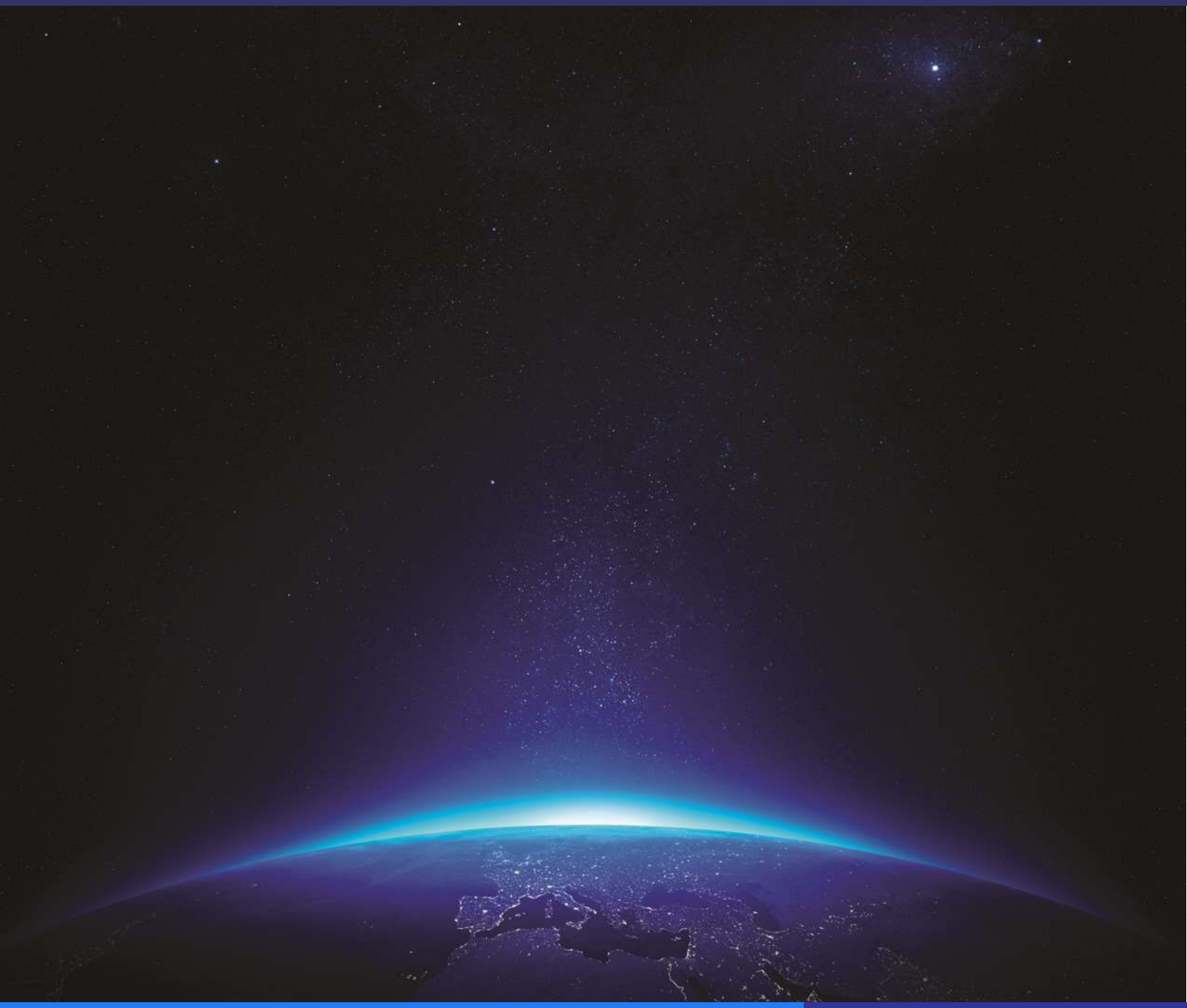
RESEARCH REPORT



RESEARCH ON CONTINUITY OF CONSCIOUSNESS BASED ON CURRENT PHYSICS

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Survival of Consciousness and the Anticipation of an Afterlife as Based on Current Physics

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Abstract

This paper pays special attention to the interfacing of the field of universal consciousness and our personal brain in relation to a potential afterlife and postulates a toroidal event horizon workspace of the brain that allows a symmetric 4-Dimensional (4-D) to 3-Dimensional (3-D) quantum information flux and holographic personal memory integration. The geometry of a 3-D brain, embedded in a 4-D realm, may explain the phenomena of functional brain binding, qualia, intuition, serendipity, synchronicity, extra-sensory perception, and other well-established parapsychological phenomena. Brain function is conceptualized as guided by the Zero-point Energy (ZPE) Field (ZPF)–derived pilot waves that support consciousness, even in the absence of neuronal activity, such as in Near-Death Experiences (NDE). The brain's toroidal organization exhibits quaternionic dynamics and thereby allows an opening to 4-D geometry and, consequently, to universal consciousness and the ZPF. This personal holographic workspace, that is associated with but not reducible to the brain, collects active information in a "brain event horizon," as an internal and fully integral model of the self. At death or transition of our material body, this personal mental knowledge domain dissociates from the body, yet it is retained because entangled and meaningful quantum information can never be destroyed. In NDE, this uncoupling is only temporal, but reveals universal consciousness in a fully transparent manner, since in this condition non-neuronal information processing is preserved. This preservation occurs through fractal semi-harmonic frequencies, from the ZPE field, that reflect an entangled personal register of each conscious being. The proposed concept, therefore, contradicts the tentative and promissory materialist solution to the mind-body problem. Instead, it substantiates the notion that the brain can act as a kind of "receiver" by filtering (sub)conscious states through holographic

resonance with universal consciousness through specific coherent oscillation domains in the body. Yet, it is recognized that our self-consciousness can also act as a damping filter for information from this universal knowledge field. The latter aspect of a "dual filter theory" is apparently perturbed at states of odified brain function such as NDE, deep meditation, and use of psychomimetic drugs, that all expose us to an unknown cosmic perspective. The presence of a mental, field-receptive, resonant workspace, might be termed our "supervening double" (or "soul," not implying religious doctrine), and provides an interpretation framework for widely reported but poorly understood transpersonal conscious states. These may even imply that death can be conceived as a transition to another state of existence, yet we realize that all of us already belong to such an eternal domain in our present lives. Therefore, the present model may imply the potential for the survival of individual consciousness, qualifying conscious individuals as designated survivors and eternal beings.

Keywords: *Afterlife, Holo-fractal Brain Model, Universal Consciousness, Zero-point Energy(ZPE), Zero-point Energy Field (ZPF), Field-Receptive Workspace of the Human Brain,Scale-Invariant Consciousness, Mental Aspect of Brain Function, Brain Attractors, Mind-Rose+Croix Journal – Vol. 18 www.rosecroixjournal.org61body Problem, Transpersonal Experiences, Near-Death Experience, Out-of-Body-Experience, Qualia of Conscious Perception, Dual-Filter Theory in Brain Perception*

Introduction

Out-of-body experience, qualia of conscious perception, dual filter theory in brain perception This paper provides a detailed outline on the topic of immortal consciousness and a potential afterlife, a subject that, as always, raises quite some international interest and discussion.
A person is a symbol- and metaphor-creating being who apprehends the world through the power of imagination. The desire to give an enabling place to an inevitable individual transition from this world has led people to create many powerful immortality and afterlife symbols and stories. However, cell biology shows that humans are programmed to transition, and daily experience shows that we cannot escape the fatal wear of our bodies. An incredible amount has been written about a potential afterlife and potential immortality. Today, molecular and genetic aspects of current longevity research shed a spectacular light on the first attempts to master immortality. In addition, we have entered the era of digital immortality (Meijer 2013).
Current transhumanists advocate that human-machine hybrids (cyborgs) will be designed and that the universe might be finally recreated by super-intelligent civilizations, providing a cyclic process of rebirth of our universe (Tipler 1994; Bostrom 2003; Lloyd 2006).

Yet, is all this wishful thinking, or do we have a real perspective for some sort of afterlife in a cosmic setting? In other words, do we have to wait for completion of such technological developments or can we rely on more immediate answers to the question of an “afterlife”? In this paper, we postulate that the thousands of faithfully recorded near-death experiences (NDE) and reincarnation cases clearly have explanatory power and reveal the true nature of our individual consciousness as connected to universal consciousness and a potential eternal being. It is shown, on the basis of quantum physics, that dying may be only virtual and should be interpreted in the framework of conservation of information.

While studying the nature of consciousness (Meijer and Geesink 2016, 2017, 2022; Meijer2023), there were reports about a non-material existence, a continuation of consciousness even while the brain was without cortical function and seemed to have stopped functioning, as discussed in many books on NDE (for example by Pim van Lommel). We can argue that if herein an alternate reality was being described, it would be theoretically possible that the NDE reports might contain explanations for (self)-consciousness, or useful hints about the nature of a reality ordinarily not perceived in personal experience

At the instant of a severe trauma-inducing NDE, such as a heart attack or violent vehicle collision, the suffering individuals sometimes report being puzzled about what has happened, as they are suddenly viewing their environment from a different perspective. Typically, they are now located above their bodies, so they no longer see through their eyes, but observe the environment from a different location.

They also then start to notice that the fundamental nature of their sight has changed, as they seem to see through objects, can focus onto the vibrational atomic level of reality and obtain wide vistas across the whole cosmos, by even experiencing panoramic views over 360 degrees. Individuals who have been born blind also report complex visual representations, colors, and perceptions of distinct objects that they never could have observed before, during their out-of-body experience or OBE (Ring and Cooper 1997). An excellent case has been made for the reality of discarnate consciousness by Greyson (2019) and Pandarakalam (2019).

