Life and Consciousness are Guided by a Semi-Harmonic EM Background Field

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ABSTRACT

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 space/ zero-point energy 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 DNA and hydrated proteins in the cell, including several cell types in the human brain. Consciousness is seen as arising through interaction of life systems with a holographic, field-receptive workspace, that is associated with the brain as a global supervening memory horizon, that is organized through toroidal geometry. Implications for a better understanding of the creation of first life, crucial coherent states in quantum biology, the impact of biofield research and the importance of information in the fabric of reality are discussed. This knowledge can be applied in improving high temperature superconductive properties and the dedicated design of innovative technology for the protection against the potential detrimental effects of EMF in our present world. Our studies show a consistent pattern of discrete EMF frequencies in a wide spectrum of animate and non-animate systems, indicating that a previously unknown biophysical principle seems to be revealed.

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The Science-Historical Background for the Present Work

At the time that Erwin Schrodinger published his book on "What is Life" in 1944, he was left with a question: what is the physical mechanism that provides the neg-entropic accumulation of life information in cells so that they can survive and reproduce? It lasted a few decades until Herbert Fröhlich postulated that the potential answer could lie in coherency of wave information, while Fritz-Albert Popp pioneered in researching a potential mechanism for ultra-rapid intracellular communication in revealing a potential signaling system: the biophoton. (Popp *et al*., 1994, 2002). If photons are involved, one speaks implicitly about electro-magnetism and the cell *electrome,* (Fig.1). Much later Stephen Hawking (1988) proclaimed: everything that matters in the universe is electro-magnetic field activity. The force field idea reached back to David Bohm who advocated the idea that our world is steered by pilot waves that emerge from a quantum fluctuating domain that cannot be observed: the implicate order that was later interpreted as the zero-point energy field or a superfluid quantum space (Keppler, 2012; Sbitnev and Fedi, 2017).

It was the Nobel laureate Wilzcek, who claimed that fabric of reality comes about by harmonic relations of discrete wave frequencies displaying beautiful patterns, among others reflected in the color-spectrum (Wilzcek, 1987). Sir Roger Penrose

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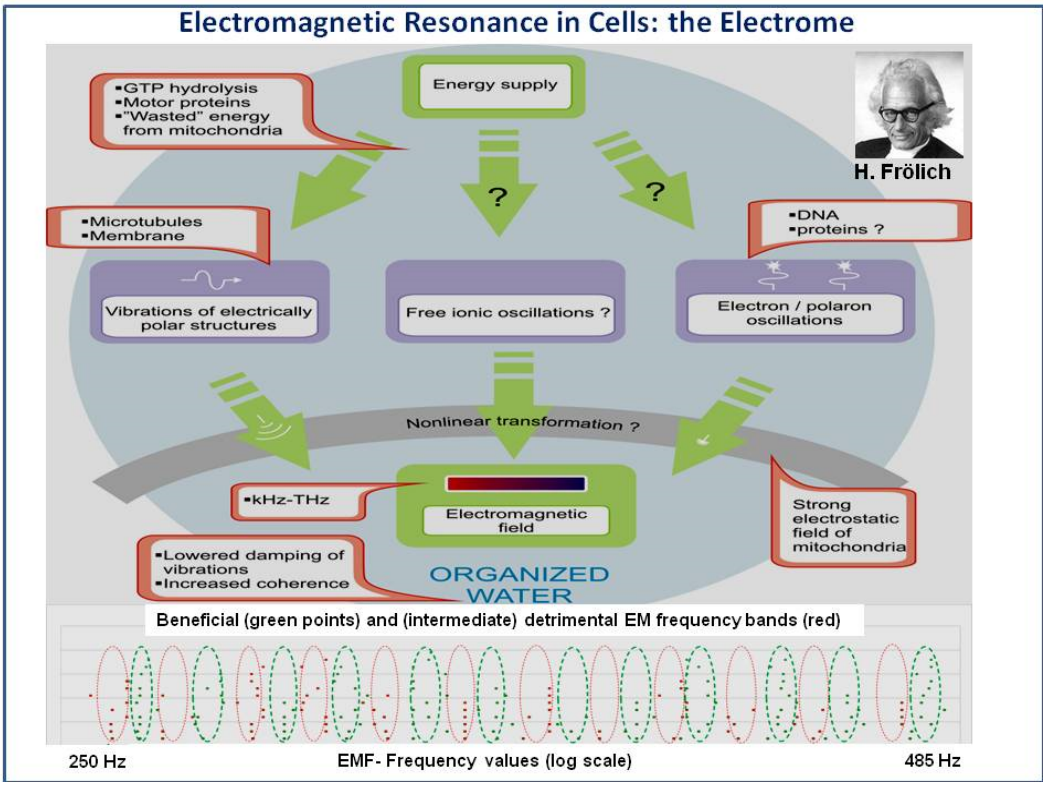

