recorded in the frontal cortexes of two rats or bats close to each other. Interestingly, after starting action potentials in animal 1 as the encoder, the same action potentials with the similiar patterns immediately appeared in the frontal cortex of animal 2 as the decoder. In the case of the rat study, the decoder rat also performed the same action as the first encoder rat (Pais-Vieira et al., 2013).

The potential role of brain magnetic particles (magnetites) may be effective in perceiving another brain's magnetic field. It may be of significant interest in upcoming research to clarify the role of brain magnetic particles in brain-to-brain communication. The ubiquitous cryptochrome, a crucial receiver of the magnetic field, should be examined and its potential role in direct brain-to-brain communication may be elucidated

by some fundamental research**.** In a similar vein, we should take into account the many cases of personal life panorama's reported in stunning detail by the many registered near-death cases (for a critical discussion on the latter item in which astounding transpersonal information states of consciousness states are experienced in the absence of neuronal processing and fluxes of information in brain cortex (Meijer, 2024).

The importance of the concept of a holographic brain theory was recently treated by Nishiyama et al, 2020-2024). They investigated Quantum Electrodynamics, corresponding to the holographic brain theory introduced by Pribram, to describe memory in the human brain. First, they derived a super-radiance solution in Quantum Electrodynamics with non-relativistic charged bosons (a model of molecular conformational states of water) for coherent light sources of holograms. Next, they estimated memory capacity of a brain neocortex, and adopt binary holograms to manipulate optical information. Finally, they introduce a control theory to manipulate holograms involving biological water's molecular conformational states. It was shown how a desired waveform in holography is achieved in a hierarchical model using numerical simulations. Based on experimental observations of brain activity they proposed that the brain can be excited into particular quantum states by stimuli from the external environment. Thus, information can be thought of as being coded into the brain as quantum excited states representing short-term memory. This code would then be later on transferred to the lowest quantum energy state by means of a Bose–Einstein condensation accounting for learning and long-term memory, as represented by macroscopic quantum fields. Memory in the brain can be stored in a diffused un-localized domain of a quantum field theoretical vacuum acting like a single entity of the Bose–Einstein condensate as that in superconducting media. Memory is stored in patterns in an invariant form.

Memory has diffused nonlocal features and is not localized in a particular region of the brain. Cavaglia et al., 2023, recently proposed a holographic paradigm in the brain involving neuronal membrane dipole oscillations with quantum coherence. The collaborators of Pribram were Jibu and Yasue who proposed the concrete degrees of freedom in Quantum Brain. Kerskens, 2022, suggested the presence of quantum entanglement of excited states emerging in a brain Dotta et al., 2012, showed that photon emission from the head increased while subjects imagined light in a very dark environment. Kauffman et al.,2023a;b proposed that measurements by our mind convert possibilities manifested in quantum superpositions of states to actual events In Quantum brain dynamics (QBD), memory corresponds to the vacua, emerging in the breakdown of rotational symmetry of quantum degrees for freedom (Meijer and Wong, 2021).

Therefore, it is a logical conclusion to suggest integration of QBD with the proposed holographic brain theory. Or we might adopt a dissipative quantum brain theory with squeezed coherent states of Nambu–Goldstone bosons in open systems, which is equivalent to fractal functional representations as earlier proposed by Vitiello. The authors give the reasons why they focus on water molecules. In the mainstream of neuroscience and physiology, most researchers investigate constituent elements of the human brain, such as neurons, proteins, DNA, ions, and so on, for physiological processes, and consider water molecules as merely an inert solvent medium. In this view, water plays the role of a supporting actor, not one of the main actors. However, to achieve long-range correlations in the whole brain, we need degrees of freedom present in the entire brain. The most likely candidates for such degrees of freedom are photons/phonons and water molecules, with dissolved physiological salts (Meijer et al, 2020, Sbitnev, 2016). Electric dipoles of tubulin-dimers in a microtubule affect surrounding water dipoles due to their dipole-dipole interactions. Conversely, surrounding water molecules as a group also affect the dynamics of the cytoskeleton, especially

in neurons where microtubules form parallel bundles.

Whether or not our brain adopts the language of holography might be investigated by manipulating holograms by external stimuli. A recently reported experiment for invasive stimulation to manipulate our visual subjective experience was also described in by Beauchamps et al., 2020, for example. Nishiyama et al., 2024 prefer non-invasive methods such as transcranial electric stimulation with direct current and alternating current photonic methodology with near-infrared photons and an ultra-sound methods, as have also been developed and applied to treat neuropsychiatric diseases, (Geesink, 2023, Meijer 2023). Likely, quantum systems exhibit a blend of deterministic evolution and probabilistic measurement outcomes, making them fundamentally different from classical deterministic systems. Quantum Electrodynamics (QED) with non-relativistic Bose fields correspond to the holographic brain theory by Pribram. Nihiyama et al., 2024, have shown a super-radiance solution, (see Fig.10), around neuronal microtubules in the brain, and provided a holographic aspect within the QED framework. Manipulating holograms by external electric fields, might enable to affect memory and subjective experiences. and even artificial memory may be induced by external electromagnetic fields and be recalled. Quantum coherence in microtubules might provide saltatory coupling between spines and induce saltatory conduction in axons via solitary waves covering a longer range for maintaining coherence, as proposed independently by Davydov, 1975.

Quantum computation within the brain was predicted by Penrose and Hameroff, 2015, to occur within neuronal microtubules. Tubulin is the building block of microtubules and it has been considered to carry biological quanta of information, qubits. To overcome a dephasing effect, the geometry of the system composed by water molecules plays a significant role. Arranging water molecules on a ring, van der Waals interactions induce symmetric property and dephasing effect is expected to diminish. Microtubules work as single mode waveguides with a cutoff wavelength 21 nm, in brief they should be able to guide light from strong ultra-violet to near-infrared region.

As mentioned above, it is of interest that Geesink et al. 2020; Geesink and Schmieke, 2022h detected that the reported EMF frequencies of water and microtubular oscillations exhibit the semi-harmonic frequencies of our Acoustic Quantum Code and that the latter are also detected in blackbody radiation frequencies at the Planck scale (see Meijer, 2023). This may imply that resonant wave relations are at stake, and water represents a crucial conduit modality. This is in line with the findings of Nishiyama et al., of various structures of holograms for information storage by water molecular conformational states around spherical, *toroidal* and cylindrical forms for neurons, glia cells, microfilaments and microtubules. Karl Pribram's holonomic brain theory argued that his model may solve the binding problem. Pribram collaborated with David Bohm in his work on quantum approaches to the functioning of the mind. He proposed that ordered water at dendritic membrane surfaces undergoes Bose–Einstein condensation forming a large-scale coherent quantum state, which would support ideas such as quantum brain dynamics proposed earlier by Umezawa and collaborators. Kerskens,2022, reported experimental MRI results obtained from human participants, which imply the involvement of nuclear proton spins of brain water molecules in an entangled quantum state.

Of note, the various studies of Nishiyama and Pribram, in fact, support our concept of a toroidal memory workspace associated with our brain, but lack the quantitative frequency data as identified in our analysis of literature data on neuronal microtubular oscillations and resonant blackbody frequencies at the Planck scale, thereby missing the potential vibratory link with the fundamental informational geometry.

4. Mathematical Models of Consciousness

4.1. Introduction

The story of philosophy in Western civilization begins in ancient Greece, which produced four of the world's thinkers, namely: Pythagoras, Socrates, Plato and Aristotle, yet likely preceded by related wisdom from India, China and Mesopotamia. The explanations offered by these philosophers were not only deeply philosophical, but, by the standards of their time, also represented an impressive scientific endeavor. In fact, many of them had practical interests in mathematics, astronomy and biology. According to historical tradition, mathematician and philosopher Pythagoras and colleagues (c.570–c.497 BCE) held that numbers and mathematical relations underlie reality. For Pythagoras et al., mathematics was at the centre of his philosophy, insofar as he believed that mathematical relations govern all things in reality. Since everything seems related to mathematics through the same mathematics everything can be predicted and measured in rhythmic patterns. Two types of mathematical ratios were especially important for Pythagoras: The Tetractys and Musical Harmony. According to Pythagoras, it is the "number" or mathematical principle that provides order, harmony, rhythm, and beauty to the world. This harmony keeps a balance both in the cosmos and in the psyche. For Pythagoras, "numbers" are not abstract concepts, but embodied entities manifested as norms, cosmic interrelations, and sensible natural objects. Moreover, the mathematical order in beings is perceivable not only by the physical senses but also by mental perception.

Pythagorean tuning is a system of musical coding in which the frequency ratios of all intervals are based on the ratio 1:2 and close approximations of 2:3. This ratio, also known as the "pure" perfect fifth, was chosen because it is one of the most consonant and easiest to tune by human ear and because of the inherent importance attributed to the integer 3. It appeared that this numeric harmony could be discovered in apparent rules and forms throughout nature. In this concept, numbers governed the properties and conditions of all beings and were regarded as the origin and cause of being and it was believed that since all bodies are composed of numbers this served as the basis for a mathematization of science. The pioneer of physics, Werner Heisenberg, argued that "this mode of observing nature, which led in part to a true dominion over natural forces, contributes decisively to the development of humanity, in an unforeseen manner vindicated as the "Pythagorean faith" (Constantine, 2009; Schuch, 2010; Faller, 2012).

Durdevich, 2015, stipulated: "On the other hand, the ancient Pythagorean musical scales naturally lead to a simple quantum circle. There is something profoundly quantum in all music. A discrete space, the skeleton hosting any musical score morphs into a true musical form, only after being symbiotically enveloped by a geometry of sound. And this geometry is inherently quantum, as it connects the points of the discrete underlying structure, invalidating the difference between now, then, here and there, so creating an irreducible continuum for a piece of music: continuous discreteness and discrete continuity" (Durdevich, 2015). Probably the origins of math stems from music states: "Pythagoras discovered that multiplying two ratios is equivalent to adding their intervals: (2:3) x (3:4) = 1:2, so a fifth plus a fourth equals an octave. In doing so, he unknowingly came up with the first logarithmic law in history, "(Abdounor, 2015). The "world" can, in this manner, be described by a sound analogy according to Pythagorean harmonics, as also discussed by Whitehead (Amodio, 1992; Gare, 2006).

As explained above, it was proposed by Geesink and Meijer that an optimal photon/phonon -electron coupling can be achieved if all of the typical discrete frequencies are exclusively positioned in 12 entangled

boxes of wave frequency values, and under those conditions superconductive properties at room temperature can emerge. All the quantum entangled positions can be expressed by the proposed quantum equation of coherence showing the following typical invariant scale of energy distribution in the zone-centre modes: $\mathbf{E_n = \hbar\, 2^q\, 3^m}$. This equation also describes entangled standing waves, represented as toroidal fibre bundles and points located at the surfaces of a nested torus. Twelve fundamental topological invariants could be found: 1.0000, 1.0535, 1.1250, 1.1852, 1.2656, 1.3333, 1.4142, 1.5000, 1.5803, 1.6875, 1.7778, 1.8984 (Geesink, 2021c), as can be derived from the reported Chern numbers.

4.2. Normalized Chern Numbers to Describe a Toroidal Space Distribution

One of the revelations on reality is given by the Chern Numbers. It was the observation by professor Chern that all matters are contained within a 3D space dimension on any given time. Therefore, any reality must be given by either a One-, Two-, or Three-dimension state, and their superpositions. The mathematical connection between these realities is the theory of perspectives. The projection between dimensions can be given by fixing the Euler angles. It is now apparent that the 3D homogenous space can be extended to 4D homogenous space, due to the Euler angle for 4D space is the same as the spherical surface angle, hence making 4D=3D.1D, in terms of Chern numbers for the space dimensions 4=3+1. This exercise also proves the existence of the Maxwell magnetic monopole potential. In the quantum regime, the monopole is massless, charge neutral and a "Diagonal Long-Range Order" (DLRO) Boson. The Thermal Canonical Ensemble of such a monopole Boson, with eigen-energy signature 2hv(j) must then be given by the Bose-Einstein (B.E.) Condensed distribution. Namely, it is in a B.E. vacuum, in agreement with the Higgs Boson. The explicit form of the monopoles must then be given by a direct product of two oppositely charged and massless spinors, each carrying a momentum opposite to each other of hv(j)/c along 'r'. The hypothetical existence of a magnetic monopole would thus imply that electric and magnetic charge must be quantized in certain units. It is known that Bosons and Bose-Einstein condensates can be used to emulate the monopole. Bosons and Bose-Einstein condensate have been described by a generalized quantized coherent wave function that demonstrates a toroidal geometry, see Fig. 11. It is proposed by us that the monopole can be described by the proposed coherent and decoherent excitations, embedded in asymmetric wave states that are positioned in a "quantum ".

It is considered that a relation between Dirac's monopole and a rotating torus exists and can be made visible by a Hopf-transformation, that maps to each point on the ordinary 3D sphere from a unique circle of points on the 4D sphere. The monopole energy spectrum in a quantum field has been divided into different frequency ranges to separate the complexity of bio-organisms (Wong, 2020; Meijer and Wong 2022). In addition, an invariant wavelength (Geesink metric) could be calculated from the Higgs Boson amounting to $9.8166\ 10^{-18}$ meter and can be considered as a fixation of the gauge group (Geesink, 2022f). The monopole potential can thus be the result of extending the space-time homogeneous manifold to 5D. In electrodynamics, given in the homogeneous 4D Maxwell manifold, energy is carried by photons/phonons emitted from a charged current, which is absent in the homogeneous 5D manifold. Hence, although the monopole Bosons carry energy, we may describe this 5D space-time of the Universe as Dark Matter domain, and a vacuum filled with the Bose Einstein condensed Higgs' Bosons (Wong, 2020).

Property	Superstring Theory	Toroidal-Monopole theory
Mass	Massless or > 10^{19} Gev	Mass and massless
Length	One-dimensional length ~ 10^{-33} cm	Geesink metric, Invariant wavelengthfor Higgs Boson 9.8166 10^{-18} meter
Mass and Massless State	Helicity	Toroidal and monopole in a quantum field
Graviton(s)	Spin 2 closed loop	Fit in toroidal and monopole geometry
Dimensions	Ten real dimensions	Twelve dimensions, and a 2^n copier of the basic toroidal configuration (n is an integer)
4-D Space-timereduction	By compactification	5-D Space time
Internal Symmetries	Broken by compactification	Symmetry: duality and non-duality
Chirality	Chiral and non-chiral	Basically chiral
Universe's InitialState	Total symmetry	Total symmetry, basic chirality, 5D
Formulation	Based on conventional quantum field	Based on toroidal/monopole geometryand quantum field equation: $E_n = \hbar 2^q 3^m$
Interaction	Trouser diagram	Toroidal algorithm according Chern equations and Pythagorean like equation

Table 2. Comparison between Superstring and Toroidal-Monopole Theories

Shiing-Shen Chern (1911-2004), was a mathematician and made fundamental contributions to differential geometry and topology. Differential geometry is a mathematical discipline that studies the geometry of smooth shapes and smooth spaces, otherwise known as smooth manifolds, using the techniques of differential calculus, integral calculus, linear algebra and multi-linear algebra. Chern classes can be expressed in terms of the curvature, and in terms of the local invariant. We conceive the symmetry as a toroidal fractional symmetry with nested torii having 12 symmetry generators and the number of copies of the symmetry is a power of 2^n. A same deterministic algorithm has been found by us for Bosonic elementary particles (Geesink, 2022a), that were shown to be positioned at discrete energy intervals, whereas Fermionic elementary particles, rather show a combination of a distribution of disentangled states that are just positioned in between coherent states (Geesink, 2022a).

The empirical derived quantum equation of coherence can be analytically calculated by normalizing the equations of Chern numbers in a toroidal setting (Grama, Kotschick, Thung, 2020, Geesink 2021c). Normalized Chern numbers in a toroidal setting show the same set of invariants as has been found for our informational Quantum code. Both proposed equations show spatio-spectral eigenmodes, of which the energy modes of the second equation representing decoherence, are precisely located just in between the Eigen-modes of the first coherence equation, both for animate, as well as for typical inanimate materials.

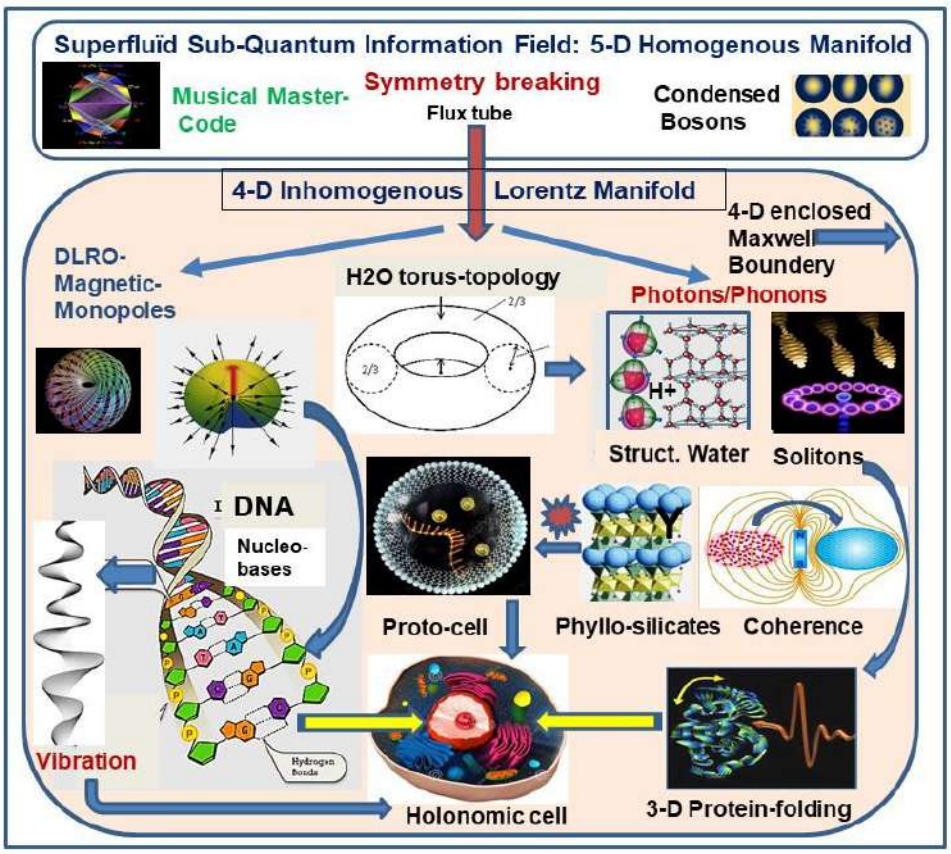


Figure 11*: The present concept in a nutshell: The 5-D to 4-D symmetry breaking results in generation of magnetic monopoles (left above) and photons/phonons together with the essential Torus-operator for energy guiding. Water-molecule structure exhibit torus topology and hexagonal water-clusters, containing freely moving proton antennas are structured by interaction with discrete photo/phonon frequencies. Solitons (polarons) are longitudinal waves formed by electrons coated with phonons (quasi-particles), that promote coherent vibrations of cell components (middle right) and interact with poly-peptide chains to guide the process of 3-D folding to functional proteins (right below). In biological evolution, first life proto-cells are informed by discrete EMF waves that are generated by metal-doped phyllo-silicates (clay materials) that function as semi-conducting wave transmitters and can catalyze polymerization of nucleotides to primary RNA/DNA. DNA spatial structure with its nucleo-bases is depicted on the left below and its formation and dynamic constitution is guided by specific magnetic monopoles energies (see left part of figure). DNA exhibits a specific vibration pattern that is instrumental in cellular function and forming of a life-memory information store, that in a holographic manner steers the holonomic cell as well as intercellular communication.*

For our analytical analysis about 750 different Chern numbers have been considered, as calculated by Grama et al. (2017), Kotschick and Terzic (2008); Kotschick and Thung (2020) and showed that when all the calculated numbers are divided by 2^n (n is an integer) topological normalized invariants or called space-time dimensions can be derived, thatare positioned in a scale between the values of 1 and 2, see appendix 1. The distribution of the coherent energy distribution has a semi-harmonic behavior and a schematic pattern of Chern numbers can be depicted in a picture of cell decompositions, that shows 12 topological numbers, that precisely fit with the derived coherent 12 eigenmodes. Just in between the 12 coherent eigenmodes (green lines and green bands) one finds areas that are described as disordered or chaotic modes (black lines

and red bands, see figure 12.

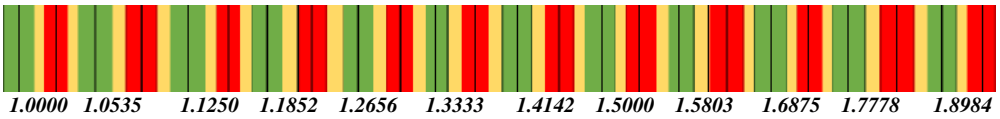


Figure 12: *A cell-like decomposition of the proposed acoustic algorithm into scalar field spaces of finite points and intervals; the schematic pattern of Chern numbers or 12-alternating ordered coherent eigenmodes (green fibers and bands), 12 disordered (chaotic) modes (red fibres and bands) and 12 transition zones (yellow bands). All higher or lower scalars can be calculated by multiplying or dividing by 2^n, called the 13^{th} scalar, of which n is an integer.*

The same principle of combined order and disorder has been found for the so-called soliton waves. An experimental protocol for the creation of rings of light (ordered) and dark (disordered) solitons using the toroidal self-interference, has earlier been shown by us (Geesink, 2020b). Self-interference of a single Bose–Einstein condensate has been demonstrated on a connected geometry, in which the experimental protocol shows the creation of ring dark solitonsusing the toroidal self-interference (Toikka, 2014).

The proposed model seems a deterministic model and corresponds to the ideas and concept of: 1) the idea of Einstein that quantum randomness is not the determinant of the fabric of reality, 2) the conclusion of Schrödinger that living cells require external quantum information for their development and ecological survival, 3) the proposal of Fröhlich that living cells make use of constructive interference through so called acoustic solitons, that can be described by Bose- Einstein-statistics, 3) the theory of Louis de Broglie, 4) the theory of David Bohm, 1952. The Bohmian interpretation of quantum mechanics was introduced in 1952, and later called the ontological interpretation, seen as an alternative to the standard Copenhagen interpretation. Bohmproposed an interpretation of quantum mechanics that is nonlocal, causal, and does not treat systems and measuring apparatus differently. The de Broglie–Bohm theory, in fact is an interpretation of non-relativistic quantum theory that postulates an actual configuration, that exists even when unobserved. Bohm's Quantum Equilibrium has a typical determinate type of entangled configuration, of which the frequencies of the eigenvalues can be mathematically described by theproposed equation of coherence (Bohm, 1952, 1986, 1987).