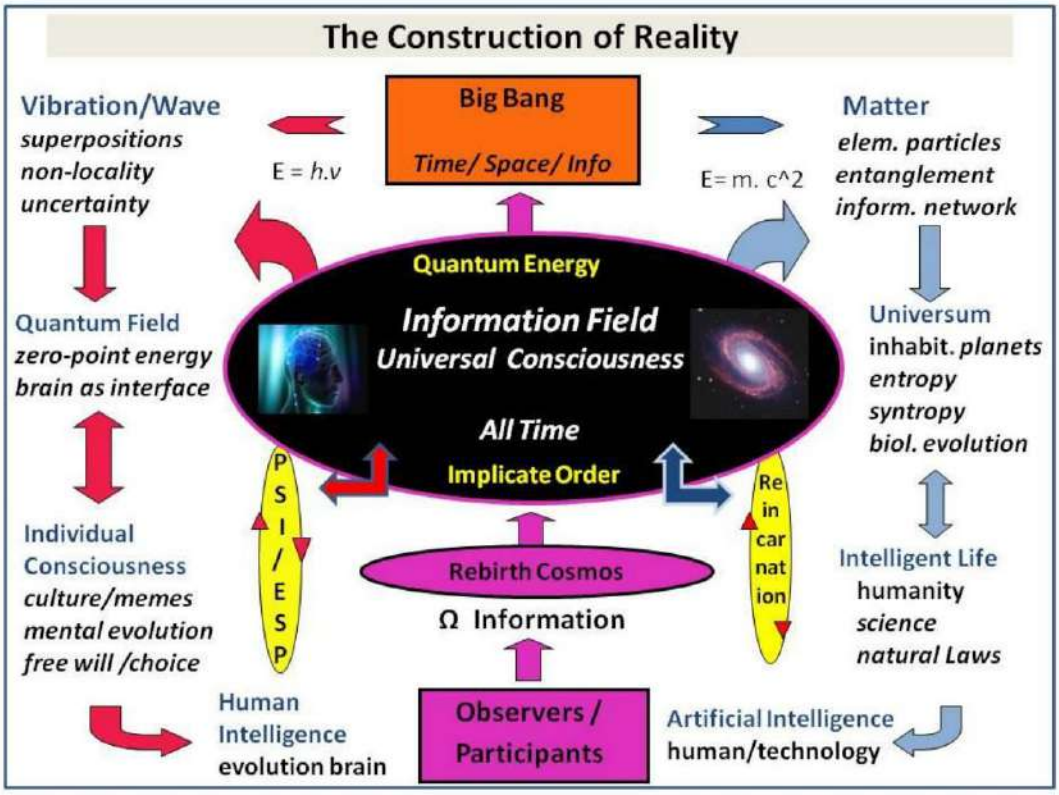

Figure 1. An integrated scheme depicting the construction of reality, with its material (right part of the figure) and mental (left), aspects. This concept assumes a central quantum information field, that provides the very basis for the creation of our universe and dynamically evolves further through cyclic feedback processes from the present reality, in which natural (among other human) and artificial intelligence play crucial roles in observation and participation (all images courtesy of the author, unless stated otherwise).

In the model in Figure 1, we hypothesize that conscious perception during normal functioning of the body and brain occurs not solely in the brain itself, but is realized by permanently receiving conscious states through resonant interfacing with an individual part of a dynamic universal consciousness in which the whole body is embedded. The differential qualities of perception are thus derived externally from this universal field of consciousness and not only from intrinsically stored information in the brain.

It is further proposed that the discrete electric and magnetic field (EMF) wave frequencies that we receive inform our 3-D reality through resonance with an underlying 4-D universal field of consciousness, with a fourth spatial dimension (not time), as seen in Figure 1. We have earlier shown that information in the universe is fundamental, and with energy and matter form the building blocks for the architecture of reality (Meijer 2012). One of the most interesting features of the OBE is the feeling that usual linear time, from past to future, no longer runs. During the OBE, it is reported that one can have simultaneous views of the past, current environment, and, remarkably, also future scenes. Hiller (2011) related this absence of running time to a sort of frozen time, realizing that formulation of Special Relativity predicts that photons do not experience time, and that the NDE experience reveals a world c

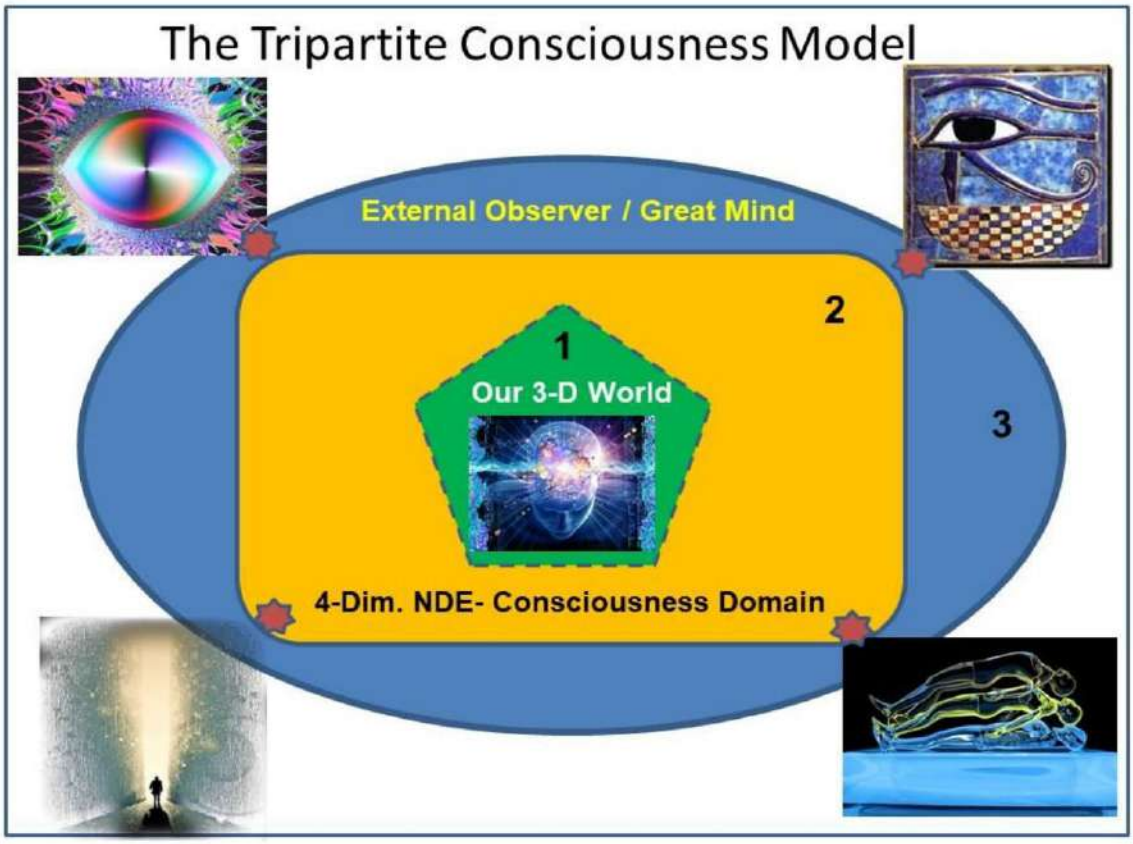

Figure 2. A model of the the tripartite concept of consciousness: our 3-D world (domain 1, green) is permanently imbedded in a universal consciousness field revealed by NDE experiences (domain 2, yellow). All is part of Domain 3 which is supposed to consist of the great mind of an external observer. (Modified by author from Hiller 2011).

A conjecture that seems best suited for the existence of a material brain within a universal consciousness domain is that there initially existed a domain of pure consciousness in which nothing else was contained – no light, no space, not even time. Such an initial domain is generally discussed in science in relation to a primordial external observer. It has also been associated, in common with most religions, with the presence of the Divine. Thus, assuming such an external observer or Great Mind, a tripartite domain theory, as depicted in Figure 2, can be conceived (Tiller 2011). Such a concept is consistent with many NDE reports: the feeling of an omnipresent and powerful being (Domain 3), in addition to a world of universal consciousness (Domai

(Domain 1). Of note, this concept implies that Domain 2 should be seen as primary and that our world is permanently imbedded in universal or cosmic consciousness.

A reflection about the origin of the fabric of reality, such as the Big Bang theory, that postulates some kind of perturbation of quantum fluctuations, can invite the hypothesis of an "initiator of events," or in other words, an "external conscious observer." However, current physics does not propose the involvement of a "privileged observer," or, alternatively, the work of an intelligent alien species. Yet, such theories are certainly not less likely than the current multiverse speculations that have an infinite number of solutions and an obvious lack of testability.

Modern Physics and its Implications for the Afterlife

As we all realize, individual life is finite, despite the current advanced measures to prolong life: death remains ultimately unavoidable. However, there are theorists, such as some quantum physicists (Wolf 1985, 1996, 1999, 2008; Goswami 1990; Amoroso 1999, 2003; King 2003; Schwartz et al. 2005; Bleicher 2012; Carter 2012; Lanza 2012; Burke and Persinger 2013; Hameroff and Chopra 2013; Berkovich-Ohana 2014; Pregnolato and Pereira 2016; Kastrup 2016; Mishlow 2018; Schwartz and Begley 2018; Van Lommel 2018; Schwartz 2019), who at this point come to a very different conclusion: namely, that true permanent death is in fact, impossible. Our physical body, indeed, cannot escape its demise, but according to them, the information that determines our overall personality and reflects our life's experience will be retained ac
Although, at first glance, this seems to be an unrealistic idea, it is perhaps somewhat more compelling when one realizes that our perception of the full range of reality is very limited and thus provides a very inadequate representation of reality. In the underlying knowledge field that is described by quantum physics, the preservation of information is po
Therefore, in the framework of the present paper, it certainly makes sense to discuss such alternative scientific perspectives.

In the twentieth 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, represents 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-worlds in a single set of equations. One example of this is the superstring theory or, even better, its successor the M-theory that assumes the existence of at least 10 if not 11 dimensions. This theory, first suggested by the theoretical physicist Edward Witten in 1995, postulated what has been called an "uber-theory of strings" (Sutter 2020). The basic idea of 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 tiny strings or loops that vibrate at different frequencies in a discrete manner. This theory implies that matter at the smallest physical level can be c

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 terms of their properties (e.g., their polarization and rotation or spin) can be correlated with regard to each other over huge distances: if one changes the spin of one particle, the paired particle spin is altered too, in

order to maintain their system integrity. This property, 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 (Meijer 2021, 2023). Nature can therefore be seen as an enduring interaction of waves/particles, carrying their inherent physical status of information. The system's information 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 2013).

A number of prominent scientists have laid the foundations for the hypothesis of the quantum brain: the Nobel Prize winners Eugene Wigner, a quantum physicist, and John Eccles, a neurologist; as well as the quantum physicists David Bohm, Basil Hiley, F. David Peat, Henry Stapp, Amit Goswami, and Fred Alan Wolf. Also, neurologist Karl Pribram, psychiatrist Carl Jung, and mathematician Roger Penrose have theorized that our brain may function as an interface between the individual and a "collective consciousness" that is stored in a supposed universal quantum field. Ervin László (2007) stated that the universe, in this way, exhibits a kind of universal memory and that all experiences are stored in, what he calls, the Akashic records, a term that is also encountered in some Eastern religions and the Ancient Mystical Order Rosae Crucis (AMORC). The basis for the existence of this field was derived by Erwin László from the quantum vacuum domain, also called the Zero-point Energy Field (ZPF). Zero-point Energy or ZPE refers to the lowest state or ground state of a quantum vacuum; this state contains no particles but may still have energy, since quantum states are always in flux or in motion in waves, although particles may also "wink in" and "wink out" of this state (see Figure 3 regarding the wave/particle duality). All things in the cosmos including particles and electromagnetic fields, any kind of element or field, all have a ZPE state. The totality of all ZPEs is called the Zero-point Energy Field (ZPF).

Recent experiments have shown the possibility of the teleportation of particles, based on sending complete information on a particular particle over a wide distance by which a solid particle is created at a distant site; this implies that matter may arise from information. The renowned scientist Anton Zeilinger (2003) therefore concluded that information is more fundamental than matter and energy. It became also clear that the abovementioned universal information field can also be seen as the source and origin of reality, underlying the design of the universe.