Figure 1. The EM resonance aspect of the integrate cell (electrome) with oscillating constituents at various intracellular sites (green arrows). Bottom part: EM field frequency band pattern of coherent (green points) and non-coherent values, as revealed in a meta-analyses of biomedical literature (see Geesink and Meijer, 2016).

went even deeper by claiming that consciousness in the brain arises from a sort of resonance of tubulin proteins and neuronal communication with vibratory ripples of the supposed smallest scale in the known universe: the Planck scale (Penrose and Hameroff, 2011). Gravitational activity at this extreme micro-level would induce the recognition of basic information required for consciousness: the so-called qualia. Yet, knowledge on the discrete values of the crucial quantum wave frequencies at stake remained scattered, and it was a meta-analysis of biomedical literature, treated in the present paper, that revealed qualitative and quantitative properties.

The particular pattern of EMF frequencies detected by us, fitted modern music theory that finds a basis in an ancient 12-tone octave-like semi-harmonic structure. The grounding mathematics with real and complex (imaginary) numbers predicted a rotatory feature that introduced the idea of vortices and even toroidal geometries. The fractal nature of this life algorithm suggested a cosmic dimension from longitudinal soliton waves from black holes down to vortice-like energy distribution at the Planck scale, as a meta-language of nature. A scale invariant toroidal operator, displaying a communicative wormhole structure emerged as a connective principle in the universe. The self-referential aspect of torus trajectories and knots pointed at a relation with the reflective states of human self-consciousness. Scientific endeavor is conceived as a product of our consciousness in which a part of nature investigates another part in full detail. The latter aspect, obviously, raises the critical question: how can current science neglect the phenomenon of consciousness being the very basis for performing science and write about it ? (Meijer, 2018).

In the present short review, an attempt is made to integrate the various concepts of the authors in a comprehensive treatment of the physics of life and consciousness, realizing that life in the cosmos cannot do without fine- tuned collective modalities of information.

Discovery of a Semi-harmonic EMF- Spectrum in Life Systems

A biophysical basis for a spectrum of discrete electromagnetic field (EMF) frequencies, that were shown to affect health and disease, was elaborated and generalized (Meijer and Geesink, 2016; Meijer and Geesink, 2017; 2018 d). The particular EMF pattern was earlier revealed by us through a meta-analysis of more than 500 biomedical publications that

reported life-sustaining as well as life-decaying EMF frequencies. The detected eigen-frequencies could be arithmetically scaled according to a corresponding music theory, based on an adapted Pythagorean tuning. The particular semi-harmonic scale exhibits a core pattern of twelve eigenfrequency functions with adjacent self-similar patterns, according to octave hierarchy (Geesink and Meijer, 2016; Meijer and Geesink 2016; 2017a; Geesink and Meijer 2018d). It should be realized that this frequency pattern reflects experiments in which the life systems were exposed to *external* EMF radiations, as well as influenced by the presence of endogenous frequencies. We postulated that this coherent pattern is effective because it mimics *internal* oscillations within the organism and its constituting cells, and acts through resonant communication, as extensively discussed in literature by many others, (see Hammershlag *et al*., 2016; Muehsam and Ventura, 2014; Rouleau and Dotta, 2014). It has been found by us recently, that about 20 different infrared spectra of biomolecules: proteins, lipids and DNA can be described by the proposed quantum wave equation by making a discrimination between coherent, decoherent and transition frequencies (to be published). Transition frequencies are meant here as the poised condition between coherent and decoherent states, that occur in order to switch between order and disorder. This functions as a start to assemble biomolecules by folding and twisting motions, or disassemble them by de-folding, and untwisting, or even implies a route to cell-death.