De Broglie pointed at the harmony of phases in which a particle vibration stays in phase with the guiding wave and maintains a state of resonance in which the particle exhibits an interaction with the underlying stochastic sub-quantum realm. According to contemporary physics, the universe is made up of matter fields, whose quanta are fermions and force fields whose quanta are bosons. All these fields have "zero-point energy" (Milonni, 1994). The proposed generalized model of toroidal organized quantum information supports the notion that the current 2D Standard Model and 2D modalities of String Theory could benefit from introducing 3D toroidal geometry calculated by normalized Chern numbers and to anchor both theories at the proposed quantum toroidal invariant length and twelve fundamental invariant length and frequencies.

5. Observations that Revealed the Acoustic Quantum Code

A spectrum of about 2500 different physical and bio-physical experimentally measured and published

data, in the period 1996 till 2023, comply with the equations of coherence and decoherence. The following meta-analyses have been made by us to substantiate the proposed Quantum Model, revealing the Acoustic Quantum Code of Resonant Coherence in whole nature from micro- to macro-scales. Discrete coherent frequencies, often alternated by decoherent quantum energy frequencies, were consistently found by us in the studied animate and non-animate Systems, as listed below, see also the figures 13:

1) ***Life conditions affected by EMF exposure***: A meta-analysis of over 800 biomedical publications, from 1970 till 2021, showing beneficial or detrimental biological effects as caused by external non-thermal EMF frequencies from Hz till THz. (410 data, Geesink and Meijer, 2016, as reviewed in Meijer and Geesink, 2019, Geesink and Meijer, 2019).

2) ***The Band-like distribution of discrete EMF frequencies*** can algorithmically be described by a 12 tone musical scale as basically proposed by Pythagoras and later expressed by geometry of the Tonnetz torus, implying Phonon (sound) mediated processes, (Meijer and Geesink, 2015).

3) ***EMF frequencies of the GM-scale that promote Entanglement*** **in Einstein Podolsky Rosen experiments**: Meta-analyses of the EPR-experiments learned that entanglement, achieved in such studies is real, and the applied EMF frequencies are located at discrete frequencies revealing a coherent distribution pattern, (84 data in 50 publications (Geesink and Meijer, 2018).

4) ***Superconductor Energy Gaps***: Meta-analysis of superconductor literature showed that the particular wave frequency patterns in superconducting materials have discrete coherent frequency bands and can be described by the proposed quantum equation of coherence (160 data, 76 publications, Geesink and Meijer, 2019a**).**

5) ***EMF frequencies of Phyllo-silicates, clay materials****:* Meta-analysis of radiated EMF frequencies after energizing various clay materials, showed a distinct frequency pattern fitting the proposed acoustic quantum code of resonant coherent (45 data, Geesink and Meijer, 2020b).

6) ***EMF frequencies that either inhibit or promote Cancer*****:** Meta-analysis of shows a distinct EMF frequency pattern, fully compatible with the proposed acoustic quantum code (100 data from 123 studies, Geesink and Meijer, 2017a).

7) ***EMF-Frequencies of Water****.* Meta-analysis of semi-harmonic frequency patterns found in purified water are very similar to those found in intact biological systems: frequencies of pure water show that 192 subsequent first and second derivatives of spectral frequency curves of water–molecules and can be precisely positioned at the pattern of coherent Eigen-frequencies of the quantum code with an error of 0.45% (700 data**,** Geesink, Jerman and Meijer, 2020).

8) ***Frequencies of Bose Einstein condensates***: Many independent experiments related to energy distributions of Bose Einstein Condensates show a distinct semi-harmonic distribution of energies (78 data in 26 publications, Geesink, 2020b).

9) ***Frequencies for Quantum*** **Hall effects**: A meta-analysis of experimentally found fractional quantum Hall effects learns that the different energy Landau levels are ordered according but to the harmonic function as proposed by the AQCRC wave pattern (57 data in 21 publications, Geesink, 2021b).

10) ***Frequencies for Mass/Energies of Boson Elementary Particles*****:** Support for an ontological basis of the Standard Model was found and indicates a coherent quantum wave equation for subatomic particles (40 data in 21 publications, Meijer and Geesink, 2022).

11) ***Frequencies of Zero-point Energy Oscillations***: Zero-point measurements and calculations related to Rabi frequencies, Lamb shifts, as well as vibrational energies of molecules, including hydrogen, substantiated a discrete quantum wave distribution of the zero-point energy field as calculated by the acoustic quantum code of resonant coherence. (49 data in 13 publications, (Geesink, 2021d and Meijer et al., 2020).

12) ***Frequency values for Gravity waves****:* Meta-analysis of as recently reported Gravitational waves revealed a clear frequency distribution pattern, confirming the proposed Acoustic Quantum Code (140 data from 12 studies, Geesink, 2022).

13) ***Frequency values for Oscillations in Brain Neuronal Microtubules in vitro:*** Meta-analysis of the recently published frequency values for microtubule of brain tissue studies, as performed in various groups, shows a striking congruence with the pattern of the acoustic quantum code (52 frequencies from 8 different studies (Geesink and Schmieke, 2022).

14**)** ***Frequencies of Spatio-temporal EEG peaks in Brains of Healthy Individuals and Mental Disorder Patients*** showed a remarkable fit with 150 data of the discrete coherent frequency pattern of the acoustic quantum code, with decreased coherent values in mental disorder patient (Geesink, 2023, Meijer, 2023).

15) ***Infrared Signal Technology Improves Healthy Conditions in Brain and of Other Tissues****,* meta-analysis of EMF frequencies used in clinical practice are compatible with the coherent frequencies of the AQCRC pattern (Geesink, 2023).

16) ***Chern-Invariant Metrics derived from Patterns of Phonon Topology***, meta-analysis of reported Chern numbers in literature reveal a series of subdivision (decomposition) values of the Chern numbers between 1 and 2, that is identical the AQCRC frequency values between 1-2 Hz, indicating a scale-invariant set of ground numbers in nature. (Geesink, 2022; Meijer, 2022).

17) ***Quantum Energy States of Monopoles are Described by a Generalized Wave Function*****,** literature meta-analysis of potential monopole energies exhibited a distribution pattern that is compatible with the values of the AQCRC (Geesink, 2023).

18) ***Frequencies of the Solar system, Solar cells, Semiconductors and Photosynthesis****,* revealed a striking fit with the EMF frequency pattern of the AQCRC, indicating a cosmological context of the EMF photon frequency pattern (Geesink, 2023).

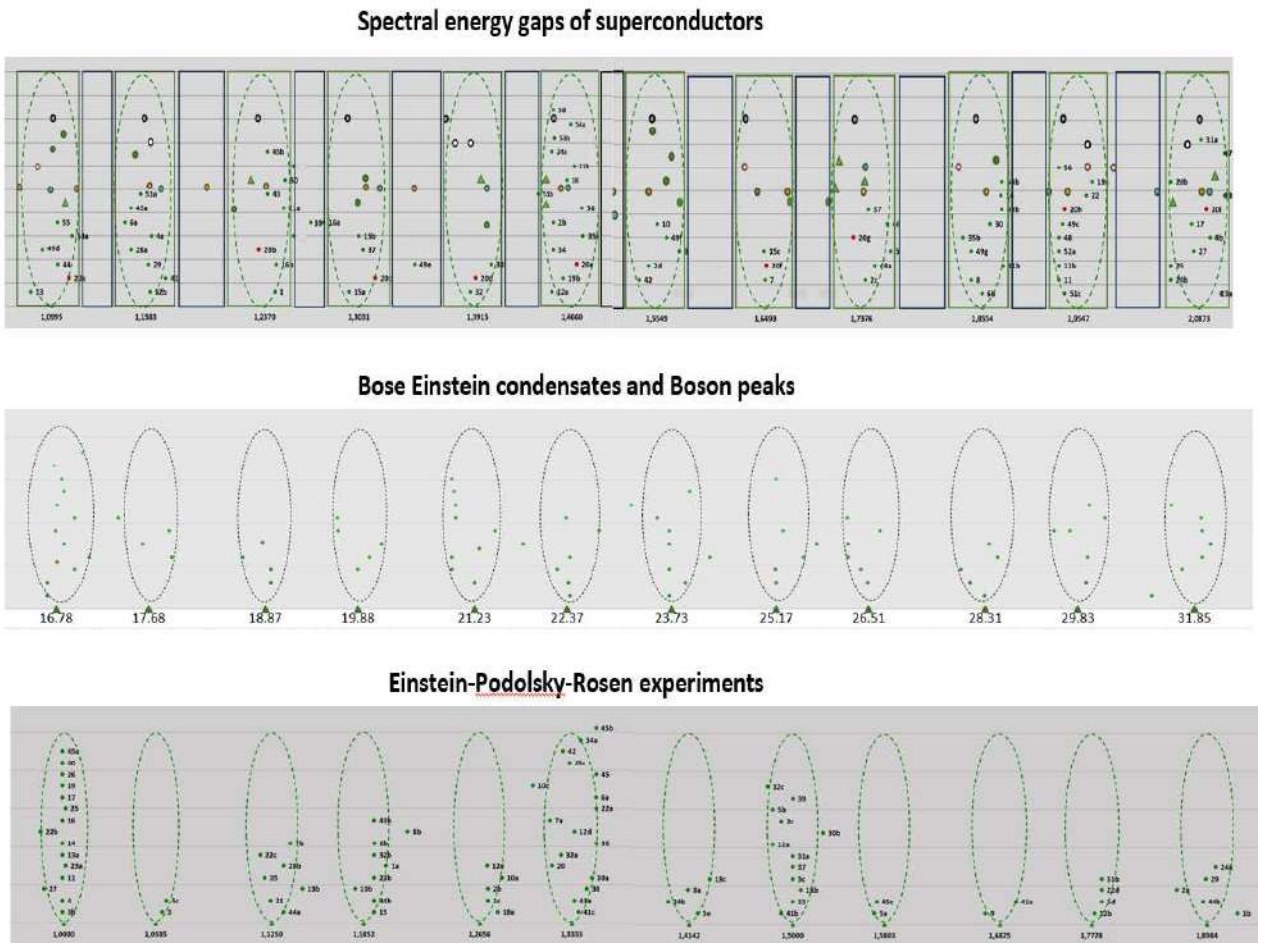
19) ***Frequencies of Energy Fluctuations at the Planck Scale*****:** analysis of data on discrete energy distribution as related to black-body radiation, showed an alternating pattern of coherent and decoherent values, being fully compatible with our Acoustic quantum code, (Geesink, 2023; Meijer, 2023), and in the present paper.

It was inferred that this semi-harmonic frequency pattern is crucial for life processes, brain function and consciousness, through an all-pervading information domain that is seen as primordial, preceding the Big Bang in a cyclic modality of the universe. This assumed information domain stems from a musical/acoustic quantum code that steers via condensed Bosons from a 5-Dimensional manifold (see theory of Wong et al, 2020), and becomes operative by symmetry breaking to the 4-D world.

These precursors of wave activity express themselves in Higgs bosons and magnetic monopoles, that steer life conditions in proteins and DNA and create superconductive properties in cells (Meijer and Wong, 2022). Similar patterns of frequency bands are found in human brain (neuronal microtubules, see Bandyopadhyay,

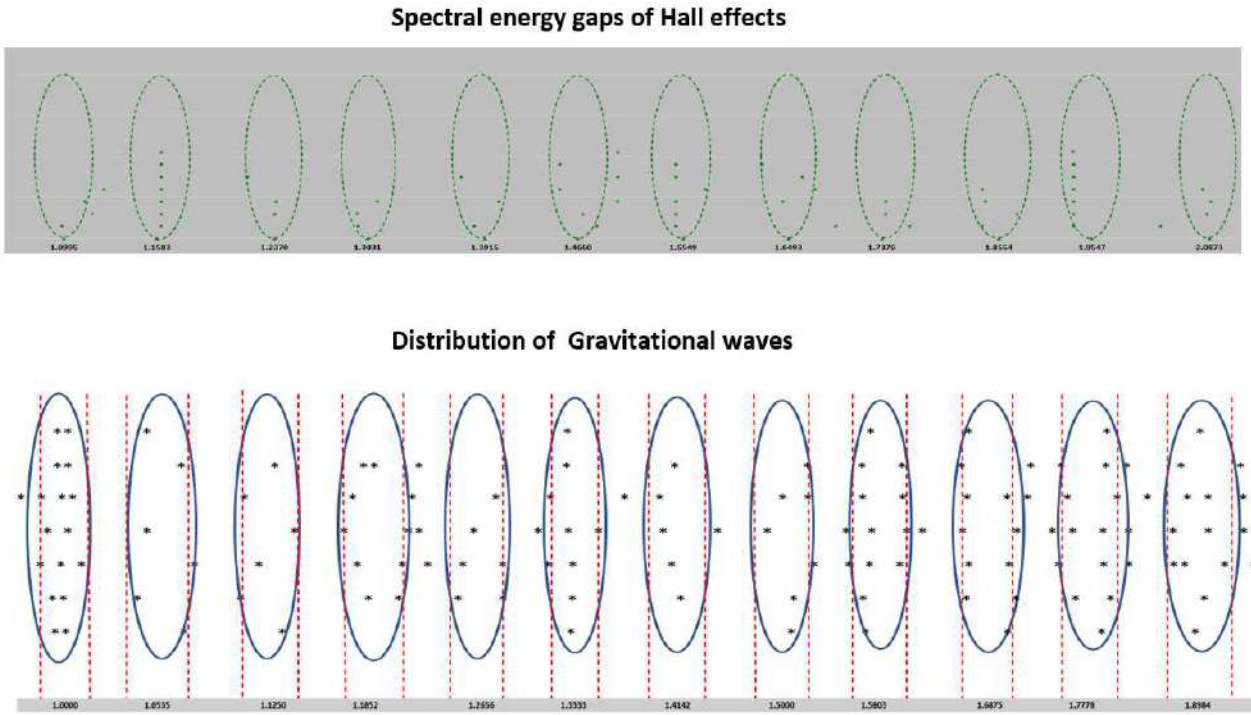
2020) that may communicate with gravitational energies at the Planck scale (Orch-OR theory) and similar discrete oscillations are also present in the ZPE field that may be instrumental in generation of scale invariant consciousness (Meijer, 2017, Meijer, 2023). In the cellular organization and “electrome” function (Fig. 2 and 14), structured layers of water molecules play an essential role in guiding processes as 3D protein folding, reading of DNA template features by imprinting and also as a cosmic conduit as dedicated structures of water and silicate components (Meijer et al., 2020).

Physical distributions of EMF frequency patterns



1.0000, 1.0535, 1.1250, 1.1852, 1.2656, 1.3333, 1.4142, 1.5000, 1.5803, 1.6875, 1.7778, 1.8984

Figures 13.1



Figures 13.2.

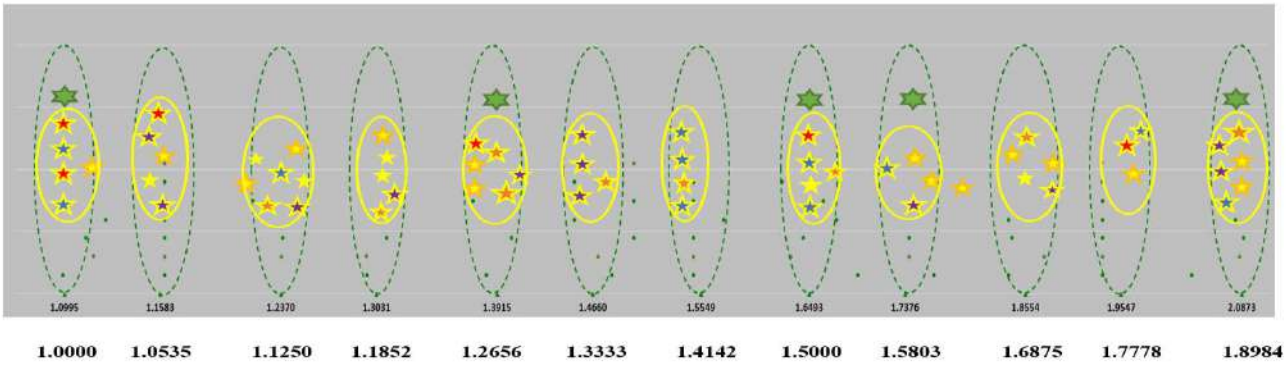


Figure 13.3

Figures 13.1, 13.2*: Selected, earlier reported, distribution patterns of EMF frequencies as revealed by meta-analysis of very different, yet related, physical phenomena (Geesink and Meijer, 2018) that all can be accommodated by a series of the ground-numbers of the equation of coherence (in red), indicating that a universal acoustic quantum code is guiding the cosmos on a very small scale), intermediate scale (superconductor materials), to very large (cosmological oscillations such as Gravity waves). The 7 different EMF- sets in the figure above, each have different EMF ranges (from Hz to GHz) but, according to application of* octave hierarchy, or called *fractal harmonics, these values can simply be related to each other and finally to an octave range of 12 scalars, (here depicted as a series of ground-numbers (red numbers above), by dividing through* 2^n*, (n is an integer), according to harmonic principles. The same patten has been shown for*

conformational energies and frequency states of living cells and molecules, such as EEG/MEG/fMRI-patterns, that are characteristic for cell building, homeostasis, versus decay and apoptosis. ***Fig 13.3****: The revealed pattern of the 12 mathematical calculated scalars can also be expressed as normalized Chern numbers, See Meijer and Geesink, 2022; Geesink, 2022f.*

5. The Modeling of Consciousness

5.1. Introduction

Influences on thinking, originating from information from outside, that influence individual consciousness, are reflected in ancient ideas such as temptation by the devil as opposed to divine inspiration, were often related to the predominant role of the gods in affecting our motives and actions. The idea of internal (unconscious) processes in the human mind was, in fact, present in antiquity, and has been considered across a wide variety of cultures. Hidden aspects of mental life, were, for example, referred to between 2,500 and 600 BC in the Hindu and Egyptian scriptures. Clear indications of such "pan-psychic" doctrines were evident already in early Greek thought. One of the first Presocratic philosophers in ancient Greece, was Thales (c. 624–545 BCE), who employed an analogical argumentation for the attribution of mind that tends towards, what we call, panpsychism today.

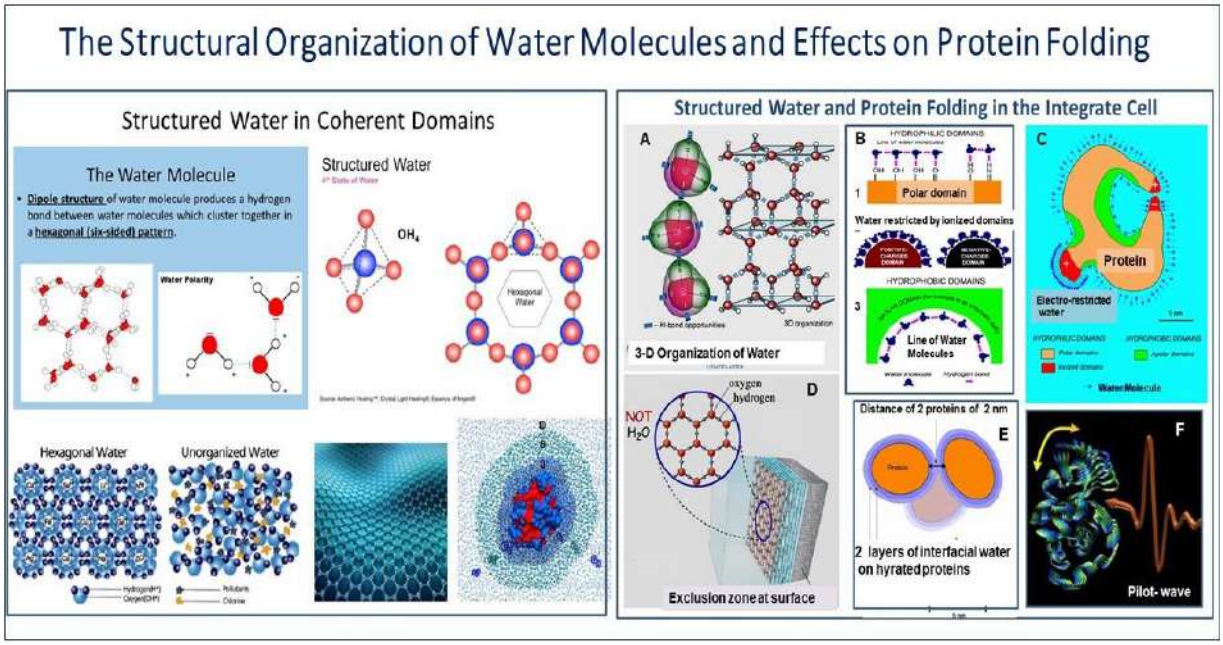


Figure 14: *The essential role of dipole Water molecules, organized in hexagonally structured domains, that are associated in exclusion zones of interfacial layers of at the surface of cellular macromolecules such as proteins, and thereby guide the functional 3D conformation of intra-cellular proteins*

In this framework, Christof Koch more recently considered the so called "integrated information theory" in consciousness studies. The ultimate consequence of this concept holds that consciousness might be a property of all living matter, not just human brains. Common to panpsychism, in its various historical guises, is the believe that psyche is in everything (pan) or is ubiquitous, not only in humans, animals and

plants, but present all the way down to the constituents of matter, such as molecules, atoms, force fields, string modalities, among others. Panpsychism assumes that any physical entity either is conscious itself, or is made from conscious parts, or rather forms part of a greater conscious whole (Melloni, 2021).

In biological evolution, our type of brain emerged in a relatively short period of time, bearing features of awareness, consciousness and especially our self-consciousness, enabling humans to have self-reflection and predictive capabilities. Our personal biography memorizes our education, our attachment to family and friends, to cultural tradition, and the identification with our habitat and country. Having consciousness is not always a blessing: fear for our life and the expectation of death, sometimes destructive ambitions, being greedy, envious, all that makes up, and is a product of our consciousness. That self-consciousness is the "me", the inner core, by some experienced as the higher self: it seems to reveal our consciousness as indivisible (Krishnamurti, 1974).

Linde's theory of consciousness suggests that, in a comprehensive physical theory of the Universe, space-time, matter and consciousness will all become ontologically equal partners in a single overriding physical reality in a multidimensional hyperspace. Consciousness may have its own space–time system and its own system of ontologically independent and spatiotemporally organized events (sensations and images) that have as much right to be called 'material', as is the case for protons and electrons. A central item in brain research is the question whether consciousness should be conceived solely as an emergent phenomenon, as related to the extreme neurological complexity of the brain or rather that the central nervous system is embedded in a much wider context in which it also receives (quantum) wave information, partly unrelated to the known senses.