Quantum entanglement implied to physicists, such as David Bohm, a reason to postulate a "quantum wholeness," an idea that expresses the concept that everything in the universe is connected or entangled (Meijer 2012; Meijer and Korf 2013; Meijer and Ivaldi 2022).

Yet, these aspects of reality are hidden from our ordinary perception. Instead, individual consciousness is so dominated by normal but overwhelming sensory inputs that we are rarely aware of this kind of connectedness. According to Bohm, such quantum phenomena are hidden due to the fact that they are part of an underlying, unseen quantum information field, called the implicate order. The latter is always present and manifests everywhere (and thus has a non-local character), what we term here Universal Consciousness (see Figure 1).

Such a universal quantum field may do so, through the exchange of information energy that is continually reallocated, in a universal, dynamic process. The building and decomposition of matter are, in fact, caused by the absorption and release of (virtual) photons, and matter can thus, more poetically, be envisioned as light captured by magneto-gravity. The virtual particles of the field can in this manner also provide an information exchange between physical reality and the non-zero local field to which they belong by the phenomenon of

resonance (Figure 4). Even the force of gravity, a yet poorly understood phenomenon, may be related to this field, because of its retarding effect on the movement of material: the phenomenon of inertia (Penrose 2014; Setterfield 2017) suggests that quantum gravity at the Planck-scale level is instrumental in the capture of quantum information in our brain (Meijer and Korf 2013; Meijer et al 2020; Meijer 2023). Typical features of quantum physics are depicted in Figure 3.

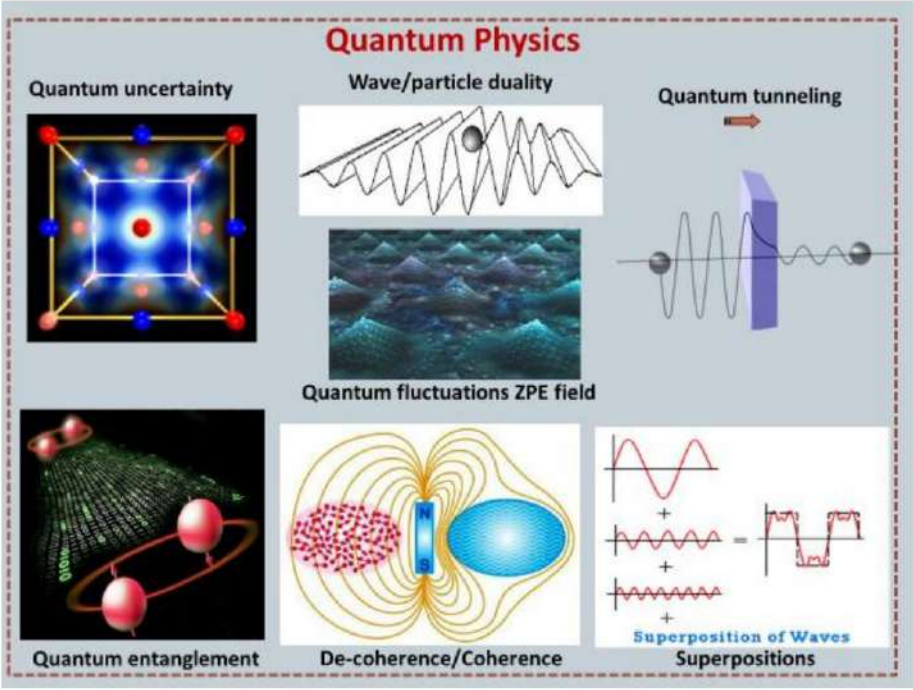

Figure 3. These are models of the essential elements of quantum physics, starting in the top left, moving right: uncertainty of position of particles; wave/particle duality, as demonstrated in the famous double-slit experiment; quantum wave tunneling; (bottom left, moving right) entanglement (non-locality) of particles at great distances; the phenomenon of coherence (uniform vibration of multiple waves) versus decoherence; and the potential of superposition of waves. In the middle, a cartoon of the supposed quantum fluctuations in the Zero-point Energy Field (ZPF) is depicted.

Infinite Cosmic Consciousness: An Information Field?

The universal quantum energy field can also be envisioned as a giant hologram (for this theory see Susskind 2015 and Hooft 2012), that permeates everything in the universe. Numerous authors support the idea that the universe has a holographic structure (Talbot 2006; Aurich et al. 2008; Anjamrooz et al. 2011; Bjerve 2016; Haramein et al. 2016; Luminet 2016; Batiz 2017; Brown 2019; Leffert 2019). Holography implies three essential characteristics: 1) it can present any 3-D object in a 2-D conformation (dimensional reduction); 2) it can project the total information of an object on a surrounding sphere, called the event horizon; and 3) any small part of the hologram contains all the information of the total hologram. The latter aspect is related to the fractal (self-similar) character of the cosmos from micro- to macro-levels. The holographic universe is considered, by the earlier mentioned physicist and systems theorist Erwin László, as a universal information field (László 2007, 2012). Consequently, each of us is supposed to be in contact with the field through wave interactions/resonances. This implies that we are in fact permanently connected to and embedded in a general energetic information field, which penetrates all animate and

Meijer and Geesink 2022; Meijer and Ivaldi 2022). We will now explore the possibility that also personal information may be stored in this domain and that this aspect can be crucial in the understanding of supposed modes of immortality. In other words: immortality and a potential afterlife can, in principle, be conceived as a modality of the conservation of information.

The Zero-point Energy Field and Stochastic Electro-Dynamics

One of the main challenges in consciousness research is the hard problem of understanding consciousness. In order to tackle this problem, an approach from theoretical physics, called Stochastic Electro-Dynamics (SED), is utilized, in which probability is being applied again, which goes one step beyond quantum theory and sheds new light on the reality behind matter (Setterfield 2002; Keppler 2012, 2016). According to this approach, matter is seen as a resonant oscillator that is orchestrated by an all-pervasive stochastic radiation field, called the Zero-point Energy Field (ZPF). In addition to these works, there is also a very interesting SED-based approach to inertia and gravity, elaborated by Alfonso Rueda and Bernard Haisch (Rueda and Haisch 1998, 2005). SED is thus based on the conception that the vacuum is filled with a real, all-pervasive stochastic radiation field, the ZPF, which can be pictured as an infinite sea of light and an ocean of pure energy (see Figure 4B).

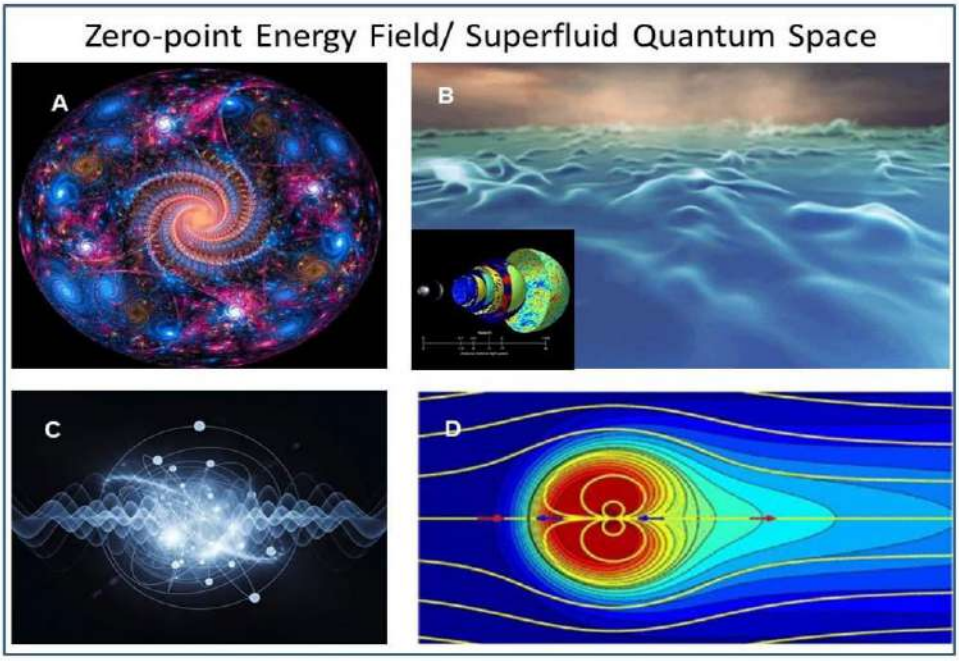

Figure 4. Top left: The universal, all pervading Zero-point Energy Field, pictured as a vacuum with fluctuations of quantum waves or particle/antiparticles in a fractal setting (B panel and inset) that are supposed to display a vortex character (A panel). Through superposition and photon polarization, information storage is possible. The zero-point quantum fluctuations are reflected by creation and annihilation of particle/anti-particle pairs, in which the anti-particles travel in a reversed time mode. Charged particles moving in the ZPF obtain a toroidal form of energy flux that may form the basis for the creation of pilot waves that guide reality in our 3-D world (D panel). The collective wave patterns that obtain permanent feedback from our reality can be conceived of as the overall wave function of the universe (C panel).

The properties of matter are not intrinsic but acquired by dynamic interaction with the ZPF, which in turn picks up information about the material system as soon as an ordered state, i.e.,

a stable attractor, is reached. These principles apply also to macroscopic biological systems. From this perspective, long-range correlations in the brain, such as neural gamma synchrony, can be interpreted in terms of order phenomena, induced and stabilized by the ZPF, suggesting that every attractor in the brain goes along with an information state in the ZPF (see Figure 5).