Our studies should be seen in the light of the rapidly expanding areas of this Biofield Research, including that of Quantum Biology, as adequately reviewed by Lambert *et al*., 2013 and Marais *et al*., 2018.

The Mathematical Basis for a Generalized Music Scale

A more detailed mathematical analysis (Geesink and Meijer, 2018a) shows that the derived arithmetical scale exhibits a sequence of unique products of integer powers of 2, 3 and a factor $\sqrt{2}$. These discrete eigenfrequency values can be related to supposed bio-resonance of solitons or polaron quasi-particles in life systems. Bio-solitons are conceived as self-reinforcing solitary waves, that are constituting local fields, being involved in intracellular geometric ordering and patterning, as well as in intra- and intercellular signaling. The discrete pattern of EM wave frequencies is mathematically expressed as follows:

$$E_n = \hbar\, \omega_{ref}\, 2^n\, 3^m\, (2^p)$$

(E_n : Energy distribution, ω_{ref} : Reference frequency 1 Hz, $\hbar$: Reduced Planck's constant,

n : Series of integers: 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)

A Novel Bio-physical Principle in Nature?

What can be concluded from the spectrum of data from our recent publications and the literature data of others that turned out to be compatible with the GM-scale ? (see Table 1). First of all, it should be clear that these concepts are based on the notion that nature is quantized according to the principles of quantum mechanics. If we assume that also electromagnetic fields have a quantized character, it follows that EM frequencies can only occur at discrete eigenvalues: to be defined as standing waves at typical frequencies. Such standing waves are able to interact and can produce constructive interference patterns that have a discrete character composed of eigenvalues.

Subsequently, multiple meta-analyses of literature (see Table 1) were performed for EMF frequencies that influence cancer (Meijer and Geesink, 2018a), promote entanglement in EPR studies (Geesink and Meijer, 2018c), in addition to energy distribution of elementary particles of the Standard model (Geesink and Meijer, 2018c), as well as manifest energy gaps in superconducting materials(Geesink and Meijer, 2019a). The latter study on so called High Temperature Superconductors (HTSC's) showed distinct energy cap frequencies patterns, in which frequency ratios of 2:3 (third harmonic) are incorporated in ratios of 1:2 (fundamental acoustic frequency ratios).

We propose to apply semi-conductive smectites (phyllosilicates), studied in detail by us earlier, and that radiate GM-like EMF frequencies, in combination with HTC superconductor materials, to further improve superconductive properties as a modality of intrinsic quantum lasing. Our observations also highlight a potential quantum bridge between superconductive properties in physics and biology.

Most recently, we studied EMF (IR) absorption frequencies of pure water (Geesink *et al*., 2019b). It was concluded that water molecule assemblies show electromagnetic and electronic collective states

that contain "quantum imprints or moulds" for living cells. A potential explanation for this feature is that water molecules are ordered in a partially distorted tetrahedral geometry and related network structures.

Since water molecules, in principle, exhibit a comparable distribution of coherent EMF bands in the fluid assemblies in living cells, superposition of these wave patterns with those of plasma components will occur and a mutual wave resonance interaction between cytoplasm and macromolecules of life matter with the surrounding water molecules can be expected (Fig. 2). Among others long-distance, soliton mediated influence can be expected in the 3-dimensional folding of life-proteins in which oscillation of structured and wave-coherent water molecules could play a distinct guiding role (Meijer and Geesink, 2018; Melkikh and Meijer, 2018). Without exception, the above-mentioned studies demonstrated a striking fit of the reported EM frequencies with the coherent GM-scale. The water spectral patterns in a surrounding of ordered and disordered matter can be used as a biomarker for a health diagnosis, in which 12 absorbance frequencies in the spectrum are related to molecular structures and coherent domains (Tsenkova, 2018).

Harmonic Brain Oscillations and Supervening Memory Space

We applied the long-distance EMF guiding principle also to the longstanding question on the brain mechanisms that are instrumental in the creation of (self)-consciousness and postulated that a supervening memory space is required to explain ultra-rapid brain responses and the presence of qualia as well as transpersonal experience, (Meijer and Geesink, 2017). It was postulated that consciousness in the whole universe, arises through scale invariant, and nested toroidal coupling of various energy fields. In the brain of the human species, this takes the form of the proposed holographic workspace, that collects active information in a "*brain event horizon*", representing an internal and fully integral model of the self. This brain-supervening workspace is equipped to convert integrated coherent wave energies into attractor type/standing waves, employing photon resonance that guide the related cortical template to a higher coordination of reflection and action as well as network synchronicity, as required for conscious states.