According to Harald Atmanspacher's "dual-aspect" approaches consider the mental and physical domains of reality as manifestations of an underlying undivided reality, in which the mental and the physical do not exist as separate domains (Atmanspacher,2017). Filk, writes that quantum entanglement, being "a particular type of acausal quantum correlation", was plausibly taken by Pauli as "a model for the relationship between mind and matter"(Filk, 2014). Thomas Nagel (1979), proposed that a set of reasonable assumptions in philosophy in fact imply panpsychism, the view that the basic elements of matter ("physical ultimates") have mental properties. The central concept is that information, apart from matter and energy is a fundamental building block of the world, that inherently has both a phenomenal and a physical aspect. The Bohm theory implied that a photon and an electron are always particles and waves at the same time. More precisely, he assumed that every particle has a well-defined position and momentum, since it accompanied by a "pilot wave" that originates from an implicate order, an informational type of field, described by the wave function ψ, that satisfies the Schrödinger equation (Pylkkänen, 2020). Mathematical models for consciousness have been proposed, aiming at the description of conscious experience and its relation to the physical domain. Whereas the axioms and metaphysical ideas of such theories have been carefully motivated, their mathematical formalism has yet to be definitely formulated. A general mathematical framework for models of consciousness that can be employed as a general approach, has been provided through a theory-building process (Kleiner, 2020).

5.2. Earlier considerations on consciousness

Consciousness is the quality of state that not only enables awareness of external objects but also the perception of thoughts within us. It has been defined as: subjectivity, awareness, sentience, the ability to experience or to feel, wakefulness, and having a sense of selfhood and executive control of the mind.

Despite the many difficulties in such definitions, many philosophers believe that there is a broadly shared underlying intuition about what consciousness really is (Jaynes, 1976). The unconscious mind (or the unconscious part of brain) consists of mental processes that occur automatically and are not available to introspection. Although these processes exist beneath the surface of conscious awareness, they are thought to exert an effect on conscious thought processes and behavior. Empirical evidence suggests that unconscious phenomena include repressed feelings and desires, memories, automatic skills, subliminal perceptions, and automatic reactions. The term unconscious was coined by the 18th-century German Romantic philosopher Friedrich Schelling and later introduced into English by the poët and essayist Samuel Taylor Coleridge.

Jung considered that the unconscious is a determinant of personality and proposed that the unconscious can be divided into two layers: the personal unconscious and the collective unconscious. The personal unconscious is a reservoir of information that was once conscious but has been forgotten or suppressed. The collective unconscious, however, is the deepest level of the psyche, containing the accumulation of inherited psychic structures and archetypal experiences. Archetypes are so-called energy centers or psychological symbols that are apparent in culture as eternal representations. The collective unconscious is therefore said to be inherited and contains information on an entire species, rather than only of an individual. The collective unconscious is therefore, according to Jung, "[the] whole spiritual heritage of mankind's evolution, born anew in the brain structure of every individual". One of Jung's main psychological focuses was on understanding human personality. He believed that the unconscious mind contained archetypes that were universal across all cultures and time periods (Jung, 2000).

In many philosophies, the conscious mind is a separate entity, existing in a parallel and hidden realm not yet described by physical law. Some scientists propose that there might be an intrinsic relation between consciousness and the world of quantum physics. Parallels between quantum mechanics of wave/particle and mind/body dualism were first drawn by the founders of quantum mechanics including Erwin Schrödinger, Werner Heisenberg, Wolfgang Pauli, Niels Bohr, and Eugene Wigner. Later it has been discussed in the framework of conscious energy as being coupled to a vacuum or aether, nowadays defined as a quantum superfluid. Quantum physicist David Bohm believed that the universe is holographic in nature and that there is an undivided wholeness of all things, realizing that each part of a hologram contains all the information of the whole picture. In his view it is useless to think in terms of separate particles since they are like little whirlpools in a dynamic river, without knowing where the whirlpool started and the river will end. Bohm, therefore, postulated that consciousness is not only present in animate life forms but also in inanimate matter, since matter, energy and information are equivalent and inter-convertible, and generate space, time and consciousness as strictly interrelated aspects (see also Meijer, 2012,2013).

Mind and soul (psyche) are two concepts that seem to be closely related yet are distinct from one another. By some the mind is considered as the inner core of a human being, but originating in the brain, whereas the soul is considered to be the eternal spiritual nature of humans and collectively seen as the universal consciousness of humankind. The individual soul is the incorporated essence of each human, and it is thought to be separable from the body at bodily death. In life, the mind is credited with the faculties of thought, action, and emotion and the faculty of thinking, reasoning, and applying knowledge. It is human consciousness that emerges in the brain and is manifested through man’s thoughts, actions, emotion, free will, memory, and imagination. Emotions, like desire, may thus stem both from our souls and our mind (information states of living beings). Religions consider the soul to be man’s divine or God-given essence. It

is considered that the soul as the essence of the individual not only may guide man's behavior, but also represents the essence of the eternal part of our being.
(http://www.differencebetween.net/language/difference-between-mind-and-soul/).

5.3. Modern Concepts on Awareness and Consciousness

It was, more recently, considered that the subjective awareness of consciousness, related to the so-called 'hard problem' of consciousness (Steel, 2021), can be understood by realizing that the whole neurological systems, including our brain with its neuro-humoral and genetic system, is embedded in a 3D, or even, 4D spatio-spectral quantum dynamic field. This implies that living organisms can process 4D spatio-spectral quantum information. Here the term 4D indicates an extra spatial dimension and does not refer to time. In our Quantum Code model, the fractal (nested) geometry of the torus takes a central position in modeling brainphysiology, as was also put forward by Tozzi et al. (2015, 2016, 2017). The toroidal generation of quasi-wave/particles such as polaritons and polarons, in which bosons, fermions such as electrons and protons are guided by associated quanta (phonons) or light quanta (photons), may represent a global and crucial aspect of information transition and integration and in this manner bridges electromagnetic and neural information processing. It has been suggested that brain functions such as mind-wandering and memory retrieval could be explained by the functional occurrence of such imperceptible spatial 4D dimensions (Peters, 2017).

Tozzi and Peters (2017), also proposed that conscious moments in brain function are correlated with specific trajectory state in a "Clifford torus" structure. In this framework it has been proposed that features of EEG brain signals with spectral peaks in preferred bands (alpha, beta gamma EEG waves) originate from such feature vectors in a 4D Euclidean space. One example of such a recurrent toroidal type of brain activity, might be found in the periodically repeating pattern of so-called grid cells in the brain. These patterns have been related to a supposed toroidal architecture of brain wave attractors (McNaughton et al., 2006). Dynamic coupling of brain attractors with ZPE field oscillation modes has been proposed as a universal mechanism underlying the generation of conscious states (Keppler, 2016, Sbitnev, 2016b, c). The latter is based on stable attractor dynamics by which the ZPE field/Superfluid-Quantum Space, in fact, becomes a substrate of consciousness. Inthis framework, the brain, as a resonant oscillator, extracts or rather filters a wide variety of phenomenal nuances from an all-pervasive stochastic radiation field in the form of phase-locked ZPE wave information states, that are supposedly linked to the creation of corresponding conscious states.

So, it seems that the functional properties of molecules should not only be inferred from properties of their constituent atoms alone, but also rely on phonon and/or photon mediated information that couple them to their workspace surroundings. In this respect, an ZPE stochastic electrodynamic field, as postulated by Laszlo, 2007, and Keppler, 2016, should be seen as the crucial "steering" modality that mutually communicates with thewhole nervous system of the organism, including its neuronal networks with their conscious and non-conscious aspects. Meijer et al. (2020) proposed the use of nested toroidal geometry for describing self-referential information flow and added the aspect of an extra 4-D spatial dimension of universe to arrive at a field-receptive mental memory workspace, a concept by which mind/matter aspects can be integrated in the consciousness framework. The importance of the concept of the universe as a cosmic hologram has been reviewed earlier in a study of Currivan, 2017, and is related to a fractal 5-D holo-fractal structure as proposed by Linden, 2009. The brain supervening workspace, proposed by Meijer and Geesink, 2017, was framed as a holographic "event horizon" information register, that is equipped to

monitor and update the waves of our brain by conversion of integrated wave energies into attractor type/standing waves. The latter were conceived as activities that guide the related cortical template to a higher coordination of reflection and action as well as to promote neural network synchronicity, as required for conscious states.

The universal quantum energy field can, therefore, can also be envisioned as a hologram (for theory see, Susskind, 2016 and 't Hooft, 2010), that permeates everything in the universe. It is considered by the earlier mentioned physicist and systems theorist Laszlo as a universal information field (Laszlo, 2007, 2012). This implies that we are in fact permanently connected to and embedded in a general energetic information field, which penetrates all animate and non-animate material (Meijer and Geesink, 2017, 2022) caused by a combined field composed of discrete coherent and decoherent frequencies. The toroidal event horizon workspace as a permanently updated memory register, associated with but not being reducible to the brain, can be instrumental in the earlier mentioned brain to brain communication, extra-sensory Psi phenomena such as clairvoyance, reported life panoramas in Near-Death Experiences (NDE) and potential survival of consciousness after bodily death. Such aspects were treated by many philosophers and mystics in the past and present. According to Kant, space appears as the *Vorstellungsform* (manner of imagination) of the executive function which means that we imagine our intentions in relation to the outside reality in the form of space. Time is the principle of order for the perceiving function and matter and connected with space in the form of laws and corresponds to the rational function of consciousness. In this analogy we derive the structure of outer space which is divided in time, space and matter from the space of consciousness.

Sieb, 2016, proposed that space-time intervals are the fundamental components of conscious experience, involving gravity, in his “theory of everything”. Such a type of reality exhibits a general covariance (independent of coordinate systems and scale invariant), a physical constant that encompasses all frames of reference. There are three basic types of space-time intervals (light-like, time-like, space-like) which interact to create space-time and its properties. Human conscious experience is a four-dimensional space-time continuum, created through the processing of space-time intervals by the brain and thus, space-time intervals are the source of conscious experience. The general covariance of space-time intervals is related to quantum mechanics, and space-time intervals are seen as the source of quantum gravity. The general covariance of space-time intervals seamlessly merges with general relativity and quantum field theory. The Minkowski-type of metric, which defines generally covariant space-time intervals, may be considered an axiom that provides the supposed “Theory of Everything” (Sieb, 2016, 2017; 2018, see also Meijer et al., 2020; Meijer, 2024).

In the present paper it is also proposed that quantum entangled life conditions and graded states of consciousness in the universe are scale invariant and are guided by a quantum wave meta-language in a superfluid quantumspace/zero-point energy field, that is instrumental in creating quantum coherent states through pilot wave resonant connectivity. This interacting dynamic EM field, in the steering of life processes operates through the semi-harmonic tuning of fractally structured water and vibrating macro-molecules such as in our genome, DNA, hydrated proteins in the cell, including the different cell types in the human brain (see figures 14 and 15). Our brain and neurons thus are not “stand alone” information processing units: they act as a central part of our integral nervous system with recurrent information exchange with the entire organism and the cosmos. The brain is conceived to be embedded in a holographic structured field that interacts with resonant sensitive structures in the various cell types in our

body. It can integrate discrete patterns of eigen-frequencies of waves, thereby continuously updating a time-symmetric global memory space of the individual. Its toroidal organization allows the coupling of gravitational, dark energy, and zero-point energy fields (ZPE), as well as earth magnetic field energies. This holographic receiver and dedicated antenna transmits wave information into the neurological system and brain tissue, that thereby is instrumental in conscious and sub-conscious information processing. It is proposed that the supposed field-receptive workspace, in a mutual interaction with the whole nervous system, generates self-consciousness and is conceived as operating from a 4th spatial dimension (hyper-sphere). Its functional structure is adequately defined by the geometry of nested torii and a monopole field, that is envisioned as a basic unit (operator) of space-time and can be described by basic harmonic algorithm (Meijer and Geesink, 2017).

Summarized: Human conscious experience is positioned in a four-dimensional space-time continuum, created through the processing of space-time intervals as experienced by the brain and our entire neurological system. According to Sieb, space-time intervals are the source of conscious experience. Our concept of space-time that bears discrete harmonic oscillations, provides a typical calculable metric, that is based upon a combination of twelve fundamental invariant numbers, with a fractal character, as EMF energies ranging from Hz to GHz values, providing a guiding background field of reality (Geesink, 2022b).

5.4. Present State of Art of Consciousness Studies

We have earlier proposed that the brain is equipped with an integral workspace for overall quality control and error correction that functionally depends on a coherent photon/phonon mediated information transmission. This was proposed since it is unlikely that the normal neurotransmission mechanisms are rapid enough to explain the ultra-fast retrieval of memory elements and almost instantaneous recruitment of information from widely separated parts of the brain (the socalled binding problem). As an alternative, the active involvement of photons/phonons was proposed rendering a versatile communication system that presents multiple orders of magnitude higher transmission rates. It can be speculated that (self)-consciousness is largely dependent on the degree of coherence of total brain information (see Geesink 2022d; Meijer, 2023) and that it requires some sort of rapid broadcasting/synchronization function to bind the several brain structures essential for conscious states. The integral memory workspace is supposed to enable effective prediction coding though algorithmic simulation of both past and future conditions, in a reversed time and time-forward manner. This concept seems very well compatible with the recently proposed state of “total simultaneity” as proposed for consciousness by De Wilde, 2016. The holographic event horizon workspace, thereby, generates an updated “reference of reference” for quality control of sensory-evoked brain representations.

A field-like quantum organization was proposed also by several authors (Amoroso, 2016; 2018; Sarfatti, 2022 McFadden, 2020, Hameroff and Penrose, 2014, Meijer et al., 2020, and Sbitnev, 2016; 2024, and see Table 3). We have earlier identified a potential mechanism for long-range communication by acoustic like phonons in brain, as well as in the communication in relation with environment and information force fields such as zero-point energy field (see Meijer, 2019; 2020, see also Keppler, 2018). Receiving of external wave information in brain may be based on wave energy reception by hydronium-type of proton antennae in brain water compartments, in which electron/phonon (polaron quasi-particles) were supposed to represent the information carriers (Meijer and Ivaldi, 2022).

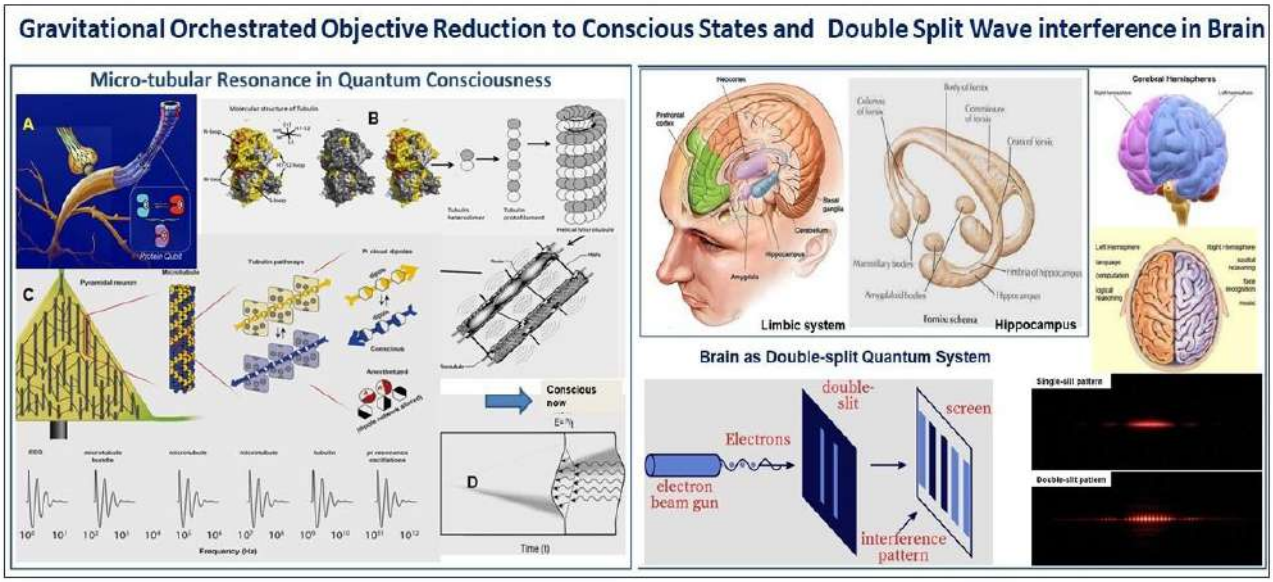


Figure 15: *Left: Neuronal microtubule showing a spiral organization of layered tubulin isomeric molecules(a) that can propagate quantum waves of various frequencies and can resonate with quantum waves at the Planck scale. D: Gravity mediated superposition of tubular and Planck scale oscillation generates conscious states in a process called "Objective Orchestrated Wave reduction", by Hameroff and Penrose, 2014; Right: The two hemispheres of the brain with central hippocampus structure can be conceived as a double split quantum interference system that can generate coherent and decoherent wave reduction (Sbitnev, 2016), as an alternative to the Orch OR hypothesis.*

Table 3: Innovative Approaches in the Study of Consciousness, 2015-2023

Amoroso, 2016	Unified Field Mechanics & Applications, Objective Character of Experience
Amoroso, 2018	Redshift CBR as Intrinsic Blackbody Cavity-QED Dynamics
Atmanspacher, 2022	Dual-Aspect Monism and the Deep Structure of Meaning
Bandyopadhyay, 2020	Interview with Hunt: Resonance Chains and New Models of the Neuron
Beichler, 2022	Brainworks: The Emergence of Consciousness in Brain, Body and Consciousness
Bond, 2022	Coherence Field Theory: Quantum coherence as the basis for a model of brain function
Cavaglia et al., 2023	Towards a Holographic Brain Paradigm: a Lipid Centric Model of Brain Functioning
Close and Neppe, 2020	The Neppe-Close Triadic Dimensional Vortices Paradigm
De Wilde, 2016	Total Consciousness in Total Simultaneity, the Consciousness Connection
De Haan, 2021	Singularity and Consciousness: A Neuropsychological Contribution
Feinberg, Mallatt, 2020	Phenomenal Consciousness and Emergence: Eliminating the Explanatory Gap
Edwards, 2023	Modern Monads: Leibniz, Continuity and the Stream of Consciousness
Fedi, 2019	Higgs, Dark Sector and the Vacuum: From Bosons to Massive Particles via Doped Vacuum
Fingelkurz et al., 2017	in: Tozzi et al., Topodynamics of the Metastable Brain
Fisher, 2016:	in: Weingarten et al., A New Spin on Neural Processing: Quantum Cognition
Funk, 2022:	Understanding the Feedback Loops between Energy, Matter and Life
Georgiev, 2020:	Quantum Information Theoretic Approach to the Mind-Brain Problem
Geffen, Braun, 2023	Effects of Geometric Sound on Human Physiology and Physical Matter
Hameroff, 2022	Consciousness, Cognition and Neuronal Cytoskeleton. A New Paradigm
Haramein et al, 2013	The Unified Space memory Network: From Cosmogenesis to Consciousness
Hardy, 2023	Synchronicities & Nonlocallity How our Hyperdimensional Self Tinkers with Spacetime
Hardy, 2015:	A Systemic and Hyperdimensional Model of a Conscious Cosmos
Ho et al., 2015	Is Spacetime Fractal and Quantum Coherent in the Golden Mean?
Hoffman, 2015:	The Interface Theory of Perception
Hosseini, 2021	Brain to Brain communication and role of electromagnetic fields

Hunt and Schooler, 2019	Easy Part of the Hard Problem: a Resonance Theory of Consciousness
Irwin, 2020:	A New Approach to the Hard Problem of Consciousness: a Quasi-crystalline Language
Kastrup, 2017	Making Sense of the Mental Universe
Keppler, 2020	Common Basis of Memory and Consciousness, Omnipresent Background Field
Kyoung-il, 2021	From IN-Out Duality to Quantum Social Mechanisms
Lahav, Neemeh	A Relativistic Theory of Consciousness
Macken,2023	A Single Field Model of the Universe
Mashour et al., 2020	Conscious Processing and the Global Neuronal Workspace Hypothesis
McFadden, 2020	Integration Information in the Brain EM Field: the Field Theory of Consciousness
Mocombe, 2023	Consciousness Field Theory: A Critical Review
Meijer et al., 2020	Scale-invariant Acoustic Information Code in a Superfluid Quantum Space Guides Mental
Meijer, 2023	Concept of Integral Holographic Consciousness: Predictive Coding and Phi-Based Harm**.**
Messori, 2011	Cells, Neurons and Qualia, The Holographic Strange Attractor Model
Miller and Torday, 2018	Four Domains: The Fundamental Unicell and Post-Darwin in Cognition based Evolution
Miller, 2023	A Scale-free Universal Relation Information Matrix Reconciles Information Problem
Nishiyama, 2024	Holographic Brain Theory: Super-radiance, Memory Capacity and Control theory
Persinger et al., 2015	Physical Basis to Consciousness: Implications of Convergent Quantifications
Pollard–Wright, 2023	The Feelings of Knowing. Fundamental Interoceptive Patterns Connecting Consciousness
Poznanski, 2019	Theorizing How the Brain Encodes Consciousness Based on Negentropic Entanglement
Sarfatti, 2020	Solving the Hard Problem Mind-Matter Conscious AI
Savelev et al., 2020	How the Biofield is Created by DNA Resonance
Sbitnev, 2024	The Edge of Chaos Is that where Consciousness Manifests through Intermittent Dynamics
Sett, Bayne, 2022	Theories of Consciouness
Sigawi et al.,	The Constrained Disorder Principle May account for Consciousness
Signorelli, Meling	Towards a New Concept for a Biological Neuroscience of Consciousness
Singh et al., 2020	A Self-operating Time Crystal Model of Human Brain
Singh et al., 2018	DNA as an Electromagnetic Fractal Cavity Resonator: Its Universal sensing
Solms, 2019	The Hard Problem of Consciousness and the Free Energy Principle
Steel, 2021	Modeling aspects of consciousness, a topological perspective
Tate, 2022	Spirituality, Theoretical Physics and the Consciousness of the Universe
Tozzi and Peters, 2021	Nervous Activity of the Brain in Five Dimensions
Trevathan, 2022	A Meditation of Consciousness, The Physics of Intentionality and Prayer
Tuszynsky et al.,2022	Archetypal Molecular Patterns of Conscious Experiences are Quantum Analogs
Vanchurin, 2020	The World as a Neural Network
Wahbeh, 2022	What if Consciousness Is Not an Emergent Property of the Brain?
Walling, 2020	An Update on Dimensions in Consciousness
Wang, 2021	Mode Transition for Increased Voltage Gain Range with Tri-State and Single Cycle Control
Wendt, 2021	Quantum Mind and Social Science
Wong et al, 2020	5D Model Theory for Creating of Life Forms, Due to 5D to 4D Symmetry Breaking

In Table 3, recent studies on the very nature of consciousness are listed, that touch upon the involvement of quantum physics in brain function. In addition, we earlier found that energy gaps of various superconductive properties, that might have a relation with our neurological system, also show the same typical frequency distribution (Geesink and Meijer, 2019a), also implying that man-made superconductor materials can be improved and shifted to higher temperature ranges by EMF lasing, using these discrete frequencies.