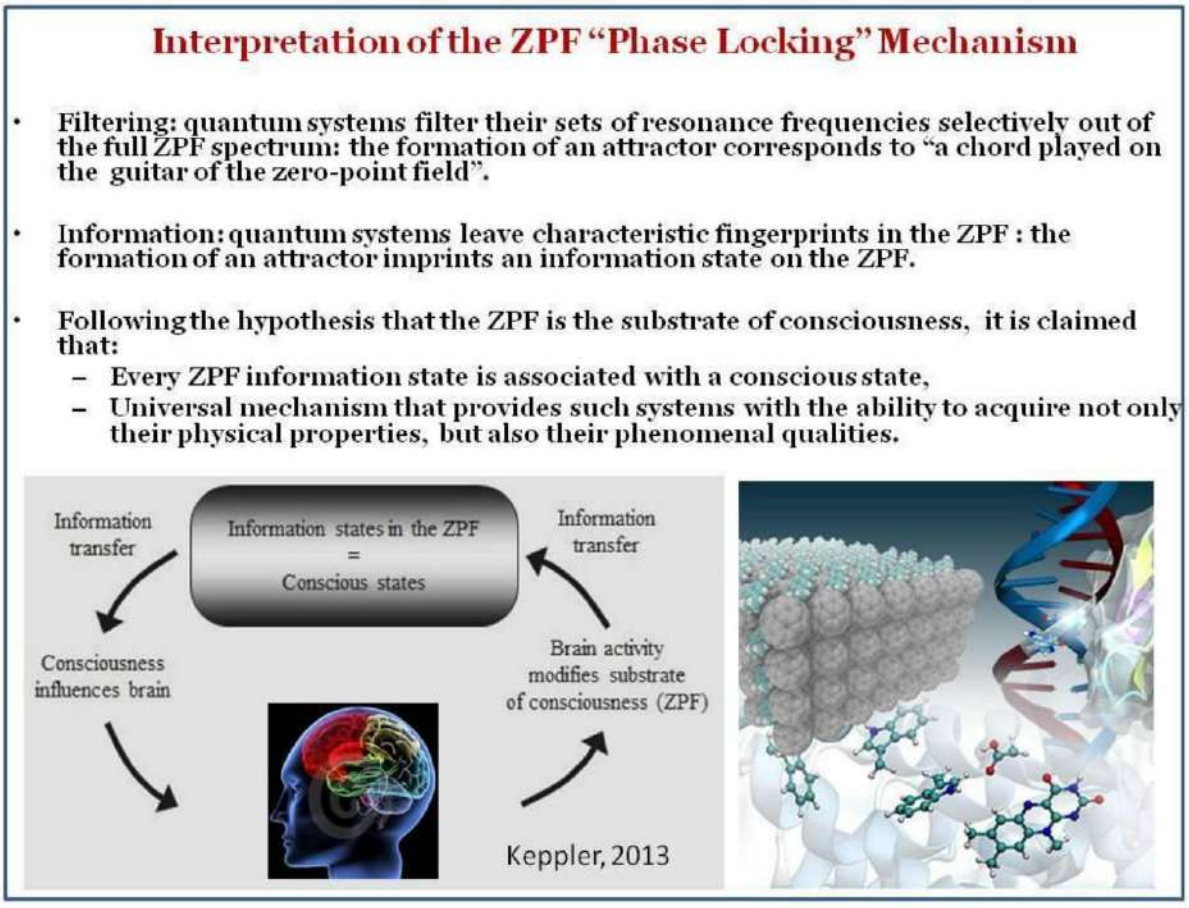

Figure 5: Filtering of resonance frequencies from the ZPE field (ZPF) modified from Keppler (2015), by a phase-locking mechanism yields the qualia for our brain function. In reverse, the quantum brain leaves fingerprints in the ZPE field and the resulting dynamic and permanently updated ZPF constitutes the very substrate for consciousness and life processes (inset bottom right).

How can the hard problem in consciousness theories (asking how mind can be generated by matter) be approached? On closer inspection, the hard problem turns out to be tightly linked to the Western way of thinking, that adheres to the idea of a matter-dominated universe. Yet, this mindset proves obstructive not only to progress in consciousness research, but also to the deeper understanding of the physical world. In the following section, the pioneering work of Joachim Keppler is summarized.

How ZPE and the ZPF Affect Matter

As explicated in the former section, SED regards matter as immersed in an all-pervasive stochastic background field with which it interacts permanently and unavoidably, thus acquiring a stochastic motion. This motion can be studied for various systems. As an example, we may take a closer look at the hydrogen atom, which is composed of a proton and an electron. In classical physics this system is unstable and collaps

fraction of a second due to the fact that the orbiting electron emits radiation and loses energy. However, within SED theory, the situation changes significantly, since the electron is no longer surrounded by a void. Rather, the electron is now able to perform a dynamic interaction with the background field, which results in an exchange of energy between the material system and the ZPF. Indeed, it can be shown analytically and numerically (Cole and Zou 2003, 2004; De la Peña and Cetto 2006; Cavalleri et al. 2010) that there are certain dynamic situations in which the average power absorbed by the atomic electron compensates its average radiated power. These situations are characterized by quantization conditions and correspond exactly to the stationary states predicted by quantum theory, i.e., the stability of matter goes necessarily hand in hand with the quantum behavior of matter and both are a consequence of the interaction with the ZPF (Setterfiel

A closer look behind the scenes of matter from an SED point of view, reveals that not only the stability of matter but also its spatial structure and three-dimensional conformation are governed by the ZPF. Hence, SED is able to provide a clearer and more intuitive understanding of structure formation, in such a way that a quantum mechanical orbital, which reflects the probability density of finding an electron in a specific region around the nucleus, is associated with a stable attractor of the stochastic interaction process between the electron and the ZPE field (Rodriguez 2012). In other words, every stationary state of matter is characterized by an "individual dance pattern" that comes i External stimuli, such as the presence of a magnetic field, can cause transitions between different attractors, i.e., an external stimulus or a perturbation can prompt the system to follow a new dance pattern (Figure 5).

How Matter Affects the ZPE Field

So far, we have dealt with the impacts of the ZPF on matter. In the second step, we now have a look at the impacts of matter on the ZPF. This is very important because it must be considered that matter and ZPE exert a mutual influence, i.e., not only does the ZPF affect the dynamics of matter, but also the latter affects the dynamics of the ZPF.

From the study of simple non-linear systems (De la Peña and Cetto 2001, 2006), one can learn that the ZPE field is modified as soon as the system reaches a stable attractor (Figure 5). This aspect reminds us of modern versions of the guiding pilot-wave theory of David Bohm (Bohm and Peat 2008), while a number of authors propose a back reaction of quantum information from our world to the supposed implicate order. Such a bidirectional flux of active information would imply that freewill-based decisions of humans are transmitted to and integrated in the ZPE realm, meaning that the field is never static or deterministic but that intelligent species participate in the dynamic character of universal consciousness (Meijer and Geesink 2017; Meijer 2018, 2022).

The free field with the initially random phase adapts itself to the new situation in such a way that the relevant frequency components, involved in the maintenance of the equilibrium, become highly correlated (De la Peña and Cetto 2001). In other words, the formation of a stable attractor results in a de-randomization of the local ZPE. This amounts to imprinting an information state on the ZPE, in which different attractors are associated with different ZPE configurations and, hence, different discrete information states.

The Connective Principle of Quantum Information in the Material Universe

We usually talk about two seemingly separate worlds: that of material particles and that of a hidden wave world with its force fields, such as Gravity and Dark energy. The special feature of the work of Erik Verlinde (2011, 2016) is that the author brings the two aspects together in the form of *quantum information as the most fundamental building block of the universe,* **following the concepts of John Wheeler (1994) and more recently of Zeilinger (2003).**

Matter and thus particles can therefore be seen as condensations of force fields that interact and both can be described with quantum information, that is actually a form of energy that is exhibited as a toroidal energy flux (Figure 7). The special property of the torus operator is to bring the various types of field information together in integrating the various types of energy flows. Marshall Lefferts, in his book *Cosmometry,* **conceived torus dynamics as reflecting the processes of the enfolding and unfolding of information in a B In quantum theory, energy is quantized and thus consists of discrete vibrational units (vibrating strings or loops). Space is also quantized according to this theory, thus divided into small space parts. This matrix of such space units is usually called quantum foam or spacetime foam (Wheeler 1994) bearing units that function as operators. Known examples of such space elements are twistors (Penrose 2014), being clearly related to nested torus geometry. Such units are supposed to operate on every fractal scale, from very small (Planck scale) to very large (black holes), and can be conceived as the collection points of the various force fields: gravity, dark energy, zero-point energy, electromagnetism**

Higgs fields are explained by Michael Cooke (US Department of Energy, Office of Science 2024) as follows:

> **The Higgs boson is the fundamental particle associated with the Higgs field, a field that gives mass to other fundamental particles such as electrons and quarks. A particle's mass determines how much it resists changing its speed or position when it encounters a force. Not all fundamental particles have mass. The photon, which is the particle of light and carries the electromagnetic force, has no mass at all. The Higgs boson was proposed in 1964 by Peter Higgs, François Englert, and four other theorists to explain why certain particles have mass. Scientists confirmed its existence in 2012 through the ATLAS and CMS experiments at the Large Hadron Collider (LHC) at CERN in Switzerland. This discovery led to the 2013 Nobel Prize in Physics being awarded to Higgs and Englert.**

Thus, in describing such units as spacetime or quantum foam, such operators as collector points of various force fields integrate quantum information and store it on the edge of each fractal unit; in the case of a black hole, it is called the "event horizon." As mentioned above, one leading principle of holography is that every object can be fully described with information gathered on a virtual screen around the object (its event horizon). Therefore, entangled quantum information with meaning, like energy, is never lost. Verlinde, among many physicists, also used the holographic principle, invented by the Nobel laureate 't Hooft (for holography aspects see also Talbot 2006; Aurich et al. 2008; Alfonso-Faus 2011; Anjamrooz et al. 2011; Bjerve 2016; Haramein et al. 2016; Luminet 2016; Sieb 2016, 2018; Batiz 2017; Batiz and Milonvanovic 2017; Brown 2019; Leffert 2019, Meijer In this framework, the entire universe and also galaxies, suns, planets, and even living systems are to be regarded as toroidal organized information fields, each projecting digital information on their respective event horizons.

In this respect, it has been experimentally demonstrated recently that:

1) Information is, in fact, a form of energy: when information is removed from a quantum system, energy is released in the form of heat (entropy), (Toyabe 2010; Bérut et al. 2012; Peterson 2016).
2) This also applies to the quantum world. Binary units can be expressed as bits and bytes; now information can mix (superpose) and can show entanglement with other states of quantum information (Nielsen and Huang 2000; Lloyd 2007).
3) Information is intrinsic to matter and may even be the source of it (Verlinde 2011, 2016; Zeilinger 2000, 2003; Meijer 2012).

Thus, information always arises from interactions of wave/particles. According to classical information theory, information/entropy represents the potential to ask binary yes/no questions (Lloyd 2007; Meijer 2013). According to these concepts, information is in fact the sum of expected information obtained from such yes/no questions. An example is DNA in our cells, which in itself contains a lot of potential information (digitally expressed in bits), yet this information is only clearly expressed in the cell in relat The intrinsic (hidden) information of an object is therefore the result of the entanglement of the stored (individual) information from the various constituting particles, providing a sort of global information through converting all of this information into a coherent information matrix, that is dynamic in time (Keppler 2013, 2016). Some link this matrix with the Zero-point Energy Field (ZPF), representing Bohm's implicate order (Setterfield 2002; L 2007, 2012; Nation et al. 2012).

That we cannot directly perceive this information aspect is traditionally ascribed in physics to a hidden 4th spatial dimension (not the dimension of time), which cannot be observed in our 3-D world, but can be mathematically inferred. Such a 4th dimension could also explain the creation of dark matter in our 3-D world through selective wave exclusion in the ZPE field, according to the so-called Casimir effect (Green and Levin 2007; Wongyun 2013; Meijer et al. 2020, 2023)—a form of Zero-point Energy (ZPE) or energy arising fro Recently, it has also become clear that even space-time itself may be derived from the above-mentioned quantum fluctuation field and, in particular, through the entanglement of quantum information that is locked in and generates space. Instrumental in this respect are "short c in space, that connect one part of space with another, via a so-called wormhole structure (Figures 6 and 7). This concept is called EP = EPR conjecture, in which EP stands for the wormhole structure and EPR for entanglement of particles (van Raamsdonk 2010; Maldacena and Susskind 2013; Susskind 2016; Haramein 2016; Brown 2019).