The concept of harmonic brain waves was recently supported by Atasoy *et al*., 2018, observing harmonic vibration patterns related to the brain

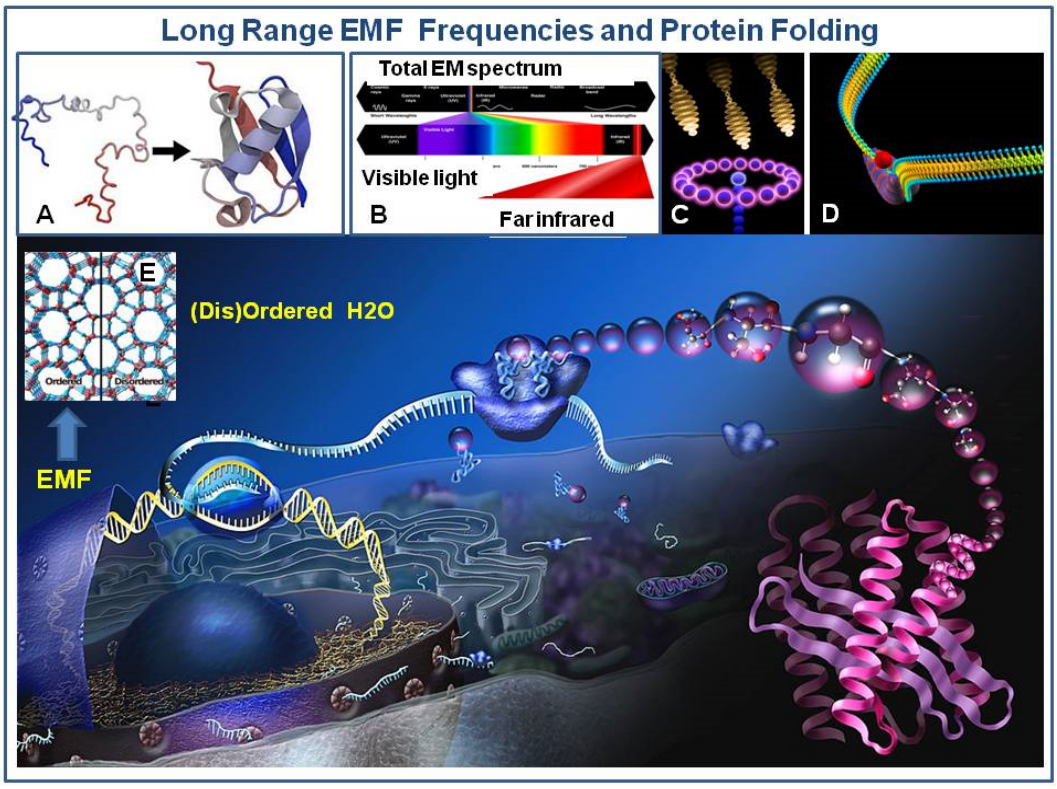

Figure 2. Soliton/phonon guided protein folding, depicting protein synthesis from DNA/RNA (left) to linear amino-acid chain (middle) and final folding to 3-D conformation (right). Inset in the middle shows: EMF-mediated structuring of water in hexagonal geometry, and on top, (A): Protein folding from linear AA chain; (B): electromagnetic field spectrum with visual and far-infrared parts; (C): phonon induced coherent vibration domain (BE-condensation) and (D): soliton/polaron travelling along a protein backbone

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. The proposed 4-D aspect of brain memory was directly shown in the fMRI studies of Tozzi and Peters, 2016, 2017, demonstrating repetitive modular electric oscillations, that were modeled as a 4-D-hypersphere that produces 3-D antipodal activities on the particular cortical surfaces.

The presence of a field-receptive resonant workspace, associated with, but not reducible to, our brain, may provide an interpretation framework for widely reported, but poorly understood transpersonal conscious states such as NDE and clairvoyance, as well providing a potential algorithm for the origin of life, (Meijer and Geesink, 2018; Melkikh and Meijer, 2018). It also points out the deep connection of mankind with the cosmos and our major responsibility for the future of our planet (Fig. 3).