What could be the relation between this spectrum of physical phenomena and the subject of the present paper on brain function and consciousness? Here we report on the remarkable congruence with the vibratory patterns of neuronal microtubular structures, that are supposed to be essential for the creation of conscious states by an orchestrated wave reduction through alignment to gravity fluctuations (Hameroff and Penrose, 2013). Also microtubules are functioning according to the proposed algorithm

(Geesink/Schmieke, 2022). Since the spiral micro-tubular tubulin protein chains also contain a core of coherently structured water domains, the set of ZPE guided frequencies detected by us in water (Geesink, Jerman and Meijer, 2020), may functionally link these processes, since ZPE oscillations can reflect those typical frequencies (Meijer, 2022). The overall coupling of cosmic events with brain function becomes clear realizing the typical found brain wave frequencies and the cerebrospinal water compartments in the brain of water-ion complexes and freely moving hydronium (H2O-proton) units including the different ion-hydrates, can be considered as EMF antennae for internal and external EMF vibrations (Meijer et al, 2020; Geesink, 2022). This brings the following features for an efficient and guided brain and neurological functions together:

- ultra-rapid information transfer through superconductive flow of photon/phonon activity.
- oscillatory behavior of water molecules according to the proposed algorithm (Geesink and Meijer, 2020).
- vibratory functioning of microtubules as confirmed by Bandyopadhyai, 2013 and Geesink/Schmieke 2022.
- potential for field-receptive signal conduction and required entanglement of distant brain areas.
- gravitational connection at the Planck scale, as suggested by Hameroff and Penrose, 1996 and recently studied by Meijer and Bermanseder, 2024.

The latter holographic construction can be envisioned if a connection modality is operable in the whole organism, in which each part of the hologram contains the information of the whole. This enables the simulation of present and future states instrumental as a global ”reference”. The holographic principle includes an event horizon, in which the entire information that describes an entity, is projected on a hyper-spherIcal domain that surrounds this object. This can even be true for individual cells, in which for example complex protein communication networks are functioning, requiring a precise 3D folding of each of the participating proteins, realizing that for each individual protein molecule, millions of possible configurations are possible, and even configurations with structures known for inanimate superconductors (Meijer ad Geesink, 2018b and Melkick and Meijer, 2018).

Such a holographic and field receptive workspace would even provide the basis for the cosmic relation and generation of a universal consciousness of which we all are participating (Kastrup, 2018; Meijer and Raggett, 2014; Meijer, 2019). Such a brain supervening modality is also assumed directly in various brain/consciousness models, as proposed by Amoroso, Sarfatti, Fingelkurz, De Wilde, Hameroff, Ho, Irwin, Keppler, Wahbeh, Wong, and in fact is implied in many of the other models listed in Table 3, including the Global /Neuronal Workspace models of Baars and Dehaene, who never did clarify their supposed broadcasting of wave activity, requires for brain binding of distant brain centers.

In the present paper, we hypothesize that neurological functions are embedded in a imperceptible fourth spatial dimension. Its very presence was empirically assessed using neuro-imaging with fMRI series (see section 10). Indeed, there is a typical feature that reveals the existence of such a functional hypersphere: the simultaneous activation of areas opposite each other on the 3D cortical surface (Tozzi and Peters, 2021), and see figure 16, that substantiated that brain activity takes place on a closed, “donut-like” trajectory. Thereby, according to these authors, helping to solve long-standing mysteries concerning our psychological activities, such as mind-wandering, memory retrieval, consciousness and dreaming states. Although the selected spectrum of studies, as listed in Table 3, (albeit not complete), propose quite

different concepts, they certainly exhibit several common aspects that support our extended brain model:

- Consciousness is not only restricted to living beings and may have a pan-experiential or even pan-psychic character.
- Consciousness should be seen as a (bio)field-like phenomenon to explain functional binding in brain.
- Consciousness bears a mental attribute and exhibits a cosmic or universal feature and ZPE guiding.
- Consciousness can be physically described in the framework of holography and fundamental information.
- Conceptualization of consciousness requires at least one extra-spatial dimension in a 5D universe.
- Consciousness requires scale-invariant coherent and resonant wave properties as well as quantum entanglement/tunneling processes for multi-level communication.
- Apart from classical neurotransmission, signal transduction in the brain requires more rapid photon/phonon fluxes.
- Brain function requires involvement of quantum physics to explain qualia and extra-sensory perception.
- Biological evolution and first life entertain quantum biology processes and some kind of cognitive guiding.
- Apart from micro-tubular oscillations, vibrant protein/DNA conformations play a role in creating brain memory and conscious states.
- The evolution of consciousness can be conceived as the result of a physical modality of symmetry breaking.
- Space-time bears a quantum superfluid or quasi-crystalline fluid character, allowing vortex type of energy patterns described in toroidal type of information processing.
- Nature is guided by an acoustic quantum code that can be mathematically defined also in relation to cognition.

6. Selected Treatment of Current Consciousness Models

Some selected consciousness models will be summarized, and a comparison of the different models will be made in the following:

6.1. Nambu-Goldstone Boson Model of Ricciardi and Umezawa (1967)

Ricciardi and Umezawa proposed a general theory of the role of quanta of long-range coherent waves within and between brain cells and suggested a mechanism of memory storage and retrieval in terms of Nambu–Goldstone Bosons. The quanta of long-range coherent waves within and between brain cells provided a possible mechanism for memory storage and retrieval. (Ricciardi, 1967). This concept was later extended to a quantum theory, encompassing the function of biological cells, according to the quantum biodynamics of Del Giudice and Vitiello (Del Giudice, 1986).

6.2. Orchestrated Objective Wave Reduction Model of Hameroff and Penrose (2014)

Stuart Hameroff and sir Roger Penrose proposed already in the mid 1990's that consciousness may depend

on a biologically 'orchestrated' wave reduction, enabling quantum coherent calculation processes in neuronal microtubules within the brain. Such quantum processes, in these organelles, were supposed to correlate with induced or modulated events of neuronal synaptic transmission and perturbation of membrane potential activity. The continuous generation of conscious quantum can be described by states Schrödinger-type of wave evolution on the basis of the specific Diósi-Penrose (DP) scheme of 'objective reduction' ('OR') of the quantum state through resonant superpositions with gravity-mediated wave oscillations at the Planck scale. When a certain threshold is reached, a so-called objective reduction occurs as a sort of a "confirmation of the state" occur. The "Orch OR" theory suggests that quantum computations in brain neuronal (dendritic-somatic) microtubules regulate axonal firings to control conscious behavior. The basic process underlying the emerging of consciousness in this model occurs through alignment of subsequent coherent conscious states, promoting the cycles of brainwave synchronization. Instead of talking about obtaining coherence through Bose-Einstein condensations, as put forward earlier by Frölich, 2010, the authors talk about quantum gravity mediated "orchestration". This objective reduction may represent the non-computable aspect of the human mind (Penrose, 2010) through the cosmic (Planck scale) connection, as well as the fundamental physical source of consciousness. In contrast, decoherent (chaotic) states disturb time- and space dependent oscillation patterns and thereby may induce anomalous dream states and finally clinically relevant mental disorders.

In line with our consciousness model, the Orch OR theory assumes that the consciousness process is dependent on discrete quantum wave information, and that occurrence of the so-called "conscious moments" is manifest at frequencies in the range of about 30-90 Hz. We defined the exact range of discrete micro-tubular oscillation frequencies in relation to fluctuations at the Planck scale (see section 2.9).

6.3. Holographic Spacetime Model of Haramein, Brown and Val Baker (2016)

The subatomic structure of the proton and the electron have been derived from a spacetime holographic structure of Planck-scale quantum vacuum oscillators, demonstrating that spacetime, at the very fine level of the Planck-scale, represents discrete information quanta. Self-organizing vibratoty systems may lead to self-awareness and consciousness and are an integral emergent property of the feedback dynamics, of spacetime information itself.

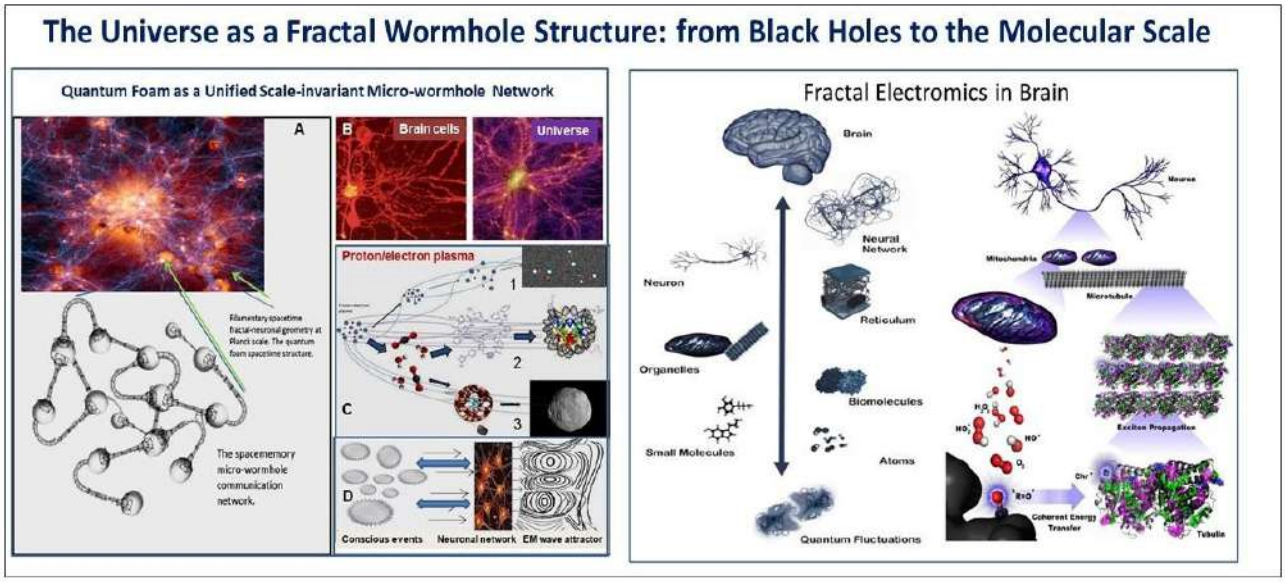


Figure 16: *Left: The fractal wormhole network theory of Haramein et al, 2016, with self-similar features at the cosmic and brain levels, producing proton/electron plasma as a unified conduit; Right: Fractal organization of brain from macro- to micro-scale, showing arranged protein layers that allow acoustic oscillation of 3D protein molecules, providing the music of the cell (Bandyopadhyai et al, 2020).*

It has been suggested by these authors that the Planck-scale micro-wormhole entangled structure interact with themacromolecular assemblies of living cells, and that this wormhole-entanglement may function in the memory and learning capacity of such biological entities. The recursive information flux, encoding feedback processes of the quantum spacetime micro-wormhole network, has been referred to as space-memory, and enables memory and learning in physical systems across all scales, resulting in universal evolutionary tendencies towards higher levels of ordering and complexity, being foundational to biological evolution, sentience, and awareness. So, human consciousness is multiply connected to distant and separate areas of the supposed cosmic Space-memory Network (Haramein, Brown and Val Baker, 2016) and see Fig. 16.

6.4. Operational Architectonics Brain model of Fingelkurz et al. (2020)

According to these authors, understanding human consciousness requires the description of the principles of underlying neural collective phenomena, and the nested hierarchy of spatiotemporal patterns of 3D electromagnetic fields, as produced by neuronal assemblies. An analysis has shown that the structure, organization, dynamics, constitutive and causal relationships of such nested hierarchy of operational architectonics of brain activity are guided by laws such as criticality, self-organization, and emergence. "Spatiotemporal Neuroscience" conceives the brain and mind in terms of their spatio-temporal dynamics rather than in terms of specific functions like cognitive, affective, social, cultural, etc. and may have a direct relation with quantum processes (Fingelkurts et al., 2020). The model certainly is compatible with our concept.

6.5. Electro-magnetic Brain Model of McFadden (2007, 2013, 2020)

McFadden proposed that conscious volition results from the influence of the brain's electromagnetic fields on neurons that thereby initiate actions. The conscious electromagnetic information (CEMI) field theory thereby proposes digital information within neurons, that by their electronic (action potential) activity and functionally pooled and integrated organization form an electromagnetic information field and see Fig. 17**.** Such a ‘conscious” electromagnetic information field theory enables that consciousness is physically integrated, and causally active. Through information encoded in the brain’s global electromagnetic (EM) field it implements algorithms in space, rather than time. Coherent states of neuronal firing, than, produce an electrical field that has been identified experimentally in several studies and here is considered as the very seat of consciousness. In return, these electrical fields integrate the neuronal activities and steer them in a functional direction. It is not clear how this relates to local and non-local quantum condtions, but Libet, 1979 and also Pockett, 2014 do not exclude a conscious mental field (figure 17).

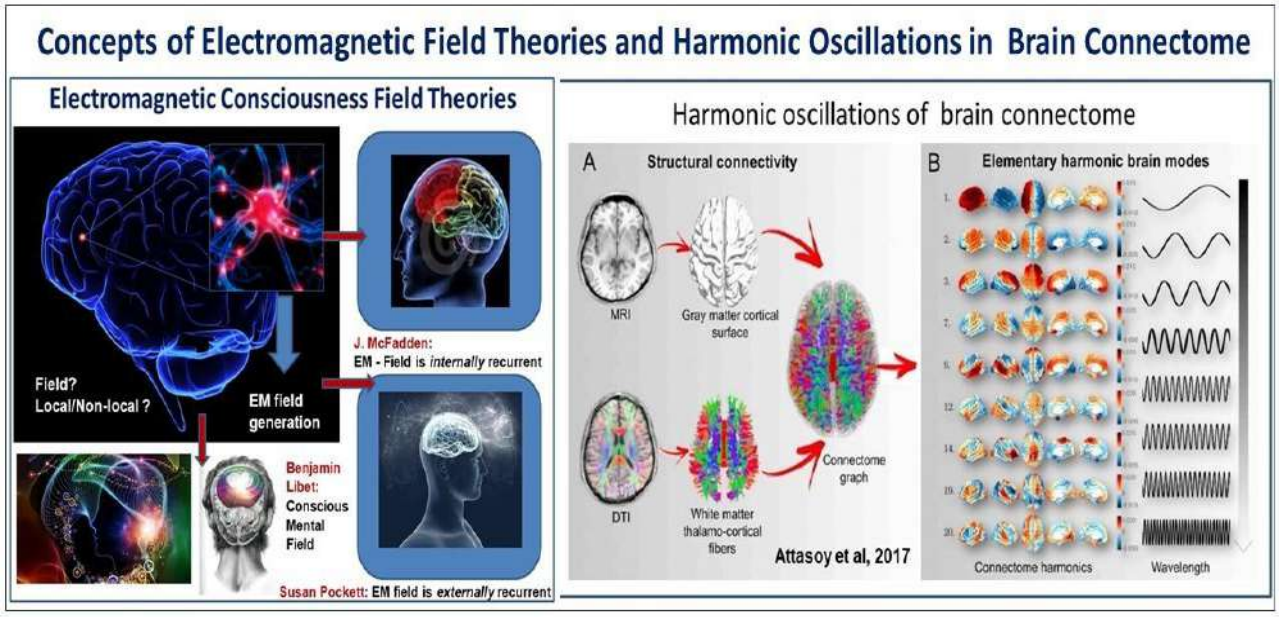


Figure 17: *Consciousness as generated by an interplay of electromagnetic fields produced by internally or externally recurrent neuronal electric activity (McFadden, 2013; Pockett, 2014), also conceived as a mental field by Libet;* ***Right:*** *Harmonic oscillations of the brain connectome of grey and white matter, and their frequencies measured by NMR.*

6.6. Toroidal Brain Model of Tozzi and Peters (2021)

An important notion in these studies is that nervous activity of the brain, at least partly, takes place in higher-dimensional functional space or dimension. The authors propose that the brain might be associated with a sort of phase space, situated in a four dimensional (extra *spatial* dimension) that is, in this case not the dimension time. This asks for a global visualization for exploiting four-dimensional maps of three-dimensional experimental data sets, an aspect not unknown in neuroscience See Meijer et al., 2020). The treatment of EEG traces with Fourier analysis allows the investigation of a scale-free activity of the brain, modeled in terms of trajectories on hyperspheres and quaternionic networks. Repetitive spatial and temporal patterns of brain activity can so be enlightened in four-dimensional space. Further, the quaternionic approach makes it feasible to identify spatially far apart and temporally distant periodic trajectories with the similar features, such as the same oscillatory frequency or amplitude. This leads to an incisive operational assessment of global or broken symmetries, representing domains of attraction inside three-dimensional projections. These matching descriptions generate relations between the apparently random paths, as hidden in the very structure of nervous fractal signals (Tozzi and Peters, 2021). Higher-dimensional nervous trajectories have so been identified in phase spaces, taken the form of genus-zero hypersphere S3 or genus-one Clifford torus (Tozzi et al., 2016). It has been suggested that brain functions such as mind-wandering and memory retrieval, could be explained by the functional occurrence of such imperceptible further spatial dimensions (Peters, 2017). This toroidal approach of brain activity and the 4D geometry is very supportive for our toroidal 5D workspace concept (see figure 18).

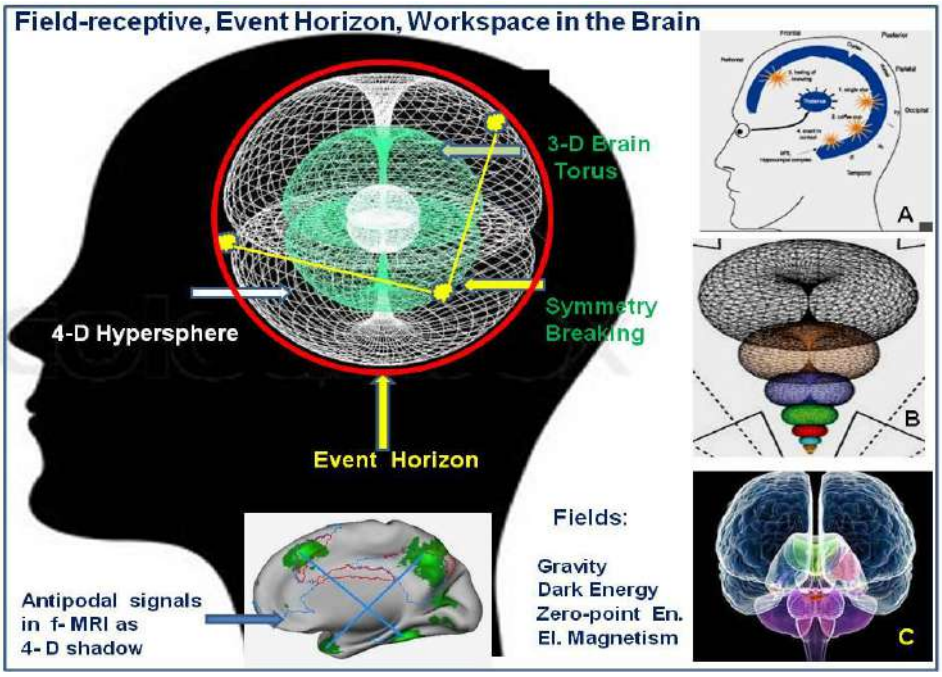


Figure 18. *Field receptive, event horizon model of consciousness, depicted in various representations: Main picture: postulated double-toroidal field integrating the 4D- hypersphere workspace with the event horizon surface, projecting the integral individual information as an internal model of the self. Note that the 4-D hypersphere is pictured within the skull, but that it can exhibit an extended localization, surrounding the brain or even the whole organism, due to fractal properties and can also be positioned at a micro-scale at or within the brain cells or extracellular space. Embedding of the 3-D toroidal domain of the brain within a 4-D hypersphere is therefore multidimensional and fractal at various levels of organization. Symmetry breaking occurs from the 4-D hypersphere to the 3-D internal brain torus, of which the traces can be detected by series of f-MRI scans of the brain as antipodal activity domains in the brain tissue (inset middle below). Insets at the right A: Supposed broadcasting centers in brain that may explain binding and global synchrony, according to Baars B: Fractal organization of information scales in the extended brain. C: Hemi-spherical anatomy of the brain resembling a toroidal geometry (reference Meijer and Geesink, 2017).*

6.7. Macroscopic Quantum Mind Model of Wendt (2015; 2020)

The quantum mind and consciousness are inherent to the material world, that goes well down to the subatomic level. Entanglement is seen as the process by which subatomic particles become inter-connected to form an inseparable quantum system in space and time. “Human entanglement”, likewise, occurs through the language and shared meanings and human subjectivity(consciousness and intentionality), and may also be governed by the principles of quantum physics. The human brain is conceived as a sort of quantum computer that can perform the function of a “holographic projector”. Social structures, endowed with subjectivity and intentionality, thus, are merely holographic organisms endowed with “quantum coherence”. Thereby, human beings seem to live in a “holographic quantum model of society”, in which “each of us is a pixel entangled in such social structures, that enable our agency”. Human beings, in this conjecture are essentially a “walking wave function” whose primary causal mechanism is that of free will. Wendt, so defines his “quantum mind theory”, which defines the “human brain” as an entangled and

holographic “quantum system”. This approach allows to bring the principles of quantum mechanics to the macroscopic level and ensures the heuristic potentiality of his “quantum human being” (Wendt and Alexander, 2015; Ricardo 2020).

A fundamental problem in cognitive and social science concerns the identification of principles guiding human cognitive acts such as decision-making, categorization, and behavior under the condition of uncertainty. It is proposed that there is a way to address subjectivity and intentionality in both individual and collective actors: in fact implying the rehabilitation of a “vitalist ontology” in social sciences. Wendt argues that this ontology would facilitate the construction of a human being in a model, on the basis of a vision of nature that can reestablish their “agency” and their “vitality”. In order to have access to the realm of “subjectivity”, the path of “panpsychism” is considered, based on the idea that consciousness is inherent to the material world and can be traced to the subatomic level. In other words, “matter is pregnant with life”. It is through language that humans create and materialize the required “holographic structures”, endowed with a type of collective consciousness that is instrumental in the organization and regulation of social life. Social structures, endowed with subjectivity and intentionality are merely holographic organisms endowed with “quantum coherence”. The practical consequence is that quantum coherence in social life is most optimal when individuals act in ways that respect institutional rules and norms across time and space, in which “human entanglement” occurs through language and shared meaning.

6.8. Fifth Force Consciousness Model of Mocombe (2022, 2023)

Consciousness, in Mocombe’s view, is an emergent fifth force of nature, a field composed of a quantum material as a substance/energy modality. The particular phenomenal property or its informational content, is recycled, replicated, entangled and/or superimposed throughout the multi-verse. Consciousness becomes embodied, via the microtubules of neurons of brains as a form of aggregated matter. The emerging consciousness field is generated by its elementary particle, framed as a psychion (a boson with spin S=1, with mass, charge, and spin), interacting through electromagnetism. The central nervous systems, including brains, and brainstem of subjects houses experience as a resonating channel. The latter exhibits the wavelengths of electromagnetic waves as are manifest both on our planet earth and the entire universe and is conceived as the absolute vacuum, i.e., zero-point field of the fifth dimension. The mind is composed, not only, of a personal conscious part but also a collective unconscious part. The sense-experience of the emerging ego, is held together by the brain’s electromagnetic field, generated by the periodic discharge of neurons. Consciousness is realized via the absolute vacuum in which the psychion elementary particles or bosons are the information carriers of the field (Mocombe, 2022, 2023).