This wormhole concept, geometrically conceived as formed by multiple central channels of a collective or nested toroidal network (see Figure 6) was already known from the physics of black holes, but now appears to be present at every fractal scale in the universe up to the Planck scale, where it constitutes the aforementioned quantum- or spacetime foam (Ford and Roman 2000; Lloyd 2007; Loll 2011; Haramein 2016).

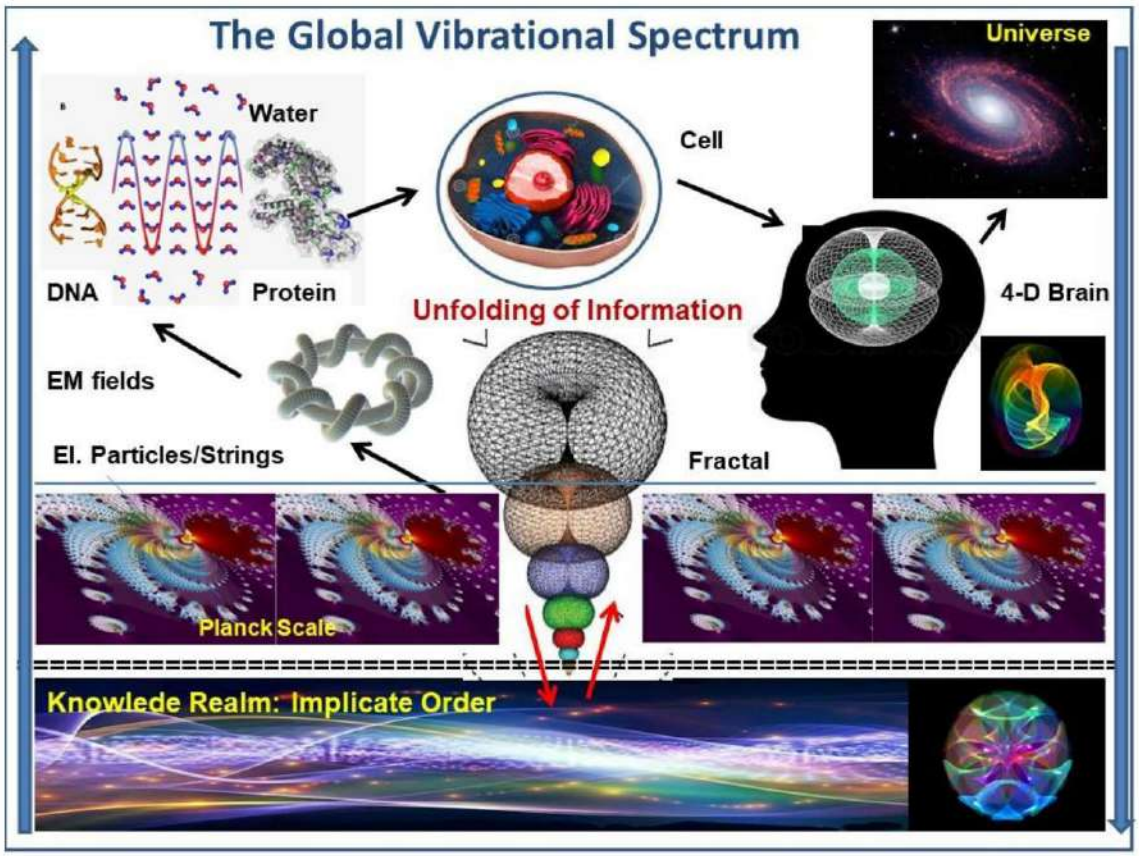

Figure 6: The flow of information in the universe from micro- to macro-levels (bottom to top) conceived as a nested toroidal operation that is fractal and scale-invariant, and is initiated in a knowledge realm underlying the known wormhole matrix (quantum foam) at the Planck scale.
Supposed quantized string activities produce elementary particles, atoms, molecules, and life systems.
The latter contain dedicated holographic memory spaces at the cellular and organ level (middle part).
The human brain integrates internally and externally guided conscious states. Further fractal and self-similar properties in a quantum fluid universe provide the conditions for life (upper left) and the architecture of cosmic macro-structures (upper right) (Meijer and Geesink 2019).

The Torus as a Geometric Model for Information Flow in the Universe

A well-known example to illustrate the use of the torus as a metaphoric and archetypic figure in art and science is the Ouroboros: a serpent that seems to swallow its own tail, bringing together the extremities of its body in a circular mode (Figure 7). In ancient times, it was seen as a symbol of eternal return and immortality. More recently, scientists such as Joel Primack projected on the snake body the pattern of the relative size of the defined structures in the universe, going from the extremes of the smallest (Planck) scale to the largest, such as black holes and the entire universe. In this schematic, humans seem to take an intermediate position. Evidently, this fractal cosmic architecture could be understood as the process of knowledge acquisition, enabling intelligent species to internalize and integrate knowledge (a sort of information enfolding) in a more holistic memory manner. This information can then later be unfolded spontaneously and centered in the here and now as the conscious moments of any individual. In the process of looking at the cosmic Ouroboros, attention is drawn to any potentially circular dynamics around the serpent's body, but generally misses the axis through the center of the circle, along which the observer is located. Yet, the Ouroboros as pictured in Figu

The mystery of nothing, of course, is a current preoccupation of physics, whilst having long been a preoccupation in relation to deep spiritual insight.

Now, we can conceive the Ouroboros differently: not as an intoxicating bite or a suffocating swallowing of itself, but rather as a symbol of resurrection or rebirth, as alchemists and philosophers like Carl Jung said long ago. In this process of repeated creation, we should penetrate into the deeper layers of the toroidal inner structure that provic wave information trajectories and recurrent coupling, thereby exhibiting an information mirroring in a process of "physical self-reflection" (information that returns to itself). In the framework of the cosmic Ouroboros in Figure 7, we now ask which element in nature can connect the various material shapes of the universe. The latter often is associated with striking spiral features at the various scales of the universe.

A possible answer to this puzzle of a connected universe thus lies in the recognition of the central role of physical information, through which any of these structures can be described. The tail portion of the Ouroboros entails the smallest quantized (Planck) scale, supposedly composed of the smallest unit of information: the qubit.

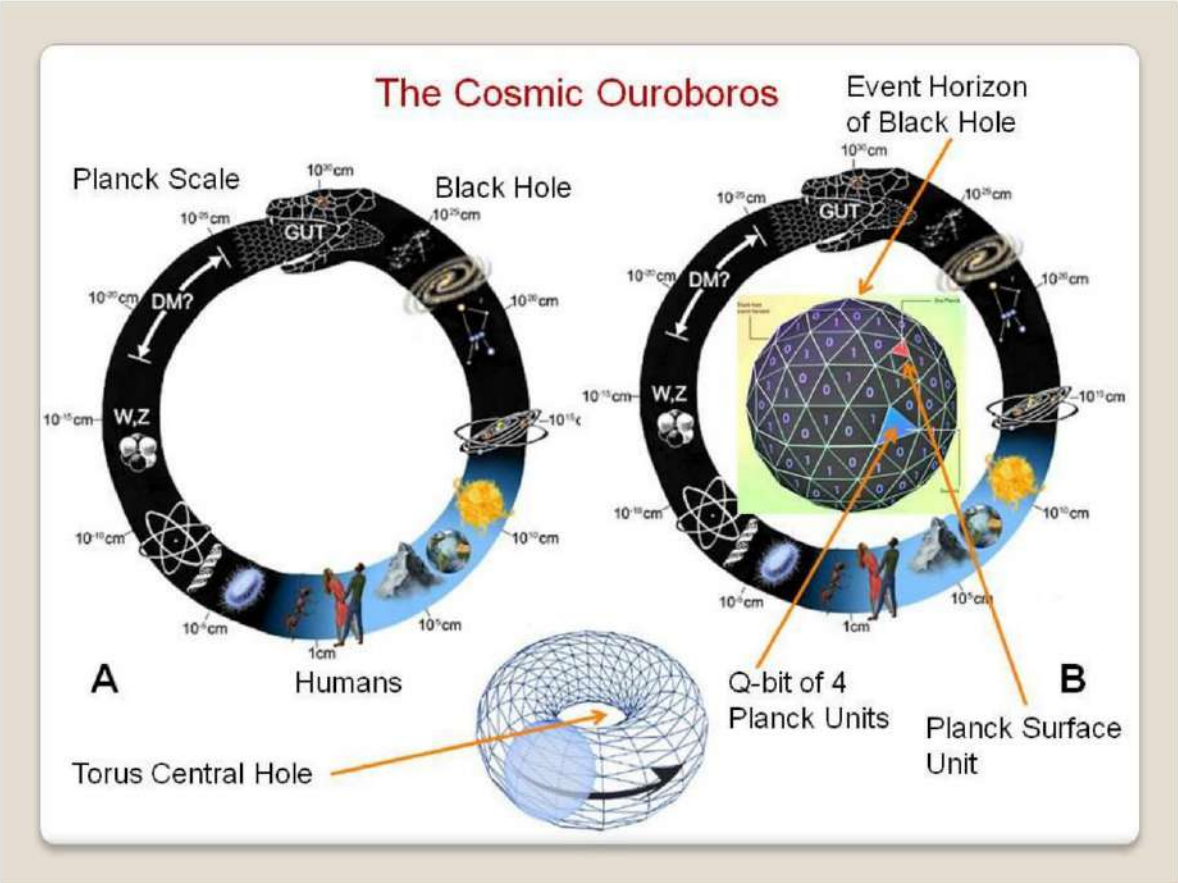

Figure 7. These are models of the Cosmic Ouroboros – A: The hollow ring structure can be interpreted as empty, but alternatively can be seen as a flat torus. B: The alternative toroidal representation of the Ouroboros. The central hole is depicted here as a black hole spherical structure, on its surface bearing the basic units of information (in 0 and 1) that are projected on the black hole event horizon. Each Q-bit (or qubit) is composed of four Planck surface units. GUT refers to a Grand Unified Theory that attempts to describe all forces except for gravity.

The mouth portion of the serpent depicts the largest structure of cosmic black holes at the centers of all galaxies, that gravitationally swallow information but, according to recent cosmological research, also radiate this information into the cosmos stemming from their event horizon, where all of the internalized information is projected and stored, in a holographic manner in the form of qubits. Here the smallest scale of the Universe meets the largest one presently known. In this model, the universe is conceived as a "living" structure (Meijer et al. 2021, 2022), that provides event horizon-mediated back-radiation of conserved information. This cosmic "symphony" arises from huge numbers of black holes, distributed throughout the entire universe. Thus, the very birth of our universe is conceived by some as a transition of information from a giant single black hole that was formed from a previous ultimate version of the cosmos in the framework of a cyclic operating mode in a toroidal model. The toroidal Ouroboros is better understood as embodying a cognitive twist, relating "inside" to "outside," as with a Möbius strip (Meijer 2017).