EMF GM-principle Revealed in Animate and Non-animate Systems

Accompanying literature search, revealed very similar frequency patterns in, among others, the color spectrum, for wave resonances of phyllosilicates (clay materials), the plasma-protein albumin and various nucleotides in aqueous solution, as well as for a candidate RNA-catalyst (see **Table 1**). The latter findings may imply that EMF guiding played a crucial role in the creation of first life in pre-biological evolution (Meijer and Geesink, 2018b). The collective evidence indicates that discrete quantum coherence, entanglement and superconductivity may not only be prerequisites for life, but that similar frequency patterns may operate also in non-animated physical materials. We argue therefore that a novel bio-physical principle could be involved.

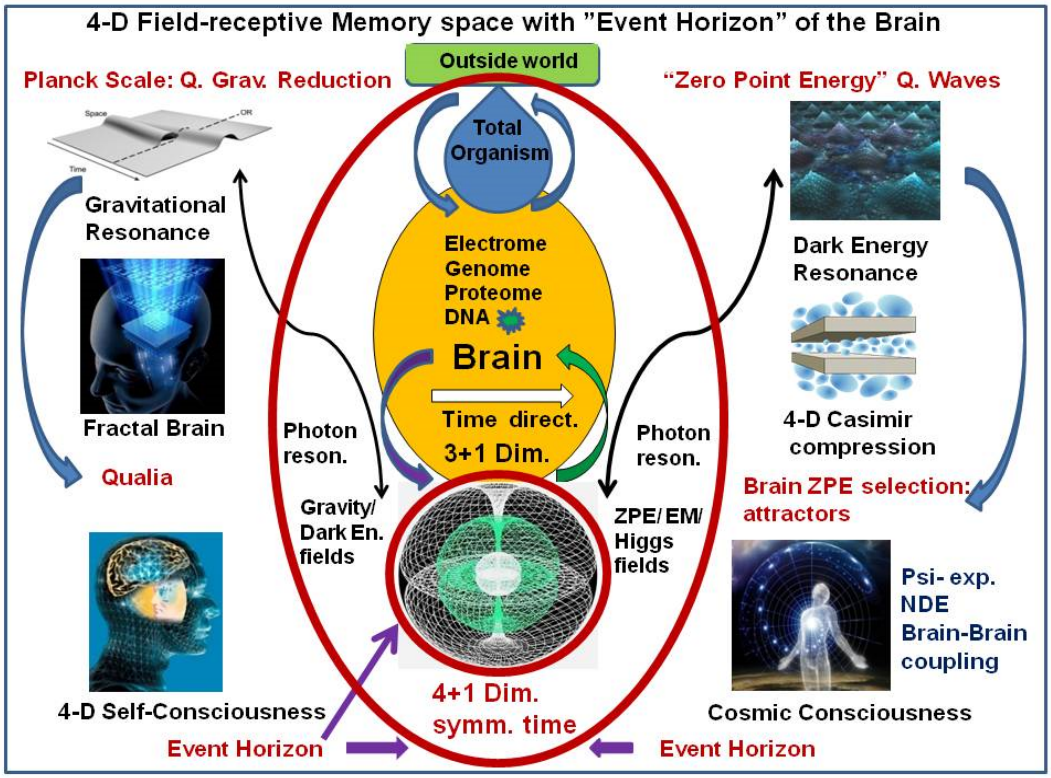

Figure 3. Modeling of brain/mind relation in a 4+1-dimensional space-time framework (4+1 implies 4 spatial dimensions and one single dimension of time, on the basis of energy trajectories in a nested toroidal geometry. The opposing forces of Dark energy (diverging force) and Gravity (converging force) as well as discrete wave frequencies of electromagnetic fields, are instrumental in the generation and compression of individual life information. The human brain may receive quantum wave information directly derived from the Planck space-time level (left above) through quantum gravity mediated wave reduction, as well as through resonance with the ZPE field (right above). Our brain can perceive only 3+1 dimensions with a one-directional arrow of time. The material brain and its 4+1-D supervening field-receptive mental workspace should be seen as an integral whole, until the bodily death of the organism. The 4th spatial dimension allows individual self-consciousness, since an extra degree of freedom is required for self-observation and reflection, while in the mental context the time dimension is symmetrical, allowing integration of past and future-anticipating events. The 4th spatial dimension is also assumed to accommodate the bidirectional flow of information between the domains of self-consciousness and universal consciousness. Bottom-up information flow from the Planck scale, combined with top-down information conjugation from the ZPE field, constitute the event horizon of the brain, also integrating gravitational and dark energy related force fields, and supervenes the physical brain. Event horizons of brain and whole body are depicted in the red ellipse and circle respectively.