6.9. Electric Field Brain Model of Bond (2023)

Here, the brain’s electric field coherence appears to be a central factor in consciousness’ integration, rather than an epiphenomenon of neuronal activity. A new paradigm in neuroscience arose that views resonance as the crucial phenomenon responsible for the origin of consciousness. The concept of resonance is understood as the connective principle in the oscillating information flow within the brain’s electric field, finally resulting in production of mind from matter. Vibrations of matter such as nanoscale atomic structures and photonic waves participate in forming the very basic substance of first-person consciousness. The hypothesis is that coherence fields show atomic nodes of integrated photonic waves, representing the fundamental units of first-person precepts. The concept of quantum coherence was formulated, based on

nano-scale membrane properties, that male clear how electrical impulses travel along neurons and how electronic currents are driven by coherence at the quantum scale. Synaptic phase regulation, was hypothesized as to be responsible for local field potentials (LFP) and their inherent wave oscillations.

Activation of neural tissue in this theory, is closely linked to temperature variations, and it is hypothesized that this phenomenon is not merely a waste product of local metabolism, but constitutes a signature of coherent field modulation. Here, photonic waves of a primarily infrared spectral range, function as an interstitial medium of the supposed basic percept field. The author holds that future experimental approaches should validate this coherence field theory, and could set science on a course to resolve the mind/body problem. Interestingly, a spectrum of relatively coherent to relatively decoherent states are proposed to exists at the subatomic scale, where electric currents are driven by states of quantum coherence in the aqueous solution of ions. The baseline condition for this aqueous solution is a state of maximal decoherence due to the nanoscale noise among the large quantities of polar constituents. Yett when charge disparity is induced between large enough clusters of ions, a coherent current is generated with a higher electron density of negative charges, combined with lower electron density of positive charges (Bond, 2023).

Neural activity, thus is built around coherent dynamics, and ion-channels modulate the flow of electric current in the process of transmitting signals between the supposed nodes, that is at a significant fraction of light speed. The principle of coherent versus decoherent state dynamics, yield the so-called coherence field theory (CFT), in which infrared photonics, and quantum entanglement of vibrations may participate in forming the basic substance of first-person consciousness as defined by informational meaning, thoughts, feelings in addition to qualia-like percepts of colors, textures, sounds, etc. Growing evidence in the field of quantum biology such as photosynthesis, indicates that photons and receptive molecules can combine to form synchronously resonating structures of contiguous energy as a distinct example of coherence fields with their local field potentials (LFP) oscillations. Photonic waves of a primarily infrared spectral range function as an interstitial medium of this basic percept field.

6.10. Social Quantum Model of Kyoung-il (2021)

Quantum social mechanics is a field that combines the principles of quantum mechanics and social systems in order to better understand the behavior of individuals within their societal context. According to quantum field theory, one quantum field covers the entire sum over all variations of particle exchange in a quantum process. In this framework, human consciousness can be conceptualized in the quantum mechanical features of wave/particle duality and inherent uncertainty. In (self)-consciousness one easily recognizes the realism–antirealism opposition, and even the occurrence of constructive and destructive interference. The resulting dichotomous view of the world may have its intrinsic boundaries and each individual needs a rather coherent foundation, that he/she can also share with others. For this, an in-out ontology identifies an ontological foundation of what they can share in exposing their personal outside to one another, and can participate in social processes.. Individualism, on one hand, holds that structure can be reducible to the properties of independent individuals, on the other hand structuralism (or holism) holds that structureexhibits specific common features and thus it is irreducible to their parts (Kyoung-il, 2021). In-out ontology provides a bridge toward an integral picture of social reality: 1. to find, analyze and/or resolve structures of destructive interference such as decoherence, 2. to identify and analyze constructive interference that produces states of coherence; 3. to search for transitions in structure, and the *inductive*

attempts to reveal how to construct coherent features of the social wave function at stake and then by proper observation crystallize (wave collapse) the result out as a productive layer for action; 4.to analyze how *deduction* of structure can promote coherence between subsets, thereby also enabling a qualitative assessment (Kyoung-il, 2021; Aerts, 2016).

6.11. Tri-State Logic Consciousness Model of Wang (2021)

The core idea in the theory of "Tri-state" is "Tri-state Logic", meaning a "positive | negative | uncertain state"). The ontology of "Tri-state Logic" aims to reveal a meta space-time movement law of things, defining the process of transforming one form to another. That is, the coupling of time and space in the development ofthings, and the orientation and evolution in the continuity of things. As the mathematical basis of "Tri-state Logic", a toroidal knot and dynamics theory was proposed. A machine-consciousness model framework was designed by the author, in which the research starting point is the perspective of cognitive dynamics (cognitive psychology + dynamics). The proposed ontology equation can be regarded as a mathematical expression of human consciousness encompassing thinking logic. As far as machine intelligence is concerned, the description of the Tri-state Logic provides a first attempt to define the underlying (abstract) logical modal structure of cognitive systems, as an intelligent machine with self-consciousness, thinking and behavior, (Wang, 2021). The reader can find further information of the field of Quantum Cognition at Wikipedia : https://en.wikipedia.org/wiki/Quantum_cognition.

6.12. ZPE Cosmology Model of Keppler (2013, 2016, 2022)

The neural activity patterns associated with advanced cognitive processes, according to Keppler, are characterized by a highdegree of collective organization, which raises the question of whether macroscopic quantum phenomena play a significant role in cortical dynamics. To pursue this question and scrutinize the feasibility of macroscopic quantum coherence in the brain, a model is developed regarding the functioning of microcolumns, which are the basic functional units of the cortex. The formation of a coherence domain turns out to be an energetically favored state shielded by a considerable energy gap that protects the collective state against thermal perturbations and entails decoherence being greatly slowed down. The brain collects sensory information in addition to resonance of cosmic wave information, by means of brain wave attractors (Keppler, 2013). These findings suggest that under the special conditions encountered in cortical microcolumns the emergence of macroscopic quantum phenomena is feasible and long-range synchronization in the brain results from a bottom-up orchestration process involving the ZPF. Dynamic coupling of the brain with ZPE field modes has been proposed as a universal mechanism underlying conscious systems (Keppler, 2016), based on stable attractor dynamics by which the ZPE field/Superfluid-Quantum Space becomes a substrate of consciousness. In this framework the brain, as a resonant oscillator, extracts, or rather, filters a wide variety of phenomenal nuances from an all-pervasive stochastic radiation field in the form of phase locked ZPE wave information states. These are supposedly linked with or correspond to conscious states.Keppler envisions discrete long-range EM frequencies, that are expressed in brain in the gamma and theta oscillations, resulting in information integration, see figure 19.

6.13. Dual Aspect Consciousness Model of Atmanspacher (2011, 2012, 2020, 2024)

"Dual-aspect" approaches picture the mental and physical domains of reality as dual aspects, or manifestations, ofan underlying undivided reality, in which the mental and the physical only seemingly exist

as separate domains.

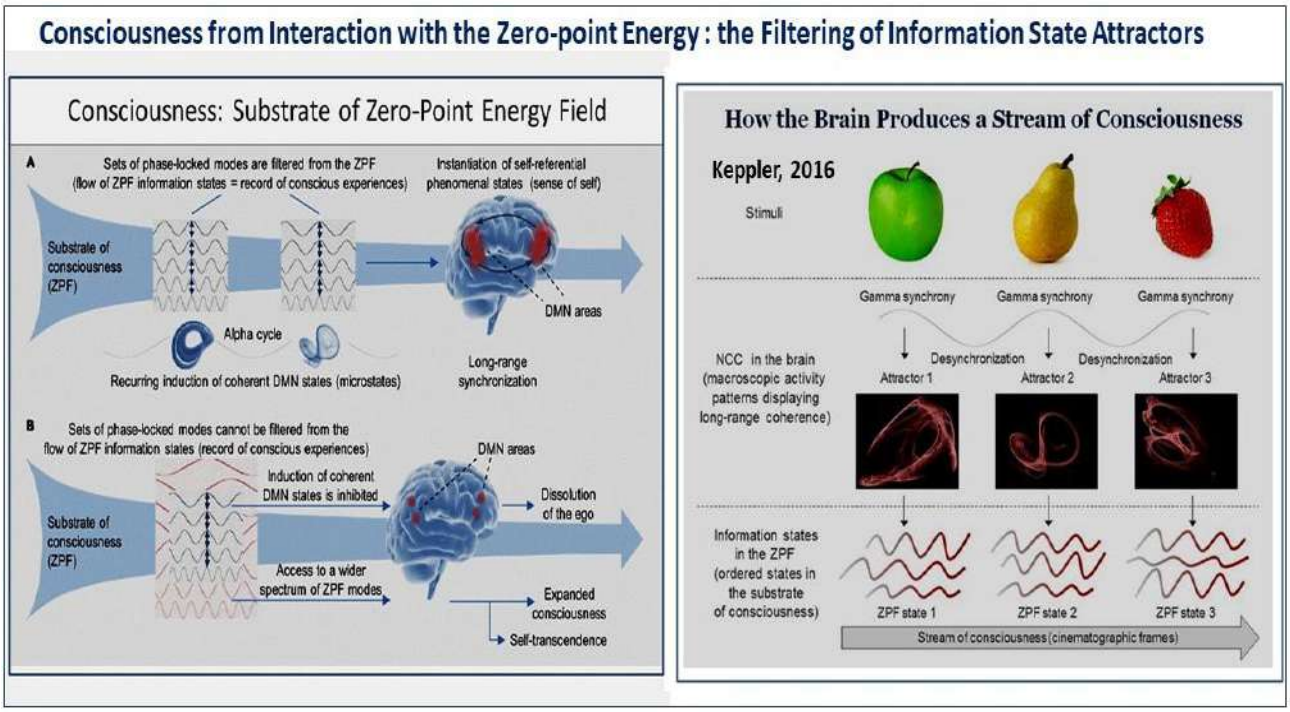


Figure 19: Left: *The ZPE-mediated consciousness model of Keppler, in which conscious states are created by filtered modes from the ZPE field that form attractor –type of brain activity that generate self-referential states. Below: If a spectrum of ZPE information is phase-locked in brain, and coherence is inhibited, dissection of ego and expanded (self-transcendent) states of consciousness can be produced.* ***Right****: a stream of conscious states of various fruits is translated in various attractor states by long range coherence in brain that form ordered ZPE information states*

In such a framework, the distinction between mind and matter results from an epistemic split that separates the aspects of the underlying reality. Consequently, the status of the psychophysically neutral domain is considered as ontic, “relative to the mind–matter distinction". In the mid-19th century, Wolfgang Pauli and Carl Gustav Jung developed a philosophical position for the mind-matter problem that is today called dual-aspect monism. Inspired by analogies with modern physics and drivenby its conceptual problems, Wolfgang Pauli, Carl Gustav Jung, Arthur Eddington, John Wheeler, David Bohm, and Basil Hiley are the originators of the particular approaches studied.

“Ordering” and “regulating” factors are described in terms of “archetypes”, but it would be inadmissible to define them as contents of the psyche. These inner images (the “dominant features of the collective unconscious” after Jung), are rather psychic manifestations of the archetypes which, however, would also create law like conditions in the behavior of the corporeal world. The laws of this world wouldthen be the physical manifestations of such archetypes. Each law of nature should, therefore, have an inner correspondence and vice versa, even though this is not always directly visible today. Dual-Aspect Monism and the related Deep Structure of Meaning investigates the metaphysical position of dual-aspect monism, with particular emphasis on the concept of meaning as a fundamental feature of the fabric of reality. Dual-aspect monism, thus, considers the mental and the physical as two aspects of one underlying undivided reality that is psychophysically neutral.

6.14. Consciousness Model of Pollard-Wright (2021, 2022, 2023)

The mind is viewed as a domain of collective energies of relationships, that give rise to consciousness, in an observer mediated change or information from the universe. The theory has implications for transforming states of mind and also the ethical treatment of all living beings. The observed universe is known now to consist of approximately 68% dark energy, 27% dark matter, and 5% normal matter, and these must also be attributes of the mind. Consciousness represents the dynamic differences that exist through interdependent relationships between dark energy, focal points of dark matter (FPDMs), energy density, zero-point energy fields as well as normal matter with its associated states of mind. The here proposed model of the Fundamental Interoceptive Patterns (FoK-FIP) theory creates contextual bridging between classical theory and quantum theory as well as a broad range of empirical research, so that biology and information can connect. The Feelings of Knowing, (FoK-FIP) theory, is a trans-disciplinary theory, developed to explain elusive phenomena suspected to exist, but do not easilylend themselves to empirical measurement. The FoK-FIP theory posits that specialized self-generated biomagnetism and "pure mental" process, share similarities with the hypothetical elementary particles, described in particle physics, and also magnetic monopoles with a magnetic charge. Feelings of Knowing (FoK) represents a sort of "awareness charge", that is considered as self-generated events. Fundamental Interoceptive Patterns (FIP) are restricted to oscillatory magnetic fields that induce FoK caused phenomena. Further, FoK produces "cognitive force," being an observing ego representing specialized interoceptive awareness. This process is understood through the components map with interoceptive markers (IMs) and a novel algorithm based on biological evolution. Accordingly, magnetism, observed daily in the physical world, can be attributed to the movement of electric charges entirely consistent with the Maxwell's equations. Dirac showed that when Maxwell's equations are extended to include the magnetic monopole, electric charge can exist only in discrete values through a "quantization" process. Electric charge is a requirement of quantum mechanics, and Dirac's work showed that classical electromagnetism and quantum electrodynamics were compatible theories in this sense. The FoK-FIP theory is congruent with Dirac's work, in which duality, in the physical sense is generated by an observing ego, interconnected with interoceptive signals (i.e., signals of the body's internal state) through a biologicalnode (i.e., FoK-FIP), that centers its sensations or feelings.

6.15. Event Horizon Brain/Consciousness Model of Meijer and Geesink (2017 till 2022)

Quantum entangled life conditions and graded states of consciousness in the universe are seen as scale invariant and are guided by a quantum wave meta-language in a superfluid quantum space or zero-point-energy field, that is instrumental in creating quantum coherent states through pilot wave resonant connectivity. The authors hold that this interacting dynamic EM field is steering collective life processes through semi-harmonic tuning of fractal structured water and vibrating macro-molecules such as DNA and hydrated proteins in the cellular matrix, including neurons and several other cell types in the human brain. Consciousness is seen as arising through interaction of life systems with a holographic, field-receptive workspace of which the communication with the various brain centers or compartments can be described by an Acoustic Quantum Code of Resonant Coherence. As treated above, presently available EEG- and MEG recordings were analyzed as to their peak frequencies in relation to this Quantum Code coherence values. Its toroidal organization allows the coupling of gravitational, dark energy, and zero-point energy field (ZPE), as

well as earth magnetic field energies and transmits wave information into brain tissue, that thereby can become instrumental in conscious and sub-conscious information processing.

In relation to its scale-invariant global character of consciousness, (Cosmic or Universal Consciousness), support has been found for an universal information matrix, framed by Bohm as a supposed implicate order and nowadays proposed in a spectrum of space-time theories in current physics and cosmology, (Meijer and Bermanseder, 2024 a;b). The presence of a field-receptive resonant workspace, associated with, but not reducible to, our brain, may provide an interpretation framework for anomalous conscious states and as the very source of an algorithmic origin of life (Meijer and Geesink, 2017; Meijer et al, 2020), see Fig. 20 and its 5D toroidal character is supported by the earlier mentioned theory of Tozzi and Peters, 2015;2016.

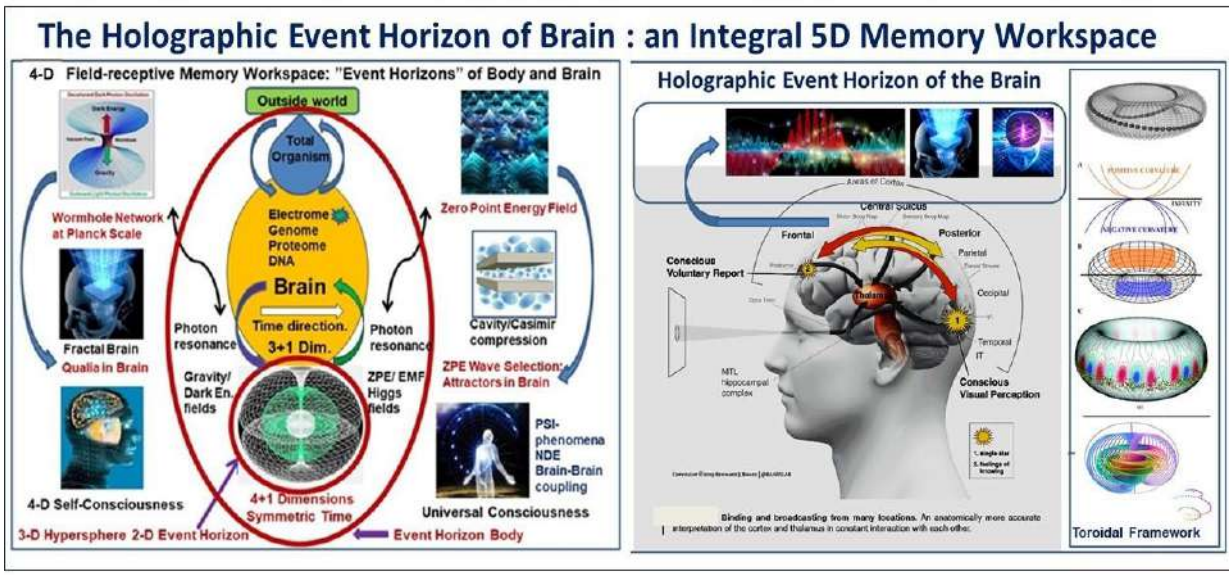


Figure 20. Left: *Schematic representation of the holographic Event Horizon Brain Model, see Meijer and Geesink, 2017). Right: Known 3D brain structure with its various components, the 4D workspace is inherent but not visual for us. It can be conceived as a toroidal workspace with fractal features (right, below) and a central part the bears aspects of infinity at the boundary of spatial transition. Right: Holographic representation of brain structure with various aspects of toroidal geometry (right inset).*

7. Consciousness Model of Geesink and Meijer, 2024

7.1 Space-time, Matter and Consciousness

This theory of consciousness proposes that, in a physical theory of the Universe, space-time, matter and consciousness will all become ontologically equal partners in a single overriding physical reality in a multidimensional hyperspace. Consciousness is inherent to the material world and goes well down to the subatomic level (Meijer and Wong, 2020). In other words, “matter is pregnant with life”. Bosonic elementary particles/waves, such as photons/phonons and fermionic elementary particles/waves, including electrons, in an entangled state, play a role in the construction of space-time. The theory proposes fundamental superfluid quantum scalar field, in line with the theories of Fedi, 2019 and Sbitnev, 2016 that

represents a basis for quantum communications and in which boson/fermion composites represent the carriers of quantum consciousness while proton/water (hydronium) moieties in cerebrospinal fluids of brain may function as versatile antennas for such wave information (Meijer et al, 2020). A relation is proposed between the frequency patterns of life molecules in cells in general including neural tissue as evidenced by monitoring brain waves (Geesink, 2021a; Meijer, 2023). The resonancesof Bosonic elementary particles exhibit coherent values as defined in our model, while Fermionic elementary particles can show coherence but also decoherent conditions. Its toroidal organization, in a cosmological context, allows the coupling of gravitational, dark energy, zero-point energy field (ZPE) as well as earth magnetic fields energies and transmits wave information into the brain and other neurological tissues, that thereby becomes instrumental in high-speed conscious and sub-conscious information processing. A holoflux of information can be expressed in a toroidal model in which converging and diverging Information flow give rise to Gravitation and Dark energy, respectively. Neg-entropic creation of information is located at a so-called White Hole event Horizon, whereas Entropic Creation of information is located at a Black Hole event Horizon that signifies the ultimate state of the present universe. A non-dualistic monopole field is positioned in the core of the torus field, that allows 3D to 4D transition of entangled information, that after an implicit Möbius type of conversion re-enters the inner torus trajectories to the projected White hole and Black hole, see Fig. 21.

7.2 Consciousness Projected in 4D Dimensional Space with Toroidal and Monopole Fields

An integral Holographic Memory Network, positioned in and around human beings is proposed, that is based on a quantum entangled toroidal and monopole field, conceived as a connected wormhole matrix, where (from micro to macro) entanglement is instrumental in forming an ordered spacetime structure.

The graded states of consciousness in this model are scale invariant throughout the universe and can be expressed ina toroidal and monopole geometry in a quantum field that houses helical combinations of right and left rotating waves. Information is projected onto a white and black hole horizon and confined by a magnetic monopole. The toroidal energies are proposed to be passed through a wormhole-like tunnel structure that is inherently connected to black and white hole modalities into the central monopole (see Fig. 21). The white hole represents a coherent and ordered structure of emitting waves, whereas the black hole is collecting decoherent and more disordered structure of waves. Themonopole structure is located at the centre of the toroidal geometry, whereas a white hole ispositioned at the upper located vertical vortex, and a dark hole at the lower located vertical vortex.

7.3. Consciousness Becomes Manifest Through a 4D Memory Workspace

It was previously postulated that consciousness in the entire universe arises through, scale invariant, nested toroidal coupling of various energy fields (Meijer et al., 2020). In the brain and neurological systems of the human species, this takes the form of the proposed holographic workspace, that collects active information in a mental workspace, coined the ”brain event horizon”, representing an internal and integral model of the self (Meijer and Geesink, 2017). This brain-supervening workspace is equipped to convert integrated discrete coherent or called constructive interference as well as decoherent wave energies or called destructive interference, according to two proposed wave- equations into attractor type/standing waves that guide the related cortical template and neurologicalsystem to a higher coordination of reflection and action, as well as network synchronicity, and to be required for conscious states. In relation to its scale-

invariant global character, support was found fora universal information matrix, and extensively described earlier by David Bohm, 1952-1987; Bohm and Peat, 1997, as a supposed an “implicate order” (Meijer and Geesink, 2022).