Electromagnetic Aspects of Dynamic Models of Consciousness

Many scientists have earlier suggested that basic information reaches our brain from outside (Wolf 1985, 1999, 2008; Grof 1987; Jahn and Dunne 2004; Tonneau 2004; Persinger et al. 2008, 2015; Taneichi 2015), since the nervous system may also function as a receiver of subliminal signals. One could regard this as a physically defined "extrasensory perception." In other words, we have to take into account a "sixth" sense in the form of a vibrational, resonance sensitive macromolecular apparatus in each of our cells (Hameroff and Tuzcynsky 2015).

These brain receivers of external information act as bio-antennas, being vibrational, resonance-sensitive elements in cells that both may act as receptors and as emitters of quantum information. They function as resonant oscillators with specific resonance frequencies, which are coupled with a natural quantum field (Pereira and Furlan 2007; Bokkon et al. 2009, 2013; Persinger 2008; Cifra et al. 2010; Persinger and Lavallee 2010; Dotta 2013; Rouleau 2014; Pereira 2015; Meijer and Geesink 2019; Meijer 2023). These particular cellular sensors are composed of flexible structures of proteins, oligonucleotides, and elements of the cell skeleton that mutually communicate through discrete wave resonances and are instrumental in mediating fluxes of photons, phonons (sound particles), and related quasi-particles such as polarons (phonon covered protons and electrons). This bio-sensing apparatus of the electromagnetic cell was tentatively called "electrome" (de Loof 2016), and is under the continuous influence of natural occurring internal as well as external electromagnetic fields (Meijer and Geesink 2017, 2018, 2019; Meijer 2023). They represent a fractal series of discrete EMF frequencies that influence a wide range of animate and inanimate systems and, interestingly, are identical to EMF frequencies that have been reported in cosmological studies as cosmic microwave background radiation and also gravitational waves (Meijer 2023), and therefore likely represent a primordial spectrum of EM frequencies that originate from the Zero-point Energy Field in which also our brains are embedded.

We hold that this overall harmonic matrix of EM resonances produces quantum coherent vibration domains in aqueous brain compartments and intrinsic ions (Geesink and Meijer 2019; Meijer 2023), as well as in proteins, DNA, and membrane-associated structures such as ion-channel and microtubular proteins. These particular macro-coherent wave connections are claimed to be instrumental in creation of the subconscious brain function. Such a hidden neural network maintains its information processing ability, even in the absence of classical

neuronal transmission, for example in NDE. This EMF type of consciousness is required for bidirectional information transfer between the associated memory workspace of the brain and the residual brain activity in NDE. The latter is also conceived as the 3-D to 4-D interfacing with the supposed universal consciousness realm, and can explain the global life-panorama visions in NDE and related phenomena, as reflecting a personal memory domain of the all-pervading Zero-point Energy Field.

The Zero-point Energy Field may potentially undergo resonant wave interaction with either life systems (Setterfield 2002; László 2007; Keppler 2012; Caligiuri 2015) or with physically defined mental dimensions (Grof 1987; Jahn and Dunne 2004; Beichler 2012). Also, a bio-photonic type of communication (Bokkon and D'Angiulli 2009; Dotta 2013), gravitational sensing of information present at the Planck scale (Penrose 2014; Meijer 2023) and even information projected from event horizons of black holes have been implied in such holo-fractal phenomena (Maldacena and Susskind 2013; Pourha

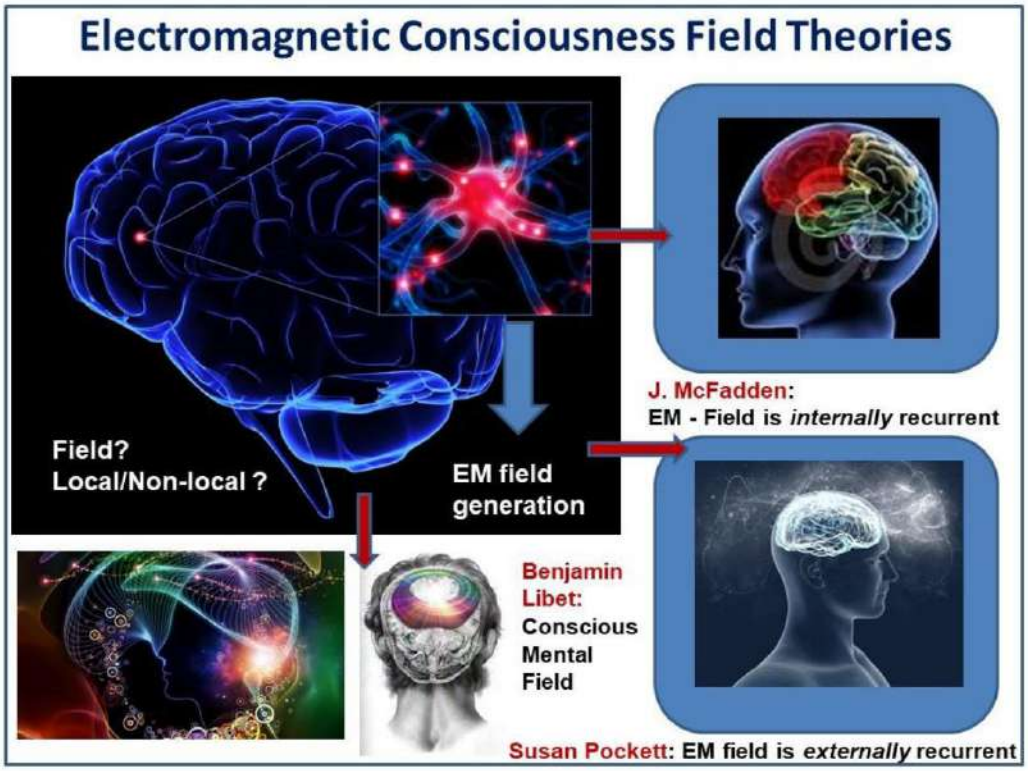

Figure 8. These are current models of consciousness on the basis of long-range electromagnetic fields that may explain the simultaneous binding of distant brain nuclei involved in integral perception processes.

In this respect, it is worthwhile to mention that, based on quite solid evidence, the brain has been described as an electromagnetic workspace (John 2001; McFadden 2007; Pocket 2012). See Figure 8. The universal force of electromagnetism likely controls all biological response, as Stephen Hawking noted in *A Brief History of Time* (2010). Indeed, living systems are under the continuous influence of electromagnetic fields, and it is proposed in the present paper that the native, non-trivial, photon/phonon guided electron vibrations are shared with resonating proteins and nucleotides that control cell function throughout the entire hierarchy of living systems (Meijer and Wong 2021, 2022).

Of note, this inferred collective field concept may constitute an interpretation framework for poorly understood phenomena such as mental states like intuition, telepathy, far distance observation, as well as NDE (Radin 1997; Myss 2006; Alexander 2012; Beichler 2012; Bókkon et al. 2013; Rivas 2016; van Lommel 2018) and psi phenomena—the unknown factor in psychic experience from the Greek *psyche* meaning mind or soul (Radin 1997; Rousseau 2011; Beichler 2012), to mention only some of the many studies available on these topics.

Extra-sensory Perception: Information from Another Physical Domain?

Examples of extrasensory perception are transpersonal feelings of intuition, serendipity, synchronicity, as well as dreams. These transpersonal experiences include aspects such as channeling, out-of-body experiences, and NDE, that are broadly discussed in this framework (Braude 2003; Jahn and Dunne 2006; Radin 2006; Carter 2012; Kastrup 2016; Mishlov 2018; van Lommel 2018).

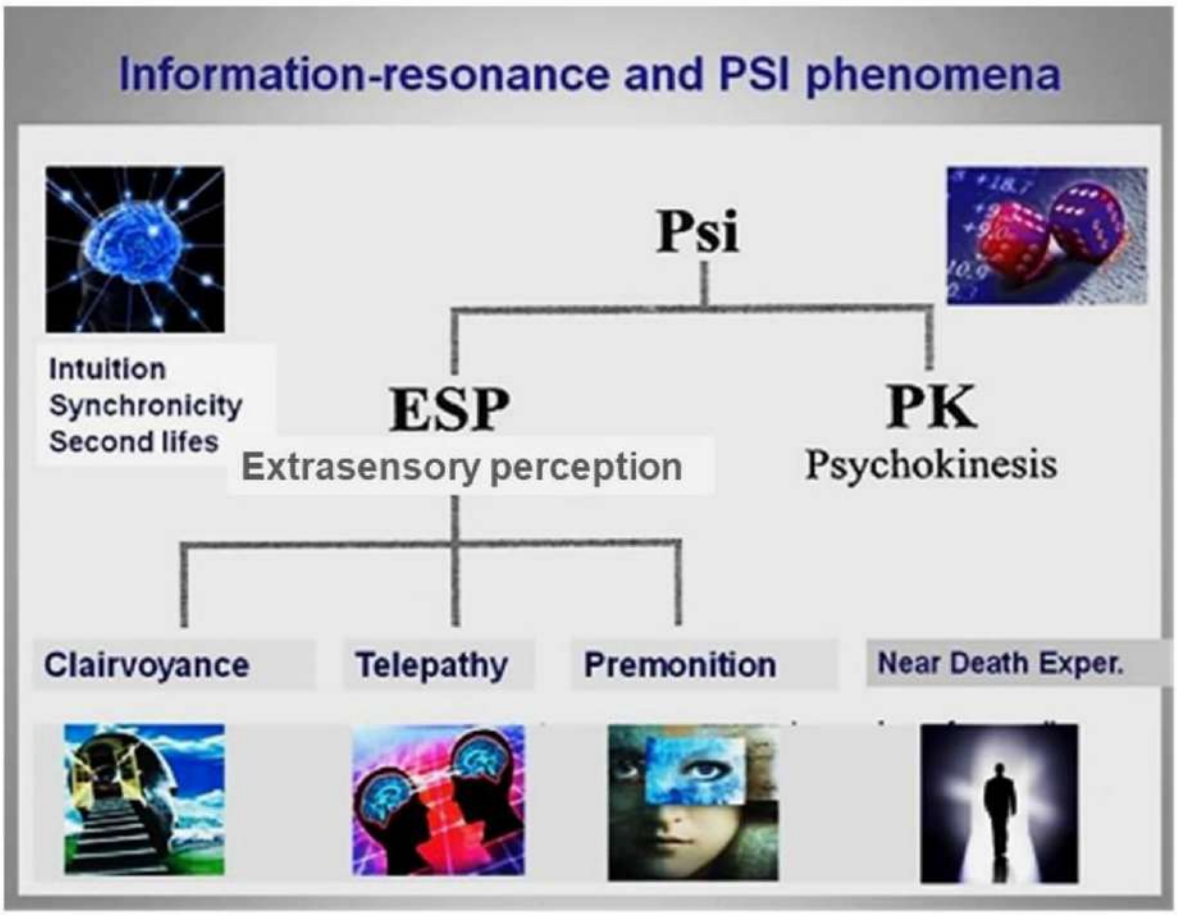

Figure 9: This is a model of some of the forms of extrasensory perception and psi phenomena.