Table 1. Guiding EMF GM- principle in Animate and Non-animate systems*

Animate systems	***Non-animate systems***
- Biomedical research (1)	- Entanglement in EPR-experiments (6)
- Cancer research (2)	- Energy distribution elementary particles (7)
- Neurological studies *0	- Coherence behavior in superconductors (8)
- Albumin vibr. resonances *1	- Sound induced vibration patterns of Chladni, *4
- RNA synthesis catalysis *2	- Phyllosilicate semi-conductor materials *5
- Brain function and Consciousness (3, 4)	- Zero- point energy EM frequencies *6
- Protein folding in intact cells (5)	- Gravitational waves *7
- Superconduction in life systems (8)	- EMF absorption Spectrum of pure Water (9)
- Oligo-nucleotides in solution *3	- Nucleotide sequence in DNA *8
- Ir-spectra of proteins, lipids, DNA (10)	

** = EMF freq. values extracted from related international literature.*

*In brackets (nr.): reference to own publications :(1) Geesink and Meijer, 2016; (2) Meijer and Geesink, 2017; (3) Meijer and Geesink, 2016; (4) Meijer and Geesink, 2018; (5) Meijer and Geesink, 2018; (6) Geesink and Meijer, 2018 a; (7) Geesink and Meijer, 2018b; (8) Geesink and Meijer, 2018 c; (9) Geesink and Meijer, 2019a; (10) Geesink and Meijer, 2019c. Supporting research of others: *0: Hamblin et al, 2017; *1: Nardechcia et al, 2017; *2: Ferris, 2006; *3: Tang et al, 2018; *4: Chladni, 1980; *5: Adamatzky, 2013/Hashizume, 2012; *6: Irikura, 2007; *7: Rezolla et al, 2003; *8: Selvam, 2007.*

Practical Applications and EMF Radiation Protection

Living cells thus make use of coherent frequency signaling, similar to Bose- Einstein condensates, in order to stay viable and stable, yet we also revealed decoherent frequencies that are detrimental to life system, (Geesink and Meijer, 2016; Meijer and Geesink, 2016), among others in cancer (Meijer and Geesink, 2018a). If incoming man-made electromagnetic signals indeed exhibit such de-coherent EMF radiation, then these signals, potentially, will decrease the coherency of (quantum) wave domains of living cells. A possible way to deal with such a problem is either to lower the energy density of the external man made de-coherent waves and/or to convert them to more coherent frequencies. We envision innovative methods for increasing the coherency of the electromagnetic signals through the use of appropriate semiconductor technologies, inserted in electromagnetic man-made devices. This by making also use of the knowledge with regard to the so-called Terahertz energy gap, through enabling the combination of supplied optical and electronic coherent information. Beneficial EM wave technology may therefore find applications by further improving health during the increasing use of EM-information/data in our society as well as in the design of therapeutic instrumentation for various chronic diseases and ageing processes.

Semi-Harmonic Background Field

Finally, we want to stress that the dynamics of the biophysical processes at stake: harmonics/ music, entanglement, superconductor conditions and elementary particles (knot theory), all can be modeled by toroidal geometry (Amiot, 2013; Meijer and Geesink, 2016; Meijer, 2018), as shown in many other related studies. We consider the torus as a versatile space-time operator for the handling and integration of information fluxes, in which the physical information is projected in a holographic manner in a 3-D/4-D context and the syntrophic life information is projected in a scattering event horizon. Such field-sensitive toroidal workspaces have been postulated as a key element for the creation of scale invariant consciousness in the universe (Meijer and Geesink, 2017). It remains to be shown whether an implicate order, as proposed by David Bohm, finds it physical expression in an information/geometric domain described either as a crystal-like matrix, zero-point energy fluctuations or superfluid quantum space, that may operate at the level of the Planck scale or even beyond this domain (see Fig. 4).