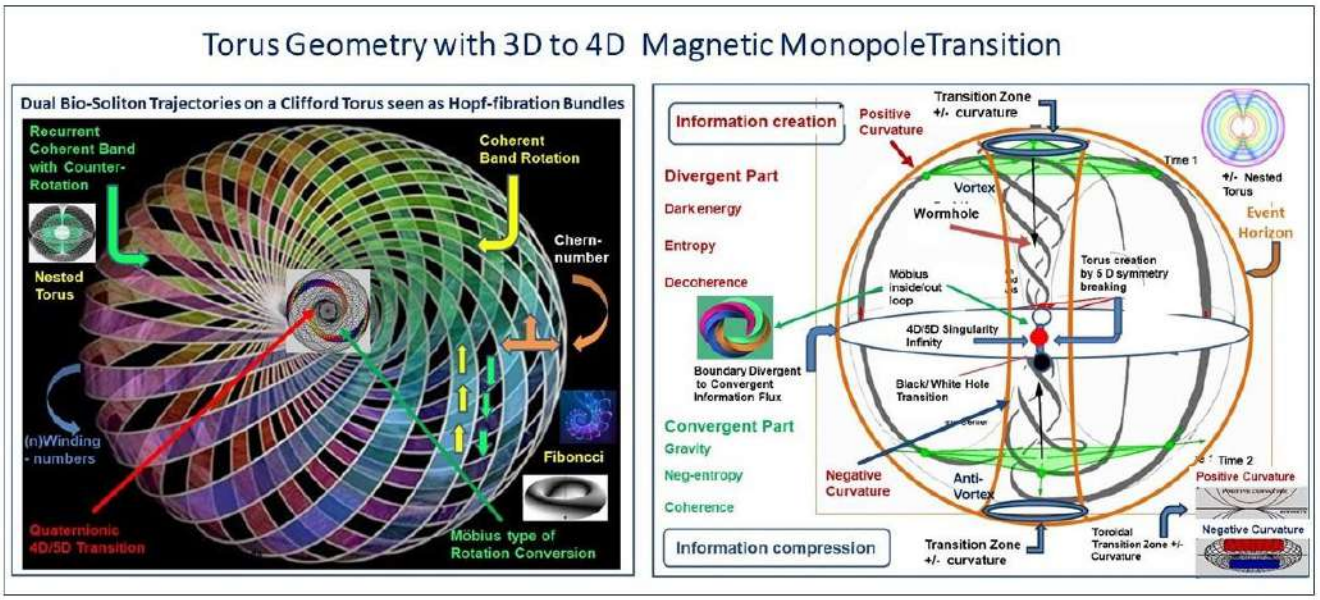


Figure 21: Left: *Toroidal model for the GM-scale biophysical principle- related acoustic like (bio-soliton) frequencies, depicted as coherent spiral trajectories with varying winding numbers. The band-like Hopf-fibration bundles reflect the acoustic-like (musical) tones with higher harmonics. All wave energies finally end up in the Torus core in a Fibonacci-type like of wave propagation, that provides tone separation and termination. In the centre core of the torus monopole confined transitions result in opening to a 4th spatial dimension from which new torus energy trajectories are initiated in 3D after a Möbius-type of (inside/out) wave-conversion. Chern numbers describe the mutual relationship of coherent waves positioned in the nested torii;* ***Right:*** *A tentative cosmological torus model for describing the re-bounce of the universe in a circular universe concept, as a bi-spiral information flow with ongoing creation and compression (folding and unfolding) of information. This geometric toroidal approach models the Information Universe as a scalar superfluid quantum space, exhibiting a fractal series of phonon oscillations. The surface and inner trajectories of informational phonons are shown in a grey pattern, including their interactive processing to a magnetic monopole (red) in the inner core of the torus, with potential wave coupling/conjugation by superposition (see inset right middle), and transition to a 4 D domain with an integral memory character, called by Jung the Self. The blue rings indicate sites of +/- transitions of torus channel curvature with infinity aspect, see the inset right below. The dynamics of the torus are shown as an inherent rotation and recurrent flow of wave information in a bi-spiral flow pattern. The state of the torus depicts a supposed stage of our universe in which information is collected and gravitationally compressed into a terminal black hole structure that after 4D to 3D transition is converted in a white, this through passing a central monopole structure that is inherently connected to the adjacent holes. Aspect of time in the model is represented by the colored triangle planes: present time is a superposition of a back projection of past and future waves, according to the transactional interpretation of quantum physics by John Cramer, green plane below indicates the past time, and green plane above the future time (figure modified from Stan Tenen, (2002) as shown in a PPT presentation of Amoroso (1999), modified by Meijer (2017) and modified by Geesink (2024).*

7.4. The Quantum Field Character of Consciousness

It is proposed that human (self)-consciousness is coupled with a quantum information field, that is connected to our brain and neurological system, and operates as a scale-invariant attribute of reality. The structure of space at quantum scales including our consciousness is conceived as a collection of connected elements, that are called coherent and decoherent quantized wave patterns, positioned in a quantum field. The nested toroidal field shows “bright” states (light, constructive, coherent), that are in balance with electromagnetic states that are “dark” states (disordered, deconstructive, decoherent). This balance is characteristic for our consciousness and exhibits a dualistic principle, that is positioned in a toroidal geometry and as shown below, can also be expressed in a so-called guiding ladder system. The different states of electromagnetic patterns in the proposed ladder system can be seen as the eigenstates that can be analytically calculated by two equations of the proposed Acoustic Quantum Code and thereby form the global characteristic of our behavior.

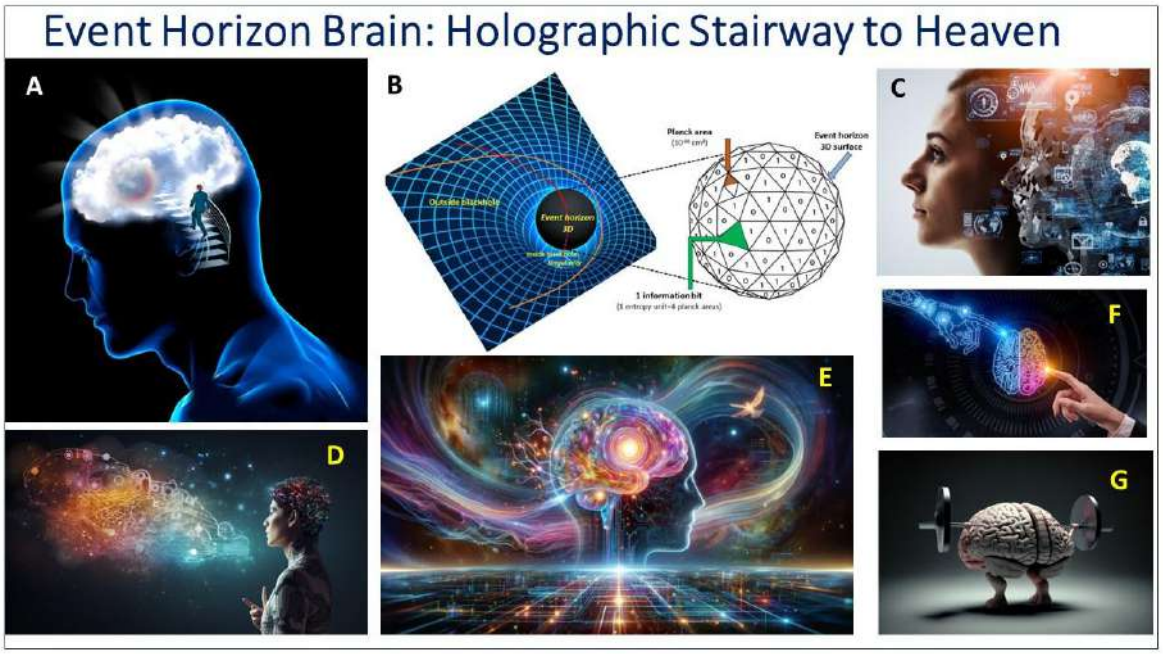


Figure 22: *Holographic representation of reality:* ***A:*** *the ladder to higher brain function* ***B:*** *the Geometry of the Black Holes with Event horizon, exhibiting tri-angular Planck information units of which 4 constitute a Q-bit.* ***C*** *and* ***D:*** *the cosmic connection of each individual* ***E:*** *Contribution of human conscious states to universal (collective) consciousness;* ***F:*** *The feed-back from cosmic consciousness: Intuition, clairvoyance, and other Psi phenomena;* ***G:*** *the heavy load of human consciousness*

The monopole in the quantum field is located at the centre of the torus, near a white (coherent) and black (decoherent) hole, located at the ends of vertical vortices and coupled with a magnetic monopole that can open to 4D-space. This monopole field, thereby, shows a non-dualistic structure of integrated coherent and decoherent positions and is also linked with our consciousness, see figure 22.

Conclusion: Geesink and Meijer, 2024, propose a quantum field embedding our consciousness: toroidal bidirectional and spiral trajectory patterns, are arriving at White and Black holes, connected with a

magnetic monopole center, that confines information and gives access to 4D. The coherent eigenstates and decoherent states are positioned in the toroidal geometry including the monopole field and can be described by the proposed quantum equation of coherence and decoherence. All decoherent eigenstates are spatial positioned at the toroidal geometry just in between the waves of coherent states and can be described by the proposed equation of decoherence. Chern equations can analytically describe the coherent states, as well as by a Pythagorean like equation, that answers the question how to distribute ratios distribute ratios of2/3 into of 1/2, to attain a perfect semi-harmonic fit, (framed semi-harmonic scaling).

8. Consciousness and the Archetypical Models of Jung and Leibniz

8.1. Introduction

The human consciousness in 3D is coupled to distant and separate areas in 4D, that are quantum entangled. Living beings, thereby, make use of the 4D dimensional informational space, so realizing the different levels and degrees of consciousness. They employ a neurologically defined open brain system, and follow the different positions or eigenstates by making use of a so-called ladder system. The different energetic electromagnetic patterns of this ladder system show a deterministic pattern, but free choice is guaranteed by chosen projections in the dynamic 4D information field (Meijer, 2023).

As treated before, meta-analysis of literature has shown that many measured quantum systems and living states of molecules and cells show the same patterned electromagnetic wave distribution, of alternating coherent and decoherent band features. Interestingly, the principle of proposed distribution of discrete patterns is in line with the proposed theory of monads described by Leibniz and called by him a pre-established harmony: each monad follows a pre-programmed set of "instructions" peculiar to itself. So, these monads are seen as centers of patterned energy.

It is said that Leibniz anticipated Albert Einstein concepts, by arguing against Newton, that space, time, and motion are completely relative as he quipped (Ferraro, 2007). Einstein, who called himself a "Leibnizian", even wrote in the introduction to Max Jammer's book “Concepts of Space” that Leibnizianism was superior to Newtonianism. Leibniz ideas would have dominated over Newton's had it not been for the poor technological tools of the time; it has in fact been argued that Leibniz paved the wayfor Einstein's theory of relativity (Agassi, 1969). Monads were compared to the corpuscles of the mechanical philosophy of René Descartes. These simple substances or monads represented the "ultimate units of existence in nature". It has been said that monads have no parts but still exist by the qualities that they have. It is proposed by us that the monads can be expressed in the proposed 12 different spatio-spectral eigenmodes, positioned in a so-called ladder system and expressed in one equation of a toroidal distribution of the geometry: $2^{q}\,3^{m.}$

8.2. Psychological Model of Jung

According to Jungian psychology, archetypes are innate potentials that are expressed in human behavior and experiences. They are hidden forms of information that are activated when they enter consciousness and are shaped by individual and cultural experiences. The concept of archetypes is a key aspect of Jung's theory of the collective unconscious, which suggests that there are universal experiences that are inherent to the human condition. Historically, the Self, according to Jung, signifies the unification of consciousness and unconsciousness in one person, and represents the psyche (Henderson, 1978). It is realized as the

product of individuation, which in his view is the process of integrating various aspects of one's personality. For Jung, the Self is an encompassing whole, which acts as a container. It could be symbolized by a circle, a square, or even better a more complex mandala (Village, 2017). Jungian archetypes are a concept from psychology that refers to a universal, inherited idea, pattern of thought, or image that is present in the collective unconscious of all human beings. He first introduced the concept of primordial images, which he later referred to as archetypes, to explain this idea. The psychic counterpart of instinct, archetypes are thought to be the basis of many of the common themes and symbols that appear in stories, myths, and dreams across different cultures and societies. Some examples of archetypes include those of the mother, the child, the trickster, and the flood, among others. According to Jung, archetypes are innate patterns of thought and behavior that strive for realization within an individual's environment. This process of actualization influences the degree of individuation, or the development of the individual's unique identity (https://en.wikipedia.org/wiki/Jungian_archetypes).

Jung considered that from birth, every individual has an original sense of wholeness of the Self, but that with ongoing development a separate ego-consciousness crystallizes out of the original feeling of unity. This process of ego-differentiation provides the task of the first half of one's life-course, though Jungians also saw psychic health as depending on a periodic return to the sense of Self, something facilitated using myths, initiation ceremonies, and rites of passage (Henderson, 1978). The idea is that there are two centers of the personality distinguished Jungian psychology at one time. The ego has been seen as the center of consciousness, whereas the Self is defined as the center of the total personality, which includes consciousness, as well as the unconscious, and the ego; the Self is both the whole and the center. A field of interest and research was synchronicity, in psyche matter, and numbers. It seems to have also triggered Jung, whose research had led him to the hypothesis about the unity of the psychic and material worlds: that they are one and the same, just different manifestations. He also believed that this concept of the unus mundus could be investigated by means of researching archetypes. Two books, “Number and Time” and “Psyche and Matter”, deal with this research (Franz, 1974, 1992).

Jung called this center the 'Self' and described it as the totality of the whole psyche, in order to distinguish it from the 'ego', which constitutes only a small part of the psyche" (Von Franz, 1992). Under the Self's guidance, a succession of archetypal images emerges, gradually bringing the fragmentary aspects of the Self increasingly closer to its totality. The archetype of the Self is seen as the last point on the route to self-realization of individuation (Jacobi, 1968). In totality, the self is a coincidentia oppositorum; it is therefore bright and dark and yet neither" (Jung, Mysterium Coniunctionis (London 1963). Its opposite are not contradictions, but rather superpositions (Jung 1959-1996). Remark Geesink: The Self of Jung can also depicted as a monopole field in the center of the toroidal geometry.

8.3. Models of Leibniz

In the Preface of “New Essays”, Leibniz argued in favor of innate ideas: There is the question whether the soul (psyche) in itself is completely blank […] or whether the soul inherently contains the sources of various notions and doctrines, which external objects merely rouse up on suitable occasions. Pure mathematics and particularly in arithmetic and geometry, must have principles whose proof does not depend on instances nor, consequently, on the testimony of the senses, even though without the senses it would never occur to us to think of them (Leibniz, 1678-1765). His contribution to metaphysics is the theory of

monads, as exposited in Monadology. These substances or monads are the "ultimate units of existence in nature". Monads have no parts, but are unique, and still exist by the qualities that they have. They are also not affected by time and are subject to only creation and annihilation. Monads are centers of force; substance is force, while space, matter, and motion are merely phenomenal (Monadologie, 1714; O'Leary-Hawthorne, 2008).

Leibniz proposed his theory that the universe is made of an infinite number of these “simple” substances known as monads; the substances are 'programmed' and act in a predetermined way, and each substance being coordinated with all the others, solving the mind-body problem, albeit at the cost of declaring any interaction between substances a mere appearance, (Freiherr, 2005; Woolhouse and Franks, 1998) (https://en.wikipedia.org/wiki/Monadology). In the present paper these monads will be addressed to the proposed energy states of the equation of coherence, represented by fundamental scalars and calculated by Chern numbers. This is necessary to his enterprise: without it, he could not hope to make plausible his suggestion that the aimof morality is self-realization (Bradley, 1883, 1962; Suojanen, 2023).

The concept of pre-established harmony can be understood by considering an event with both seemingly mental and physical aspects. Under pre-established harmony, the preprogramming of each mind is complex, since only it causes its own thoughts or actions, for as long as it exists. To appear to interact, each substance's "program" must contain a description of either the entire universe, or of how the object behaves at all times during all interactions that appear to occur. Leibniz used a geometry book as an example to explain his reasoning (Franklin, 2007). Although for Leibniz the situs of a sequence of points is completely determined by the distance between them and is altered if those distances are altered, his admirer Euler, in the famous 1736 papersolving the Königsberg Bridge Problem and its generalizations, used the term geometria situs in such asense that the situs remains unchanged under topological deformations (https://en.wikipedia.org/wiki/Mind%E2%80%93body_problem).

The fractal geometry promoted by Mandelbrot drew on Leibniz's notions of self-similarity and the principle of continuity: Natura non facit saltus. Leibniz wrote, in a metaphysical vein, that "the straight line is a curve, any part of which is similar to the whole", he was anticipating topology by more than two centuries. As for "packing", Leibniz told his friend and correspondent Des Bosses to imagine a circle, then to inscribe within it three congruent circles with maximum radius; the latter smaller circles could be filled with three even smaller circles by the same procedure. This process can be continued infinitely, from which arises a good idea of self-similarity. Leibniz's improvement of Euclid's axiom contains the same concept: https://en.wikipedia.org/wiki/Gottfried_Wilhelm_Leibniz.

For Leibniz the individual substance always has the same internal ‘principle of change’, which might include constant energetic drive or, in his terms, force (Leibniz, 1678) and is consistent with the role of a phononic mode. “The same term mode has been used by Spinoza, who denied the existence of true individuals, claiming all phenomena were different aspects or modes of a unitary whole” (Edwards,2020, 2023). Edwards view is that Leibniz’s concept of fundamental dynamic units, can also be associated with condensed matter ‘bodies’, capable of undergoing sequential relations of perception to world is plausible within modern physics. If the dominant monad for an ordered biological structure belongs to a form of collective mode and can be expected to last the lifetime of the structure, but respond sequentially to environmental patterns. A human conscious experience, of the sort we report to each other, reflects a direct causal interaction between a pattern of information about the world, encoded in a field of postsynaptic potentials, and a quantized mode of excitation occupying dendritic cytoskeleton. It is argued that the informer is likely to be

a higher order quantized collective mode with the biologically relevant dynamics likely also to be describable in classical terms (Edwards, 2020). A same principle has been proposed by Geesink and Meijer, 2016, for consciousness and collective sequential and ordered quantum modes found in superconductors and quantum materials, that show a BEC and EPR-behavior, show a same principle as has been found for living biomolecules and brain waves (Geesink, 2022d).

9. Consciousness as a Ladder System of Energetic Patterns: Evidence from Current Physics and Archetypical Sources

9.1. The Ladders of Discrete Electromagnetic Spins in a Toroidal Setting

It is proposed in the present review, that the nature of consciousness is a manifestation of a combination of 3D and 4D quantum entanglement and disentanglement, has a local and non-local nature and is mediated by wave-functions of bosonic and fermionic elementary particles as supported by a vacuum field. The waves can be imagined in the open strings at the top and bottom of the toroidal geometry as left, right rotating vortices in a curvature region and spin ladders. This implies that the same discrete coherent frequency pattern of EM quantum waves determines local and non-local states.

Spin ladders have many applications in different fields of quark physics, superconductors, and ultra-cold atoms, etc. The magnetic moments of molecules and atoms, normally linked to the spins of electrons are adjusted in a pattern with neighboring spins spelled in reverse directions. This is like ferrimagnetism and ferromagnetism, a manifestation of ordered magnetism. Theoretical and mathematical theories argue that the spin ladder system is an excellent medium through which the interaction between different spins can be mapped to an approximate Heisenberg-type coupling and with a coupling parameter that is inversely proportional to the distance between two separated spins (Younis, 2020). Vortex patterns can yield a rich parameter space for tuning into topologically non-trivial phases of a ladder system. The described ladder has two legs with spin-1/2 degrees of freedom at each lattice site and shows highly asymmetric couplings between nearest-neighbor spins, associated with the presence or absence of a vortex (De Gottardi, 2011).

Interestingly, DeGottardi et al., examined the connections between spin phases and topologically non-trivial phases of non-interacting fermionic systems, demonstrating the equivalence between the spontaneous breaking of global symmetry in spin systems and the existence of isolated Majorana modes. Employing the so called Kitaev ladder, they investigate topological properties characterized by the presence or absence of a vortex in each plaquette of the ladder. They conducted a detailed study of the ladder system in the presence of vortex arrays and showed that the presence of vortices can dramatically alter the topological properties of the system. The various conditions and configurations of vortices result in the isolation of Majorana modes, states at the boundaries of such phases. Majorana fermions are supposed to represent their own anti-particle and can exhibit a time reversal symmetry. The authors also discussed the power-law scaling of the residual energy density. They conclude that this avenue may unveil important physics from the perspective of non-equilibrium quantum critical phenomena as well as in realistic treatments of the dynamic manipulation of topological entities in quantum physics.

From the foregoing, a unified theory was proposed of consciousness, quantum mechanics, bioinformatics, gravity, that can be based on a multi-connected toroidal space connected with a monopole topology in a

quantum field, in which each state of the ordinary quantum system encodes the information about the state of the higher-dimensional system. This can also be applied in the field of Quantum cognition, mentioned above. So, it seems that preferential constructive, besides the known deconstructive behavior of human beings, is in line with the proposed physical principles of a toroidal geometry, that displays alternating coherent and decoherent features. We show here, that the coherent and decoherent energy states can be positioned in the known ladder system within a toroidal structure, in which the incoming energy trajectories are collected and stepwise offered to the central monopole to be confined by the inherent magnetic field to enable a systematic 3D to 4D transition and integration in the 4D information field or implicate order, see Fig.23. The latter is a bidirectional process in which, after an inside to outside (Möbius type) and/or a Majorana time reversal conversion, the particular energies undergo a similar ladder type of reversed sequencing. Here in fact a symmetric unfolding is implied into new trajectories with a reversed flux compared to the original inflowing energies. When, in this manner, alternating coherent and decoherent wave modalities are fully coordinated, as counter-flowing entities, subsequent superposition with other wave information are probably inherent to the dynamic evolution of the cosmos and if positioned in brain, the grow of conscious and unconscious states of individual consciousness.