The general question here is whether the "normal" and "beyond normal" experiences are really so sharply separated, or rather constitute a continuity of our reality. The quantum consciousness models discussed earlier may also be instrumental in the explanation of a number of so-called transcendental experiences in the category of psi phenomena (Figure 9) such as clairvoyance, telepathy, remote viewing, and psychokinesis. These phenomena could also be related to an underlying non-local inform

at a distance, which are sometimes claimed to be messages from the future. The central question is how the necessary information for these phenomena can reach the brain and how these extrasensory communications/perceptions occur from a mechanistic point of view.

It is important to note that much of the research in this field is often focused on the direct detection of paranormal phenomena and less on the underlying physical mechanisms of information transfer. The latter is of great importance for future investigation, because it may provide answers to study the well-known evading aspects at sequential psi observations, as well as how the signal strength of ESP experiences could be improved. The latter aspects could be related to the inbuilt filters in our brain that possibly are meant to protect us against too much disturbing information (Radin 1996, 2006; Jahn and Dunne 2007), since our brain is generally involved in preventing

How Information is Processed and Received in the Brain: a "Dual Filter" Hypothesis

The modern scientific understanding of mental phenomena asserts that the brain is the sole causal agency of mind. This view is substantiated by the correlations ordinarily observed between subjective mental states and objective brain states. Yet, there is an increasing amount of evidence suggesting that, under certain extraordinary circumstances, the correlation between peak subjective experiences and brain-states breaks. This strongly indicates either that the brain is not the sole causal agency of mind, or potentially that it is not a causal agency at all.

An alternative hypothesis for the relationship between the mind and the brain was put forward by Bernardo Kastrup (2016, 2017, 2018) that is entirely consistent with current neuroscience data and increasingly supported by the latest scientific evidence. Kastrup deserves credit for highlighting the crucial aspect of idealism again in science philos His hypothesis explains not only why brain states are, ordinarily, tightly correlated to mind states, but also how, under extraordinary conditions, subjective experience can occur independently of the brain. The theory offers a rational, evidence-based, yet fundamentally different perspective on the nature of consciousness, life, identity, and transition (death) than the common conjectures offered by materialism. The following provides a compilation of Kastrup's ideas.

There is an undeniable correlation between brain states and subjective experience. Alterations of consciousness accompanying physical trauma to the brain, as well as the use of anesthetics and psychiatric drugs, are also examples of the tight link between mind and brain, that many of us are personally familiar with. Laboratory studies have provided evidence that this correlation is even more specific than one could infer from direct experience: particular conscious experiences have been linked to specific neuronal activation patterns in the brain (Metzinger 2000). Experiments with Transcranial Magnetic Stimulation (TMS) have also demonstrated that deactivation of specific brain regions correlates tightly to specific changes in subjective experience (Pascual-Leone et al. 2002). Therefore, any theoretical hypothesis purporting to explain the ontological status of mind must be able to explain why and how subjective experience seem

It should be realized, however, that much of the neuronal processing in our brain, entailing the exact same kind of neurons that otherwise lead to awareness, is completely unconscious (Eagleman 2011). Such seemingly insurmountable difficulty in logically deducing the

qualities of experience from the properties of matter is called "the explanatory gap" (Levine 1999), or "the hard problem of consciousness" (Chalmers 2003, 2019).

If consciousness is primary and irreducible, then the brain cannot be the causal agency of mind: mind must exist *a priori,* ontologically preceding the brain. How can we then explain the empirical observation that, ordinarily, mind states correlate tightly to brain states? The hypothesis here is that the function of the brain is to localize consciousness, pinning it to the space-time locus of the physical body. In doing so, the brain modulates conscious perception in accordance with the position and perspective of the body in space-time. Indeed, there would be clear survival advantages for the brain to evolve to do just that: by localizing and modulating subjective experience according to the space-time locus of the body, the brain coaxes mind to identify itself with the body and, therefore, to contribute actively to the body'

According to the "filter" hypothesis of mind-brain interaction (see Figure 10), as earlier proposed by Robert Jahn and Brenda Dunne (2004), subjective experience is not always created by the brain, but rather may be selected by it, according to the position and perspective of the body in space-time. This selection process is akin to a "filtering out" of conscious experience. It is analogous to how an analog radio receiver selects from among the variety of stations present concurrently in the broadcast signal the one that you want to listen to. All other stations are being filtered out and never r

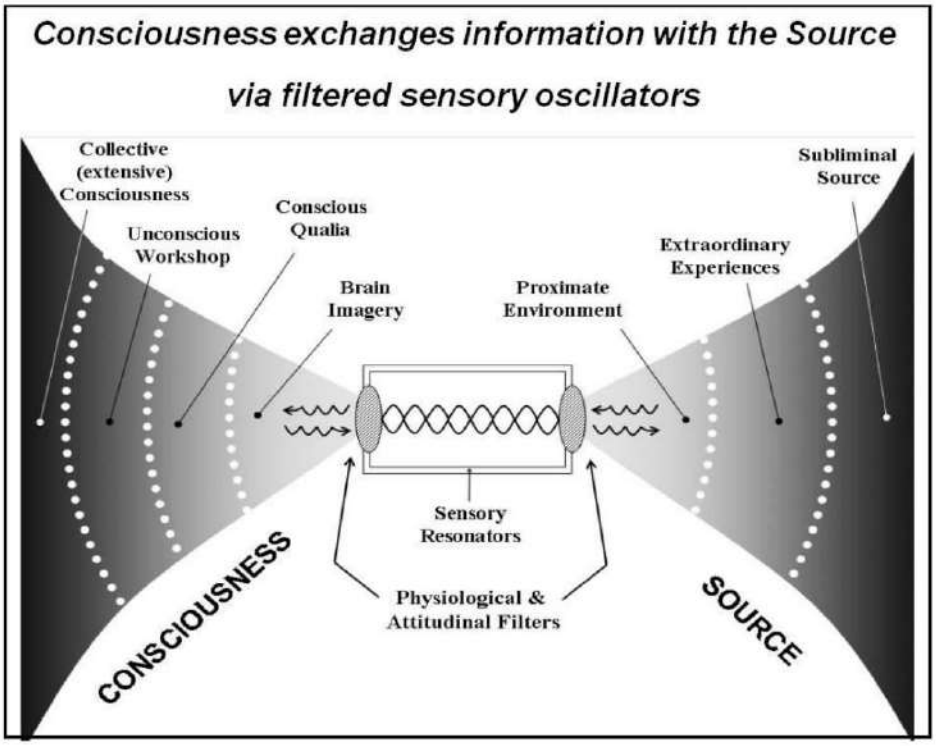

Figure 10. This is a model of the filter hypothesis: The human brain filters conscious information states, such as qualia, from the collective consciousness field (left), but at the same time it filters subluminal information by attitudinal behavior (scheme modified from Jahn and Dunne 2004, 2007).

As such, all subjective experiences exist a priori and irreducibly; the brain merely selects those that are useful for the survival of the physical body. The brain activation patterns that ordinarily correlate to conscious experience reflect the filtering process at work: they are

analogous to the circuit oscillations in the radio's tuner, which correlate tightly to the sounds the radio produces. The presence of such circuit oscillations obviously does not mean that the radio is generating the broadcast signal itself, but is merely selecting a subset of information from a preexisting signal. Analogously, brain activation patterns do not always imply that the brain is generating the correlated conscious experience, but rather can merely select it from a broader, irreducible superset.

Therefore, the ordinarily observed correlation between brain and mind states is a direct and necessary consequence of this selective filtering out of subjective experience: when the filtering mechanism (i.e., the brain) is interfered with physically, as in a blow to the head, or chemically, as during anesthesia, the filtering process that modulates our conscious experience is changed, so that corresponding perturbations of experience are the result. The hypothesis offered here remains consistent with all observed correlations between subjective experience and measurable brain states.

For there to be a survival advantage in capturing an otherwise unbound consciousness within the space-time domain determined by the brain, consciousness must have material and irreducible causal efficacy on brain function. In other words, there must be downward causation from consciousness toward brain structure and/or activity, otherwise consciousness would be merely a useless "spectator," providing no survival advantage. As it turns out, there is indeed significant empirical evidence that downward causation does occur. Experiments have been performed in which subjects could physically alter their own neuronal wiring, thereby reversing previously diagnosed brain pathologies, simply by directing their conscious intent (Schwartz and Begley 2004). This surprising effect is known as "self-directed neuroplasticity," and it suggests that conscious intent is not only ontologically independent from, but can also causally affect brain activity and structure, thereby potentially modifyir

The first aspect of a "dual filter" hypothesis, as proposed here, implies that consciousness, in its unfiltered state is, in principle, unbound. As such, consciousness is fundamentally unitary and non-individualized. The emergence of multiple, separate, and different conscious perspectives, or egos, is a consequence of the filtering process: different egos, occupying different points in the fabric of space-time, retain awareness of different subsets of a universal superset of all potential subjective experiences; the rest is being filtered out. The differences across subsets give each ego its idiosyncratic characteristics, personal history, and sense of personal identity. The part of the universal superset of subjective experiences that is filtered out, then becomes the unconscious mind of the respective ego, since each ego retains c

Importantly, the "filter" hypothesis predicts that one can conceivably have experiences that do not correlate to one's brain states. Since here the brain is seen merely as a mechanism for filtering out experiences, it is conceivable that, when this mechanism is interfered with, or is partially and/or temporarily deactivated, one's subjective experience could delocalize, and expand beyond the body in time and space, and perhaps even beyond
In other words, the "filter" hypothesis predicts that transpersonal, nonlocal experiences can conceivably happen when particular brain processes are deactivated. A key element in a second prediction of the "filter" hypothesis is that non-local, transpersonal experiences are predicted to correlate precisely to certain reductions of brain activity. Interestingly, there is indeed a broad pattern of empirical evidence associating nonlocal, transpersonal experiences (see Figure 11) with procedures that reduce

A) Fainting caused by asphyxiation or other (sometimes deliberate and dangerous) restrictions of blood flow to the brain is known to sometimes induce intense transpersonal experiences and states of non-locality (Shuman 2007).

B) Pilots undergoing g-force induced loss of consciousness (G-LOC), where blood is forced out of the brain, significantly reducing its metabolism, report experiences similar to nonlocal and transpersonal NDE (Kastrup 1990, 2014).

C) The technique of "holotropic breathwork," as well as more traditional yogic breathing practices, employ a form of hyperventilation to achieve a similar effect. They increase blood alkalinity levels, thereby constricting blood vessels in the brain, thereby causing hypoxia and dissociation (Rhinewine and Williams 2007). This, in turn, reportedly, leads to significant transpersonal, non-local experiences (Taylor 1994).

D) Psychedelic substances have been known to induce highly complex, intense, non-local, transpersonal experiences (Strassman et al. 2008). It had always been assumed that they do so by exciting those parts of the brain that are correlated to such experiences. Yet, a recent study has shown that psychedelics actually do the opposite. The study reported that profound changes in consciousness were observed after the administration of the psychedelic, but surprisingly, only decreases in cerebral blood flow were seen (Carhart-Harris et al. 2012). The researchers observed no increases in cerebral blood flow in any region. Even more strikingly, they reported that "the magnitude of this decrease (in brain activity) predicted the intensity of the subjective effects." In other words, the intensity of the experience was inversely proportional to the activation of the brain, precisely as predicted by the "filter" hypothesis.