The here reviewed studies may contribute to a better understanding of bio-fields that operated in the evolutionary organization of complexity, on the brink of inanimate and animate structures and, collectively, are seen by us as instrumental in the ongoing fabric of human and cosmic consciousness. The above treated aspects of a potential field-receptive workspace, as a guiding realm in life processes, may point back to the well- known implicate order of David Bohm, of which we may have identified some of the EM frequencies as a recipe for life. These studies are part of the ongoing research into the crucial role of information in the creation of the architecture of reality (Meijer, 2014; 2015; Meijer and Raggett, 2014) and have also been discussed in science philosophical context (Meijer, 2018) and in relation to the existence of a universal consciousness (Meijer, 2019).

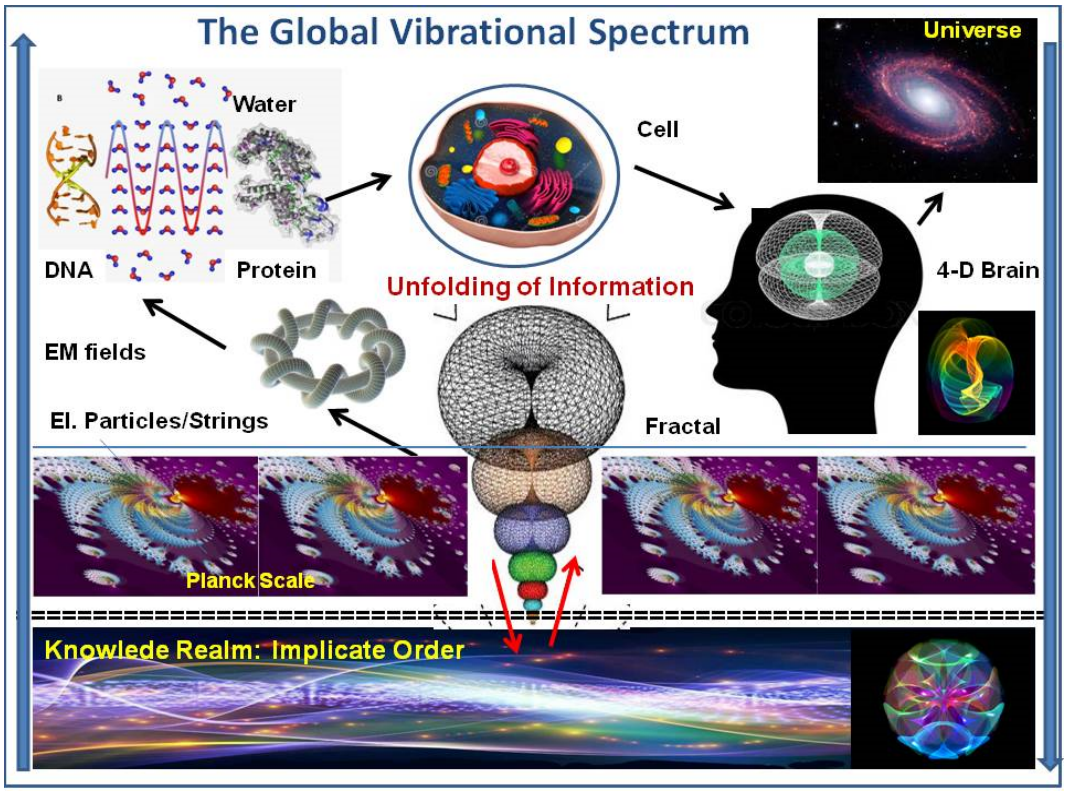

Figure 4. The flow of information in the universe from micro- to macro-levels (bottom to top) conceived as a nested toroidal operation that is fractal and scale-invariant and is initiated in a knowledge realm underlying the known wormhole matrix (quantum foam) at the Planck scale. Supposed quantized string activities produce elementary particles, atoms, molecules and life systems. The latter contain dedicated holographic memory spaces at the cellular and organ level. The human brain integrates internally and externally guided, conscious states. Further fractal and self-similar properties in a quantum fluid universe provide the architecture of cosmic macro-structures.

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