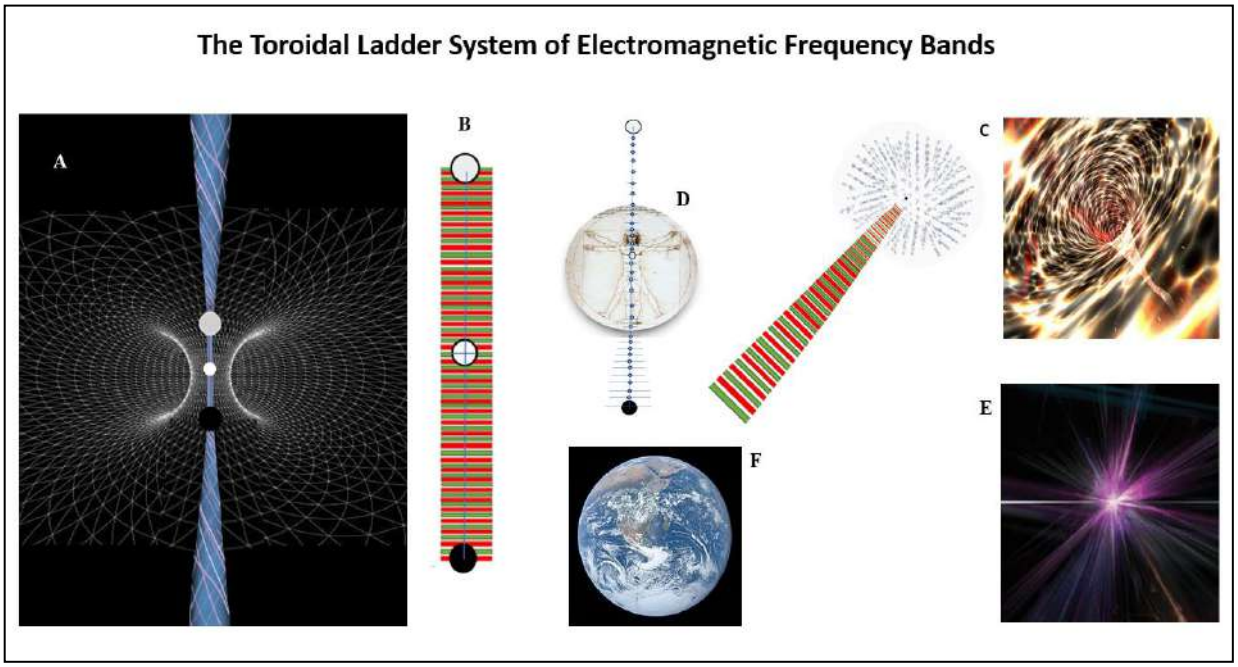


Figure 23. ***A:*** *Consciousness expressed in a ladder geometry, wormholes, and a monopole; consciousness of living being connected with a coherent wormhole in space positioned in cosmos (Geesink, 2024).* ***B:*** *Informational field and states in and around living beings. Entrances of white wormhole (depicted as grey), black wormhole (black) , monopole field (white) and ladder Pattern of* 12.2^n *: typical coherent states (green) and* 12.2^n *decoherent states (red); coherent states of living beings positioned at green transverse rungs, decoherent states positioned at red rungs, all positioned in a toroidal field.*; **C***: Wormhole dynamics;* ***D:*** *Geometries of a consciousness field of a human being, that is located at: 1) fibre bundles at the surface of a toroidal geometry, 2) white wormhole (depicted as white/grey), 3) black wormhole (depicted as black) and 4) monopole like structure entrance from 3D to 4D-space at a point located at the centre of the torus (depicted as white), called by Jung: Self;* ***E****: Monopole geometry;* ***F****: "Stairway to Heaven".*

9.2 Dualism and Non-Dualism

Aristotle noted that Pythagoras was the first person who took up the issue of “virtue” in philosophy. Aristotle turned to “the table of opposites” (the opposites arranged according to column at Metaphysics 986a22, after presenting his account of the philosophy of “the so-called” Pythagoreans (985b23), which has strong connections to the philosophy of Philolaus. The concept of “conscience”, as commonly used in its moral sense, is the inherent ability of a human being to perceive what is right and what is wrong and, on the strength of this perception, to control, monitor, evaluate and execute their actions. Such values of right or wrong, good or evil, just or unjust, or for example, fair or unfair, have existed throughout human history, but are also shaped by an individual’s cultural, political and economic environment. The dichotomy of "good and evil" is intensively discussed in religion, ethics, philosophy, and psychology and "good and evil" is a very common dichotomy in society (Geesink, 2022g).

This behavior of consciousness and “conscience” can be metaphorically conceived as a white hole, resulting from the coherent partof a toroidal field, that is coupled with a non-dualistic monopole field. The behavior of “no-conscience”, related to deconstructive interference, can be located at the proposed black hole, or decoherent part of a toroidal field, that is also coupled with a monopole field. The monopole field of a living organism can accordingly be regarded as an "inner voice"; Einstein often referred to the "inner voice" as a source of both moral and physical knowledge.

It is further considered that living organisms have a neurological system, based on quantum entanglement (Geesink, 2022d), that interferes with a consciousness field by tunneling through time and space making use of wormholes, through the “here-now” exploration of consciousness. A wormhole, also called an Einstein-Rosen Bridge, is a topological feature that would fundamentally be a shortcut through spacetime. Wormholes join distant or separate areas of physical space or spaces. It is proposed that the inner state of a living being has a pronounced inner field, that, in this manner gives access into a 4D-monopole like field, the so-called wormhole-access.

The closer our inner state of conscience identifies us with a deeper perception of moral concepts, it can be said that “conscience” is also related to the degree of integrity and honesty of each human being because it monitors and determines the quality of one’s actions. One who acts with a “clear conscience” has the advantage of feeling inner peace, which is a feeling that mitigates the adverse physiological effects experienced in times of stress. Conscience evaluates information to determine the quality of an action.

It is considered that living organisms make use of this 4D-bioinformatics in a process of Self-development, or called a developing Mind, that is also based on “innate ideas”. In the first stages of these processes a choice has been made to follow “quantum” path’s that have mainly a dualistic nature and is a combination of coherent (ordered), that is so linked to conscience and a second path called decoherent(more disordered) events and linked to no-conscience. It is further proposed that this dualistic principle also influences ordered and disordered thought forms. A same principle of dualism has been expressed in the Ying-Yang symbol. The Yin and Yang is a concept that originated in Chinese philosophy, describing opposite but interconnected, mutually perpetuating forces, see Fig. 24.

***Figure 24**. The Yin and Yang symbol with white representing Yang and black representing Yin. The symbol is a visual depiction of the intertwined duality of all things in nature, a common theme in Taoism. It is believed to be derived from the 14th century Tiandi Zhiran Hetu.*

A non-separation between coherent (conscience) and decoherent (non-conscience) behavior by intertwining the states of the white and black wormholes, is called a non-dualistic behaviour. "Advaita" from Sanskrit roots means "not-two", and means "nondualism", and is often equated with monism. One of the earliest uses of the word Advaita in the section with a discourse of the oneness of Atman (individual soul) and Brahman (universal consciousness is found in the “Brihadaranyaka Upanishad” (~800 BCE), and in the Mandukya Upanishad. Nondualism includes several philosophical and spiritual traditions that emphasize the absence of fundamental duality or separation in existence. This viewpoint questions the boundaries conventionally imposed between self and other, mind and body, observer and observed, and other dichotomies that shape our perception of reality (**https://en.wikipedia.org/wiki/Nondualism**).

It is proposed that duality occurs when the resonances of the toroidal pattern, positioned in the white and black holes are only partially experienced. On the other hand, non-duality occurs when all the discrete waves of the toroidal pattern, including the resonances in the white and black hole, both connected with a monopole geometry, are totally experienced. This presence of this combination of all coherent or all decoherent waves, as calculated by both proposed equations, will give a non-dualistic conscious and gives access to 4D. Access to these fields and the different electromagnetic patterned behavioral states positioned in the different wormholes can be described by the typical calculated states of the proposed equations of coherence of decoherence, see the equations of the 12 typical scalar functions $C_m(1)$ till $C_m(12)$.

9.3 Consciousness and Innateness according to Leibniz and Descartes

In the history of philosophy, the focus of the innateness debate has been on our intellectual lives: does our inherent nature include ideas, concepts, categories, knowledge, principles, etc, or do we start out with blank cognitive slates (tabulae rasae) and get all our information and knowledge from perception? Leibniz elaborated the theory in several important ways in his New Essays on Human Understanding. Leibniz so challenged Locke’s analogy (1689) of the mind as blank slate with a competing image of the mind as a block of marble whose veins already mark out the shape of Hercules. Leibniz argued that rationality must involve more than induction from contingent experience. Both Leibniz and Descartes claim that the mind is endowed with innate ideas which simply wait for the 'suitable occasion' to become conscious to the mind (López, 2023).

Summations of the different calculated scalar functions are related to innateness and can be expressed at the proposed fractional scales, also called a ladderfunction. It is considered that the proposed scaled ladder system functions as ladder’s transverse rungs, serving to bring the two opposing principles together:

coherent or order and decoherent or disorder. This naturally mimics the progression of life, as well as the evolving level of consciousness that living organisms may gradually attain. At the end of the ordered ladder a non-dualistic monopole field is aligning the particular information by confinement. Living beings, thus make use of a 4D dimensional informational space by evolving the different levels of consciousness, can make progress and embody different mental qualities, to be conceived as eigenstates of this so-called ladder system, see figure 25. A similarity can be found between this proposed and calculated ladder-structure (figure 25 A) and Jacob's Ladder, the "ladder" of Hilma af Klint, Jacob's Dream by William Blake, Doré's illustrated versionof Dante's Paradiso, the ladder of Osiris, the ladder of Biblical Hebrew, the ladder of Origen, the ladder of the New Testament, and the ladder of Dante. Ladders are depicted to a so-called Heaven and to a so-called Abyss.

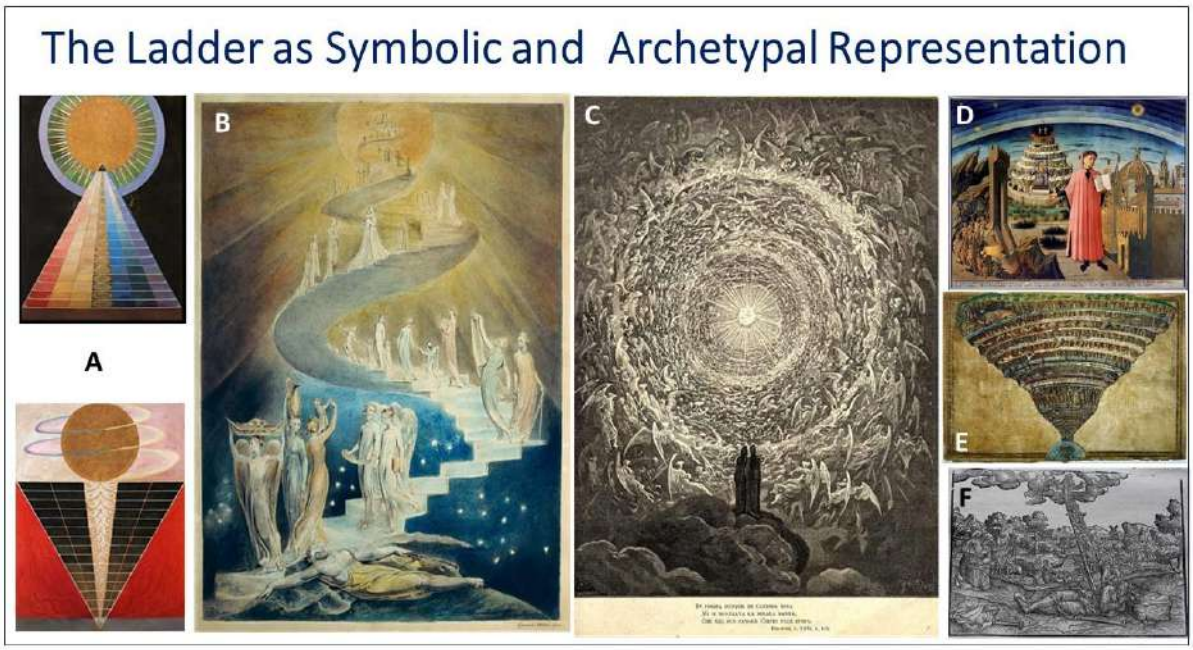


Figure 25. A: *Pictures Hilma af Klint referred to a "temple for a new era". The exact meaning remains open to interpretation. At the same time, her paintings were clearly intended to lead the viewer to levels of awareness beyond that of everyday life. Was it really a physical building she had in mind? Or was it something existing in another dimension? Dante and his Poem by Domenico di Michelino;* ***B:*** *Jacob's Dream by William Blake (c. 1805, British Museum, London)* ***C:*** *The Map of Heaven painting by Botticelli is one of the extant ninety-two drawings that were originally included in the illustrated manuscript of Dante's Divine Comedy, mid-1480s-mid-1490s, Engraving from Doré's, an illustrated version of Dante's Paradiso, Canto 31* ***D:*** *Picture of the Jacob's Ladder in the original Luther Bibles (of 1534 - 1545). The Map of Hell painting by Botticelli is one of the extant ninety-two drawings that were originally included in the illustrated manuscript of Dante's Divine Comedy, mid-1480s-mid-1490s.*

9.4 The Ladder of Osiris

One of the earliest mentioning's of the sacred passage or ladder to heaven is recorded on the wall of the Pharaoh Pepi I's pyramid located at South Saqqara. Pepi I ruled Egypt as the third king of the 6th dynasty (c. 2325-c.2150 BC) his pyramid texts record the following: "Hail to thee, O Ladder of God, hail to thee. O Ladder of Set. Stand up, O Ladder of God, stand up O Ladder of Set, stand up, O Ladder of Horus, whereon

Osiris went forth into heaven...", Pyramid of Pepi I (South Saqqara). The mentioning of the "ladder" recalls the old legend according to which the god Osiris was obliged to make use of a ladder whereon to mount from this earth to the platform of the sky.

The ladder was set up by Horus and Set, who stood one on each side of it, and, as Osiris lacked the strength necessaryfor mounting it, each of these gods placed two of his fingers under one of his shoulders and gave himthe impetus which took him up the ladder into heaven (The Egyptian Sûdân, Budge, 1907). The Famed Pyramid Texts also record the following: "O you four gods who stand at the supports of thesky, my father Osiris the King has not died in death, for my father Osiris the King possesses a spirit in the Horizon" - (Pyramid Texts) PT 556. "May a stairway to the Netherworld be set up for you to the place where Orion is, may the Bull of the Sky take your hand..."- (Pyramid Texts) PT – 610.

9.5. The Ladder of Biblical Hebrew

Jacob's Ladder (Biblical Hebrew) is a ladder leading to heaven that was featured in a dream the biblical Patriarch Jacob had during his flight from his brother Esau in the Book of Genesis. The story of Jacob's Ladder is a biblical tale, describing the process called enlightenment. A geometrical ladder that we mayclimb if we wish to reach a portal of a so-called heaven. As we climb, we may purify ourselves, our thoughts, habits and actions, so that we may reach the final steps of our ascent. The two parallel sidesof the Jacob's ladder represent two pillars: Boaz, on the left and Jachin, on the right. They reflect the positive and negative concepts of Yin and Yan, light and darkness, good and evil, which run across the planes of the universe. The ladder's transverse rungs serve to bring the two opposing principles together. They represent the progression of life through the Kingdom of nature, as well as the evolving level of consciousness that man may attain as he progresses up the ladder (*Jacob's Ladder – Wikipedi).*

9.6. The Ladder of Origen

Origen (c. 185 – c. 253) explains that there are two ladders in the life of a Christian, the ascetic ladderthat the soul climbs on the earth, by way of—and resulting in—an increase in virtue, and the soul's travel after death, climbing up the heavens towards the light of God (Origen, 238 and 244).

9.7. The Ladder of the New Testament

Jesus said in John 1:51 "And he saith unto him, Verily, verily, I say unto you, Hereafter you shall see heaven open, and the angels of God ascending and descending upon the Son of man." This statement has been interpreted as associating or implicating Jesus with the mythical ladder, in that Christ bridges the gap between Heaven and Earth. Jesus presented himself as the reality to which the ladder points;as Jacob saw in a dream the reunion of Heaven and Earth, Jesus brought this reunion, metaphorically the ladder, into reality (Adam Clarke, early 19th-century Methodist theologian and Bible scholar).

9.8. The Ladder of Dante, 1300

"Then the bright soul answered Dante's second question, "I have come so far down the rungs of the Ladder simply so that I can welcome you. I am not here because I love more than other souls — you can see brighter souls on the rungs of the Ladder". In the Seventh Sphere of Heaven, Dante encountersthe spirits of

people who dedicated their lives to prayer, climbing up and down a golden ladder. St. Benedictine tells Dante that the golden ladder is reaching up to the very Empyrean and explains the latter's nature. The Ladder stretched so far that Dante could not see its end. The Empyrean is the Highest Heaven of Dante's heavenly structure. The two silhouetted figures are Dante and his guide Beatrice looking up at the Saints and Angels. The Empyrean appears in Paradiso, the third book of Dante's The Divine Comedy (1320), after Inferno and Purgatorio, as a destination for Dante's long journey of the soul. It is considered that the ladder's transverse rungs serve to bring the two opposing principles together, may represent the progression of life through the nature, as well as the evolving level of consciousness that living organisms may attain as they progress up the ladder.

9.9 Dante's Divine Comedy

Empyrean is the Highest Heaven of Dante's heavenly structure. The two silhouetted figures are Dante and his guide Beatrice looking up at the Saints and Angels. The Empyrean appears in Paradiso, the third book of Dante's The Divine Comedy (1320), after Inferno and Purgatorio, as a destination for Dante's long journey of the soul. It is considered that Dante has described the informational eigen-states of living being and that the consciousness of persons is stored as patterns at "3x9+1 levels in circles and spheres" described in the "Devina Comedia", that obey a toroidal, monopole geometry and a dual ladder geometry. An analogy can be found with our proposed model of consciousness. Dante made subdivisions of the different natures of living beings, that can be positioned in the celestial spheres of Heaven, the Empyrean, Inferno and Purgatorio, as a destination for Dante's long journey of the soul. The connected "bright" and the "dark" states are also in Jung's "bright" and "dark" states in the Mysterium Coniunctionis (1963) and show a similarity with the proposed white and dark states in the consciousness model, that are not contradictions, but rather superpositions.

Also, the model of Leibniz seems to make use of the same principle: a so-called ladder system or called sequential monads, that seem to be collective sequential and ordered discrete modes. In this ladder system preferential "constructive" ordered rungs and "deconstructive" disordered rungs are the expressed patterns of scalars or frequencies in a ladder system, that is positioned in a toroidal and monopole geometry. The spatio-spectral ladder system in this model makes use of an ordering of 3D-state into a 4D-state. A same ladder system and spatio-spectral eigenmodes were found for our brain frequencies.

10. Overall Comparison of the Treated Consciousness Models

10.1. Introduction

Universe, space-time, matter, energy and information and even the emerging consciousness, are all ontologically equal partners in a single over-riding physical reality and can exhibit quantum entanglement. It is postulated that consciousness in the entire universe arises through integration of scale invariant, quantum entangled oscillations, that dependent on the medium at stake can take the form of photons and phonons as information carriers. Their dynamic flow behavior can be modeled by nested toroidal and magnetic monopole geometry projecting their guided trajectories of dynamic energy fields. In the brain of the human species, this takes the form of a proposed holographic workspace, that collects active (meaningful) information in a "brain event horizon" register, representing an integral model of the

actualized self. In line with this, the combination of coherent and decoherent brainwaves, as measured by EEG recordings, could also be approached by the principle of alternating eigenstate EMF frequencies (Geesink, 2023; Meijer, 2023).

The various aspects of consciousness models are listed in Table 4. Coherence, quantum mechanical aspects, role of elementary particles, as well as the presence of eigenstates, geometric and mathematical approaches, are the most involved aspects in the different consciousness models.

Table 4: Common Aspects of the Treated Consciousness Models

Name	Coherence	Coh./Decoh.	Quantum	Elem.particles	Eigenstates	Geometry	Model	Calculated
McFadden	v	-	-	-	v	-	v	-
Bond	-	v	v	-	-	-	v	
Kyoung-il	-	v	v	-	-	-	v	
Keppler	v	-	v	-	v	v	v	-
Mocombe	-	-	v	v	-	v	v	
Hameroff	v	-	v	v	v	-	v	-
Wendt	v	-	v	v	-	-	v	-
Ricciardi/Umezawa	-	-	v	v	v	-	v	-
Fingelkurz	v	-	v	-	v	-	-	-
Haramein	v	-	v	v	-	v	-	v
Pollard-Wright	v	-	v	v	v	-	v	v
Meijer/Geesink	v	-	v	v	v	v	v	v

The concept of “conscience”, as commonly used in its moral sense, is the inherent ability of a human being to perceive what is right and what is wrong. It is proposed that “conscience” is expressed by the coherent parts and can be calculated by typical scalars of coherence and decoherence as positioned in a toroidal field as harmonic and disharmonic trajectories, (Geesink, 2022g). Next to the toroidal field composed of alternating coherent and decoherent spaces, a centrally located magnetic monopole field exists, that

radiates magnetic impulses that are instrumental in the confinement of the electronic fluxes.

10.3. Comparison with the Psychological Concepts of Leibniz and Jung

Also, Leibniz surmised that there are many substances individually 'programmed' to act in a predetermined way, each substance being coordinated with all the others. This also represents a pre-established harmony which inherently solves the mind-body problem, but at the cost of declaring any interaction between such substances as a mere appearance. Leibniz proposed that there are infinite monads, which constitute the basic and immaterial elementary particles, or simplest units, that make up the universe. Interestingly, the model of the monads fits in our proposed acoustic model describing elementary particles: Bosons and Fermions obey to a typical discrete distribution of vibratory energies that both can be coherent and decoherent as mutually supplemental aspects. This particular similarity mirrors the so-called non-dualistic principle of an integral whole, including the first reason for the existence of all things: the "monas monadum".

There is also a fit with the model of Jung whose research led him to the hypothesis about the unity of the psychic and material worlds: that they are one and the same, just being different manifestations. He believed that this concept of the unus mundus could be investigated by means of researching the phenomenon of archetypes. The collective unconscious may represent the deepest level of the psyche, containing the accumulation of inherited psychic structures and archetypal experiences. Archetypes are not just memories but a qualia-type of energy centers with meaningful psychological information. According to Jung, archetypes are, therefore, innate patterns of thought and behavior that strive for realization within an individual's environment. A similar relation has been defined between the “bright” and “dark” states mentioned by Jung in Mysterium Coniunctionis (1963). There is also a deep link with the story of Dante’s in his book: Devina Comedia, that describes the dual principle of light and dark, that are related to the states of order and disorder.

Consciousness is also based on the aspects: “bright” or order and “dark” or disorder, and fits our toroidal and monopole model, that expresses the different energy eigenstates positioned in a so-called ladder system. The proposed scale and ladder system, serve to bring the two opposing principles together, represent the progression of life throughout nature, and reflects the evolving quality of consciousness that living organisms attain as they progress up this symbolic ladder. This ladder system, as another archetype, has already been expressed in many cultures and shown in many scriptures and paintings. We submit that living beings make use of the particular 4D dimensional informational space by taking the different levels of such a ladder system that can lead to an increased awareness in the perception of their own consciousness, by gradually recognizing the different positions of their entangled energy eigenstates. At the end of this coherent ladder with its sequence of harmonic steps, a 3D to 4D transition is offered by a monopole field with an inherent Möbius type of information flow (inside becomes outside and vice versa), by which a deep insight is attained and a dualistic principle is turned into a non-dualistic integral whole.

10.4 The Generalized Music Principle as Created from Cosmic Harmonics

The role of musical sound in discrete wave frequencies in the induction of very complex geometric patterns was earlier treated by us (Meijer and Geesink, 2016; 2017), based on the experiments of Chladni, as well as the experimentations in cymatics of Jenny and Waller). In these studies, sounds create clearly mathematical defined, distribution patterns of fragmented material on a flexible surface. These intriguing observations,

made quite long ago now, are still broadly mentioned in more recent physics. In Music and the Making of Modern Science, Pesic, 2014, even claims that the art of harmonics shaped today's science in line with the science philosophical study on Science and Art of the present co-author. Music resonates, it pulses, it leaps into our psyches. From a wide array of scientific research in music cognition, neurophysiology, genetics, acoustics, quantum physics, and own calculations and experiments, Pesic developed a set of principles and mathematical models to explain how we recognize and enjoy music. The theory proposes that life grows as a balance between resonance and damping, just like a vibrating string and that music perception is a built-in pattern matching between the harmonic geometry of sound and identical structures in the ear and brain. It is from this organic pattern matching process that the musical qualities of consonance, dissonance, tension, and resolution can be defined mathematically and then visualized geometrically as crystalline and quasi-crystalline structures, (see also Irwin, 2020; Hardy, 2016).

In quantum mechanics and quantum field theory, the ability of energy to travel freely through space is referred to as vacuum permittivity or the permittivity of free space and defined by an "electric constant" (see Fig. 26)**.** Each point (or quark) in the lattice requires a little extra space in order to oscillate and resonate, in which Phi provides in the phase-conjugate spacing of sinusoidal waves. Thus, the more harmonic and in phase the vibration, the more the so-called Phi gap comes into play and the more stable and coherent music and matter becomes, (see Fig. 26). This aspect made clear that the aspect of damping creates the stillness that is required to really discern the individual tones within an octave, and that the perception of music rather permittivity of free space as a function of the golden ratio. Harmonic standing waves sharing energy inside Phi-damping that provides the very separation of notes becomes manifest between the notes. The study of these in phase states is thus based on quantum coherence including the presence of decoherent waves and these aspects can be fully expressed in theoretical science behind such phenomena as lasers, superconductivity, and superfluidity.

In general, also the Harmonic Interference Theory of Merrick, 2009, 2010, offered a unified natural philosophy that merges ancient Pythagorean harmonic science with the quantum holographic model of Bohmian physics and holonomic brain theory. One of the key principles of Harmonic Interference Theory is the idea that coherent wave interference of any kind is recursive in space and time, nesting the same pattern inside itself synchronously to maintain coherence. Harmonic Interference Theory proposes that it is the flow of energy across these two "Phi-damping locations" that account for perceived qualities in music, such as consonance, dissonance, tension, and resolution (Fig. 26).

But what has music to do with brain function? Modern scanning studies have revealed a major influence of musical sound on brain activity and particularly in overall brain binding and connectivity. In this musical framework, it is of great interest that music is increasingly used in the therapy of brain disorders and cognition studies. Music engages much of the brain and coordinates a wide range of processing mechanisms. This naturally invites consideration of how music processing in the brain might relate to other complex dynamical abilities. Sanyal et al, 2016, stated: the tremendous ability that music has to affect and manipulate emotions and the brain. The study of music cognition is drawing an increasing amount of research interest. Like language, music is a human universal, involving perceptual discrete elements organized into hierarchically structured sequences. The change in the structure and form of music does clearly bring a change in the neural dynamics, inviting studies on the correlation of cognitive processes and a spectrum of musical modalities. Perlovsky (2009) made an interesting analysis of its relation with musical emotions, suggesting an evolutionary split in proto-humans into one of language, offering the potential for

differentiation, with an implicit loss of wholeness of the primordial unity of the psyche and another of music as a compensation for this.

Music, therefore, restores the deeper meaning of knowledge as an inborn instinct of harmony that, interestingly, is already manifest in babies beyond 4 months. Of note, music is seen now as an important instrument in the rehabilitation of disorders of consciousness and is likely associated with neuroplasticity. In this respect, significant effects of personally liked music on the brain level of certain neurotrophic factors, as well as on dopamine release and reward circuitry including endorphins, have been reported (Meijer, 2023). It is of great interest that, recently, striking results were reported on the treatment of Alzheimer's model in mice showing a clear reduction in amyloid plaques and improved cognitive performance, especially following a combination of visual (photonic) and 40 Hz acoustic brain stimulation. In this study the mice were treated with trains of tones repeating at various frequencies for one hour per day during seven days (Martorell, 2019), demonstrating the potential healing effect of such therapeutic music guided approaches that may have a toroidal geometric background. According to Koelsch, 2009, several studies demonstrated that music listening activates a multitude of brain structures involved in cognitive, sensory-motor, and emotional processing. It is likely that the engagement of these processes by music can have beneficial effects on the psychological and physiological health of individuals. In addition, neuro-scientific studies, in which music was used to investigate emotion and social cognition are reviewed, including illustrations of the relevance of these domains for music therapy. A recent review of Leggierri, 2018, discussed the in and outs of music intervention in Alzheimer's disease, showing that individualized music listening regimes provided the best outcomes and that they can have long-term effects on auto-biographic memory behavior and cognition. In our studies we also found a striking congruence of reported frequencies for photo-biomodulation of brain disorders by Hamblin et al., 2016.

Many examples of distinct EM frequency bands of brain cells, neurons, and different glands have been identified (see Geesink and Schmieke, 2022), that largely resemble the individual Eigen-frequencies of the geometric/acoustic pattern revealed in our studies. This supports the notion that communication of life information through coherent EM radiation is a widely spread phenomenon and that this aspect deserves further detailed investigation. We propose, therefore, that the pro-life EM frequency bands, identified in our studies may literally act in concert as "tonal octave-based symphony" to provide living systems, including the brain, with information embedded in such harmonic-like resonance patterns. Such "tonal" projections may organize synchronicity, both spatially and temporally in essential organs in the body (heart and brain). This "tuning" of life processes may originate from the proposed supervening resonance field, which in the brain imposes a coherent vibrating 3-D imprint in the cortical region, producing an *integral* modality of consciousness (Meijer and Geesink, 2017, Meijer, 2023). The relation between music, harmonics, and consciousness was also treated by Heyning 2017, interestingly both from the point of view of Pythagorean harmonics and modern physics.

It is of major importance in this respect, that recently a brain model was proposed based on a fractal information theory, derived from a geometric musical language that enables the brain to perform intelligent hypercomputing. It is based on the concept that any living system is part of music that is played in the universe and involves chains of resonances in the fractal brain structure, with at all levels a specific micro-clock in a nested configuration ranging from macromolecules down to atoms. This a type of fractal information processing in the brain was earlier proposed by us Meijer and Geesink, 2017, Meijer 2023. Interestingly, and in accordance with our concept, the group of Bandyopadhyay (Agrawal, 2017; 2018,

Sahu, 2013; 2015) found evidence for firing *below the synaptic threshold* in EMF-guided information processing in the brain according to the proposed algorithm of coherent frequencies. The particular oscillatory activities are supposed to be generated not only in microtubuli but also in many other protein complexes in the cell, that is, clearly in a fractal setting that is expressed in circular and periodic modes in 12 fractal memory layers.

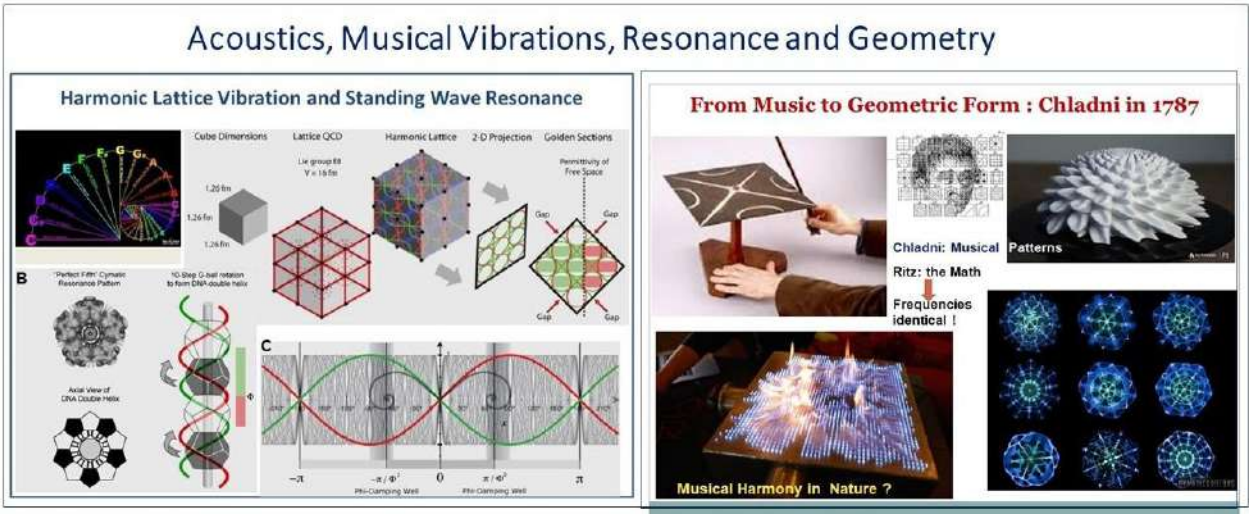


Figure 26: *Left,* ***A:*** *Spiral representation of harmonic tone relations and lattice vibration, showing permittivity and Golden mean aspects;* ***C:*** *Standing wave resonance in acoustics showing Fibonacci like type of tone separation in dark grey zones, as also seen in life systems such as DNA (B). Right: Sound induced geometric patterns by excitations of sand covered plates (Chladny), as also calculated by Ritz.*

The authors developed an innovative technique of atomic resolution scanning dielectric microscopy enabling the observation of the operation of a resonating single protein (Agrawal, 2016). The multi-layer memory may operate on the basis of 3-D resonance chains that also contain un-occupied elements that can be filled up by electromagnetic oscillator activity to produce proper information processing in the required integrated time cycles, resembling the concepts for superconductors (Geesink and Meijer, 2019). In the brain, Bandyopadhyay et al. identified 350 different classes of cavities in the nested (fractal) 12 layers and described each *cavity resonator as an octave musical flute* that together with silence periods collectively generates the known brain rhythms. Their fundamental basis is fractally organized, geometric information that finally becomes expressed in the EEG. They identified 12 discrete resonance frequencies, with solitonic (quasi-wave-particle) frequencies, very much resembling the mathematics of our GM-scale EMF pattern (Geesink and Meijer, 2018). As mentioned above, we submit that the periodic circular/spiral energy trafficking in the brain is organized according to in nested toroidal geometry, in which each oscillation returns to itself in a self-referential manner, thereby tentatively explaining the aspect of self-consciousness. As mentioned above, we suggested that “electromagnetically seen, we may be living in a “diluted plasma” with natural coherent quantum resonances.

11. Conclusions: A Unified Concept for an Acoustic Guided Cosmic Evolution and Scale-invariant Consciousness

From the collective observations, listed above, it can be inferred that our Universe with its amazing spectrum of inanimate matter forms and animated creatures, was and still is guided by a unified general algorithmic principle that is fundamentally expressed as a series of 12 ground scalars (numbers). This should be envisioned as a primordial frequency/phonon spectrum, generally supposed in physics as the quantum wave fluctuations of sound that acted as cosmic seeds, and that initiated the very creation of the Universe. This process can be viewed as the unrolling of entangled information from an implicate order, in a pre-Big-Bang context.

Both the becoming and future of the Universe might therefore be viewed as an unfolding of primordial information provided by a cycling universe (Linde, 2003, Steinhardt, 2007, Penrose, 2010). Bekenstein, 2003, a former student of Wheeler, and more recently Verlinde, 2011, confirmed his idea that atoms and their constituting elementary particles can intrinsically store basic and physical information in the form of mass, spin, polarization, and momentum and that this information can being seen as stored in bits or Qubits through holographic projection on a virtual screen**.** Importantly this holographic model applies both to the micro- (elementary particles/atoms) and macro- (black holes) levels.

In the process of composing this article, we discovered that the proposed primordial acoustic quantum code with its coherence equation (biophysical principle hypothesis of Geesink and Meijer), numerically connects various current concepts for consciousness: the Orch-OR theory of Hameroff and Penrose, 2014, the Microtubular vibration concept of Bandyopadhya, The Life Creation model of Wong et al. 2020, the Event Horizon Brain concept of Meijer and Geesink, 2017, as well as that of ZPE-mediated consciousness of Keppler and finally the Holographic Universe of t'Hooft, Susskind and Bekenstein.

The proposed code of a discrete EMF frequency pattern brings it all together through a normalized acoustic and musical-like algorithm that was earlier revealed by us. This numerical pattern can now be conceived as integrating the quantum wave aspects related to life, consciousness, and cosmological information processing. Our concept also touches upon the cosmic toroidal model of Haramein et al., 2016 as well as that of Hameroff and Penrose, who proposed the Orch-OR theory. Our studies now demonstrate the integral cosmic context in showing the resonant relation of the human brain neurons with vibrations at an adapted Planck scale, while the frequency congruence with gravitational waves, ZPE field oscillations, and energy distribution of Bosons and Bosonic BSE condensates reveal the deep primordial connections with the cosmos.

The remarkable finding that EMF-wave frequency distribution in nature exhibits a distinct fractal pattern of 12 tones, multiplied by 2^n of which n are integers, firstly at the cosmic level (Gravitational waves, and ZPE field oscillations), is supplemented by observations at the meso-level of evolutionary Life processes, in coherent Brain (EEG) and neuronal tubular EMF peaks, while at the very micro-level, we revealed this pattern in Boson, BSE and EPR Energy distribution. Finally, we detected the acoustic pattern in superconductive materials, phyllosilicate minerals, entanglement promotion in physics, this in addition to black body oscillations at a Planck scale.

The central question therefore arose: what is the origin of this "informational music code", that was shown to be accommodated by a Pythagorean music theory, and how can even primordial cosmic processes, take

such a recent algorithm into account? Although this may be related to a reconstructive (retro-causal) or cyclic rebound types of our universe, it stands to reason that our brain and thus, those of the Greek and Chinese philosophers, was hardwired for the conception of a geometry-based harmonic music theory, that now is applied in our model of an acoustical quantum code of resonant coherence, guiding the cosmos in a scale invariant manner.

In this framework, a new model for scale-Invariant human (self)-consciousness could now be proposed, that involves a 4D quantum information field, providing a 4D memory workspace that is associated but not reducible to the brain. Living organisms make use of the different quantum aspects of constructive and deconstructive interference, described by both proposed equations of coherence and decoherence, that can be expressed by toroidal- and by a monopole geometry. We hold that a more balanced behavior of human beings can be achieved if such aspects of coherent and decoherent states are integrated in a balanced manner. This implies that all of us are connected to a Cosmic framework and are active participants in the evolution of Universal consciousness.

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Appendix 1.

Quantum informational code: calculated examples of coherent frequencies from sub Hertz till PHz

Factor	F1,m	F2,m	F3,m	F4,m	F5,m	F6,m	F7,m	F8,m	F9,m	F10,m	F11,m	F12,m
m=0	1.0000	1.0535	1.1250	1.1852	1.2656	1.3333	1.4142	1.5000	1.5803	1.6875	1.7778	1.8984 Hz
m=1	2.0000	2.1070	2.2500	2.3704	2.5312	2.6666	2.8284	3.0000	3.1606	3.3750	3.5556	3.7968 Hz
m=2	4.0000	4.2140	4.5000	4.7408	5.0624	5.3332	5.6568	6.0000	6.3212	6.7500	7.1112	7.5936 Hz
m=5	32.000	33.712	36.000	37.9264	40.4992	42.6656	45.2544	48.000	50.5696	54.000	56.8896	60.7488 Hz
m=8	256.00	269.70	288.00	303.41	324.00	341.33	362.04	384.00	404.54	432.00	455.12	486.00 Hz
m=12	4.0960	4.3151	4.6080	4.8546	5.1839	5.4613	5.7926	6.1440	6.4729	6.9120	7.2819	7.7759 KHz
2^24	16.777	17.675	18.874	19.884	21.233	22.370	23.726	25.166	26.513	28.312	29.827	31.850 MHz
2^32	4.2950	4.5248	4.8318	5.0904	5.4357	5.7266	6.0739	6.4425	6.7873	7.2478	7.6356	8.1536 GHz

2^40	1.0995	1.1583	1.2370	1.3031	1.3915	1.4660	1.5549	1.6493	1.7376	1.8554	1.9547	2.0873 Thz
2^48	281.47	296.53	316.66	333.60	356.23	375.29	398.06	422.21	444.81	474.99	500.41	534.35 Thz

532.5	505.6	473.4	449.3	420.8	399.5	376.6	710.1	674.0	631.3	599.1	561.0 nm

Appendix 2. Table of coherent wavelength's according to calculated algorithm

1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	
136.33	*129.41*	*121.18*	*115.08*	*107.73*	*102.25*	*96.41*	*90.89*	*86.265*	*80.79*	*76.685*	*71.815*	*mu*
73.35	*77.27*	*82.52*	*86.90*	*92.83*	*97.80*	*103.72*	*110.02*	*115.92*	*123.78*	*130.40*	*139.25*	*cm-1*
68.165	*64.705*	*60.59*	*57.54*	*53.865*	*51.125*	*48.205*	*45.445*	*43.133*	*40.395*	*38.343*	*35.908*	*mu*
146.70	*154.55*	*165.04*	*173.79*	*185.67*	*195.60*	*207.45*	*220.05*	*231.84*	*247.56*	*260.80*	*278.49*	*cm-1*
34.083	*32.353*	*30.295*	*28.77*	*26.933*	*25.563*	*24.103*	*22.723*	*21.567*	*20.198*	*19.172*	*17.954*	*mu*
293.40	*309.1*	*330.09*	*347.58*	*371.29*	*391.19*	*414.89*	*440.08*	*463.67*	*495.1*	*521.59*	*556.97*	*cm-1*
17.0416	*16.176*	*15.148*	*14.379*	*13.465*	*12.781*	*12.050*	*11.361*	*10.784*	*10.099*	*9.5854*	*8.9766*	*µm*
586.80	*618.2*	*660.17*	*695.48*	*742.66*	*782.39*	*829.87*	*880.21*	*927.33*	*990.24*	*1043.25*	*1114.00*	*cm-1*
8520.8	*8088*	*7573.84*	*7189.28*	*6732.56*	*6390.64*	*6025.04*	*5680.48*	*5391.84*	*5049.28*	*4792.72*	*4488.32*	*nm*
1173.6	*1236.4*	*1320.33*	*1390.96*	*1485.32*	*1564.79*	*1659.74*	*1760.42*	*1854.65*	*1980.48*	*2086.5*	*2228.00*	*cm-1*
4260.4	*4044.*	*3786.*	*3594.6*	*3366.*	*3195.*	*3012.*	*2840.*	*2695.*	*2524.*	*2396.*	*2244.*	*nm*

	0	*92*	*4*	*28*	*32*	*52*	*24*	*92*	*64*	*36*	*16*	
2347.19	*2472.8*	*2640.67*	*2781.92*	*2970.64*	*3129.58*	*3319.48*	*3520.83*	*3709.31*	*3960.96*	*4173.00*	*4456.01*	*cm-1*
2130.2	*2022.0*	*1893.46*	*1797.32*	*1683.14*	*1597.66*	*1506.26*	*1420.12*	*1347.96*	*1262.32*	*1198.18*	*1122.08*	*nm*
4694.4	*4945.6*	*5281.33*	*5563.84*	*5941.28*	*6259.15*	*6638.96*	*7041.66*	*7418.62*	*7921.92*	*8345.99*	*8912.02*	*cm-1*

Appendix 3.

Proposed scale for Quantum order and disorder, June 2023

		PYTHAGOREAN			Geesink- Meijer			EQUAL TEMPERAMENT		
ordinal	*note*	*Freq. ratio*	*Decimal*	*Cents*	*Freq. ratio*	*Decimal*	*Cents*	*Freq. ratio*	*Decimal*	*Cents*
octave	**C**	1	1	**0**	1	1.0000	**0**	1	1	**0**
	D^{b}	$\frac{256}{243}$	1.0535	**90**		1.0535	**90**	$\sqrt[12]{2}$	1.0595	**100**
second	**D**	$\frac{9}{8}$	1.1250	**204**		1.1250	**204**	$\left(\sqrt[12]{2}\right)^{2}$	1.1225	**200**
	E^{b}	$\frac{32}{27}$	1.1851	**294**		1.1852	**294**	$\left(\sqrt[12]{2}\right)^{3}$	1.1892	**300**
third	**E**	$\frac{81}{64}$	1.2656	**408**		1.2656	**408**	$\left(\sqrt[12]{2}\right)^{4}$	1.2599	**400**
fourth	**F**	$\frac{4}{3}$	1.3333	**498**		1.3333	**498**	$\left(\sqrt[12]{2}\right)^{5}$	1.3348	**500**

	G^b	$\frac{1024}{729}$	1.4047	**588**		1.4142	**600**	$\left(\sqrt[12]{2}\right)^6$	1.4142	**600**
fifth	**G**	$\frac{3}{2}$	1.5000	**702**		1.5000	**702**	$\left(\sqrt[12]{2}\right)^7$	1.4983	**700**
	A^b	$\frac{128}{81}$	1.5802	**792**		1.5803	**792**	$\left(\sqrt[12]{2}\right)^8$	1.5874	**800**
sixth	**A**	$\frac{27}{16}$	1.6875	**906**		1.6875	**891**	$\left(\sqrt[12]{2}\right)^9$	1.6817	**900**
	B^b	$\frac{16}{9}$	1.7778	**996**		1.7778	**990**	$\left(\sqrt[12]{2}\right)^{10}$	1.7818	**1000**
seventh	**B**	$\frac{243}{128}$	1.8984	**1110**		1.8984	**1110**	$\left(\sqrt[12]{2}\right)^{11}$	1.8877	**1100**
octave	**C**	2	2	**1200**		2.0000	**1200**	2	2	**1200**

Pythagorean scale

Quantum order:

Equation for standing waves, along the fibre bundles and points located at the surfaces of the nested toroidal geometry:

$$E_n = \hbar\, \omega_{ref}\, 2^q\, 3^m$$

E_n: Energy distribution
ω_{ref}: reference frequency 1 Hz
$\hbar$: reduced Planck's constant
q = n + p
n: series of integers and 0.5
p: series of integers: <-4, till > +52
m: series of integers.

E_n: Energy coherent state n: n =1 till > 12 x 52; $\hbar$: Reduced Planck's constant; frequency. ωref: 1 Hz, q = n+p; n: series of numbers: 0, 0.5, 2, 4, 5, 7, 8, -1, -3, -4, -6, -7; p: series of numbers: <-4, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6, > 52; m: series of numbers: 0, 1, 2, 3, 4, 5, -1, -2, -3, -4, -5

Disorder (just in between the ordered states):

An equation is proposed for decoherent disentangled or entropic states:

$$E_x = 10^{(0.5 \log E_n + 0.5 \log E_{n+1})}$$

E_x: Energy decoherent state x (x =1 till > 12 x 52); En: Energy coherent state n (n =1 till > 12 x 52)