E) The use of transcranial magnetic stimulation (TMS) can inhibit cortical function in highly localized areas of the brain by perturbation of the associated electromagnetic fields. When the neuronal activity in the angular gyrus of a patient with epilepsy was inhibited in this way, out-of-body experiences (OBE) were reportedly induced (Blanke 2002).

F) Brain damage, through deactivating certain parts of the brain, should also induce non-local, transpersonal experiences under the right circumstances, and indeed, this has been reported. Two prominent examples are the case of neuroanatomist Dr. Jill Bolte Taylor, 2009, who underwent a profound transpersonal experience as a consequence of a stroke, in line with a systematic study recently carried out in Italy (Urgesi et al. 2010). In the Italian study, patients were evaluated before and after brain surgery for the removal of tumors. Statistically significant increases in feelings of self-transcendence were reported after the surgery.

G) As treated later, NDE are the ultimate examples of non-local, transpersonal experiences associated with reduced or virtually absent brain activity. Evidence for the validity of NDE continues to be collected under scientific protocols, and has been mounting (Greyson 2019; Greyson and Kelly 2009). Thus, the most complex, coherent, intense, non-local, and transpersonal experiences that people report, are associated precisely with reductions, or even elimination, of brain metabolism. This is cons hypothesis, and contradicts general materialist assumptions.

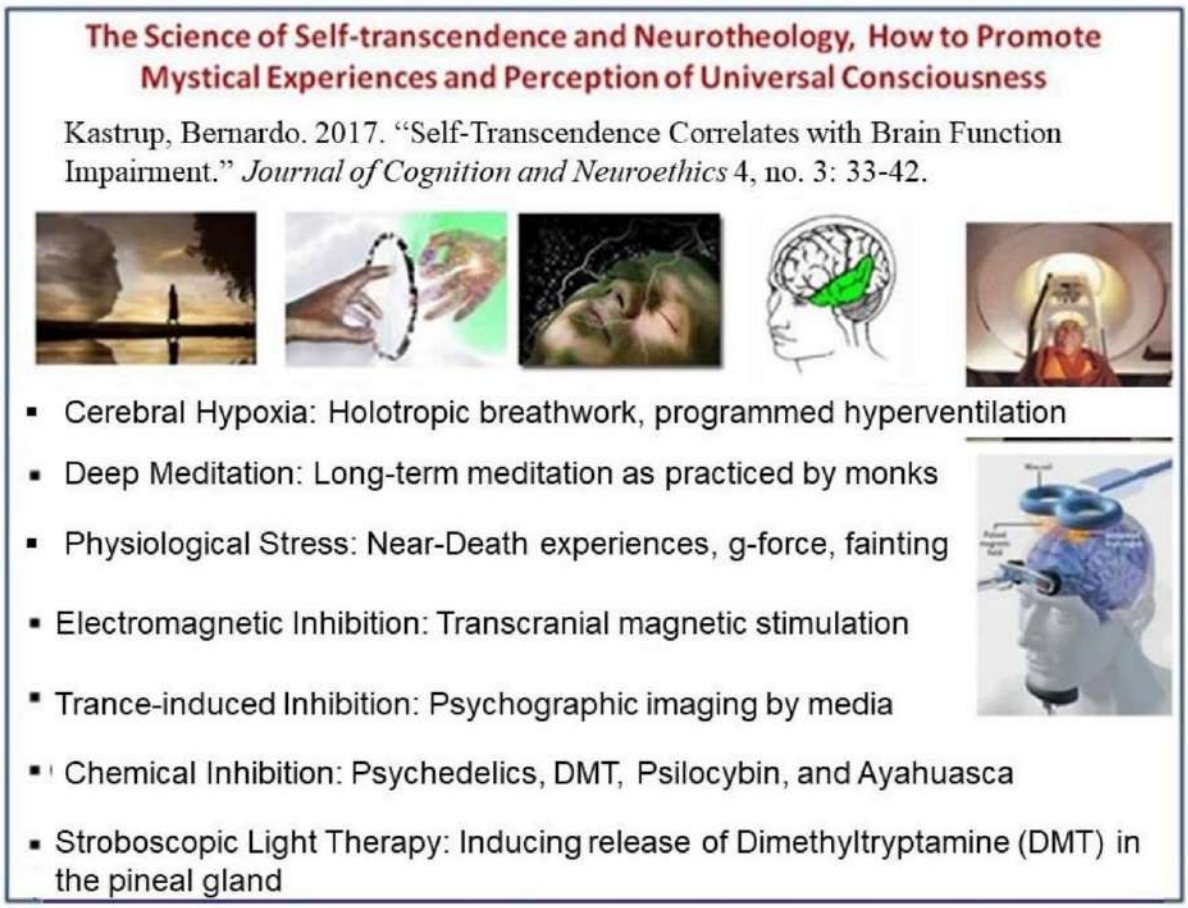

Figure 11. A model of the various conditions that reduce overall brain activity and can promote perception of universal consciousness or mystical experiences.

The broad pattern that associates peak transpersonal, non-local experiences with reductions in brain metabolism seems to contradict the tentative, promissory, materialist solution to the mind-body problem. Instead, it substantiates the notion that the brain is a kind of "filter" of consciousness, which selects from a universal superset of irreducible subjective experiences those experiences that correlate with the space-time locus of the body. It is reasonable to think that there were survival advantages for the brain to evolve this capacity, which the earlier mentioned empirical evidence for downward causation further substantiates. The "filter" hypothesis explains how traditional techniques for the attainment of higher transpersonal insight work: by reducing the activity of certain brain regions. They (partially and/or temporarily) take the filtering mechanism offline, allowing consciousness to dissociate and expand beyond the space-time locus of the body. From this

Consciousness in the Universe is Scale Invariant and Present in All There Is

It was previously postulated that consciousness in the entire universe arises through scale invariance, the nested toroidal coupling of various energy fields, an aspect that may include quantum error correction (Meijer et al. 2020). In the brain 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 fully integral model of the self (Meijer and Geesink 2017). This b

to convert integrated coherent wave energies into standing waves that guide the related cortical template to a higher coordination of reflection and action, as well as network synchronicity, known to be required for conscious states. In relation to its scale-invariant global character, support was found for a universal information matrix, and was extensively described earlier by David Bohm as a supposed "implicate order" (Bohm and Peat 2008). See Figures 12 and 13.

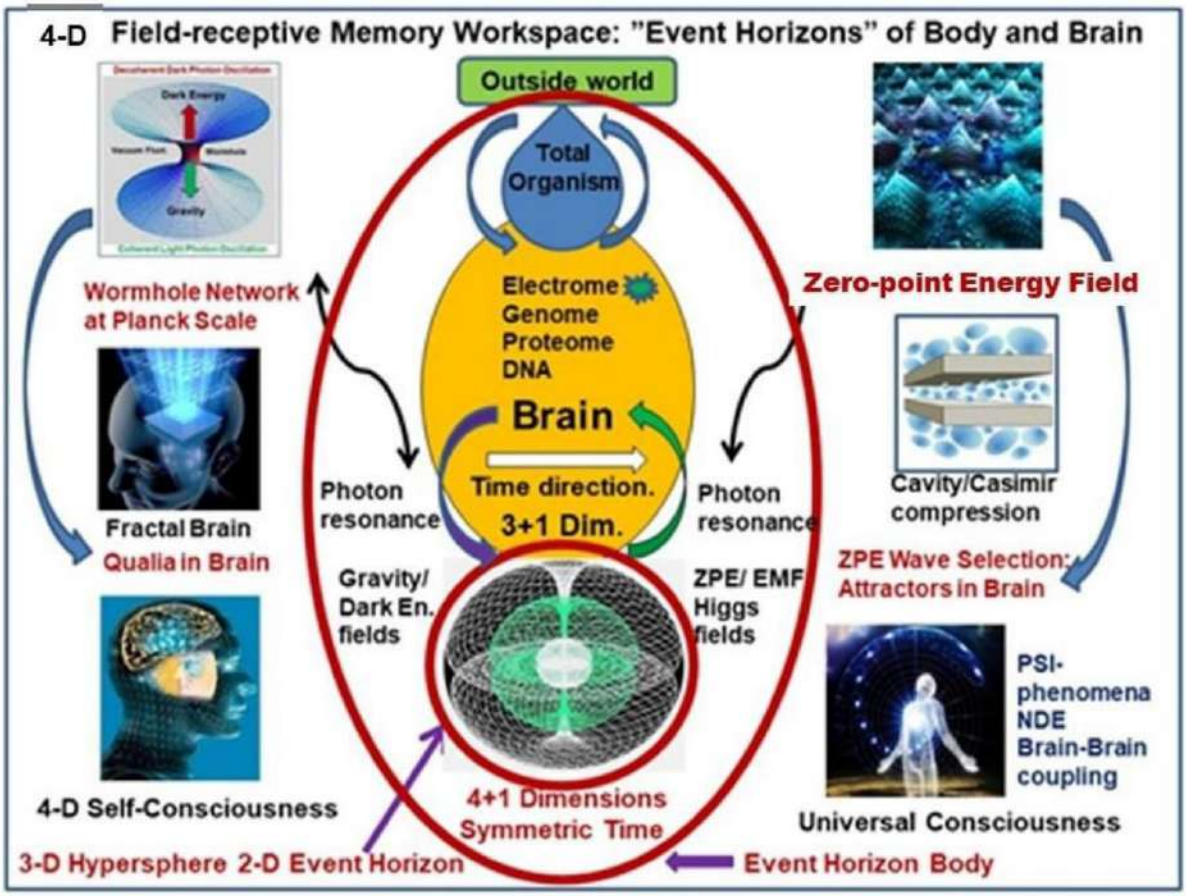

Figure 12. This is a model of brain and body relations in a 4+1-dimensional space-time framework (4+1 implies 4 spatial dimensions and one single dimension of time) on the basis of energy trajectories in a nested toroidal geometry. The opposing forces of dark energy (diverging force) and gravity, (converging 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 (upper left) through quantum gravity mediated wave reduction, as well as through resonance with the ZPF (upper right). Our brain can perceive only 3+1 dimensions, the latter being a time dimension 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 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 the 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 ZPF, constitute the event horizon of the brain, integrate gravitational and dark energy force fields, and supervene the physical brain. Event horizons of the brain and whole body are depicted in the red ellipse and the circle respectively.

This holographic conjecture still plays a role in a spectrum of space-time theories in current physics. The presence of a field-receptive resonant workspace associated with, but not reducible to, our brain, may also provide an interpretation framework for widely reported but poorly understood transpersonal conscious states, and also in the supposed algorithmic recipe for the origin of life (Meijer and Wong 2021, 2022). It also points out the deep connection of humankind with the cosmos and our major responsibility for the future of our planet (Meijer 2022; Meijer and Geesink 2022; Meijer and Ivaldi 2022).

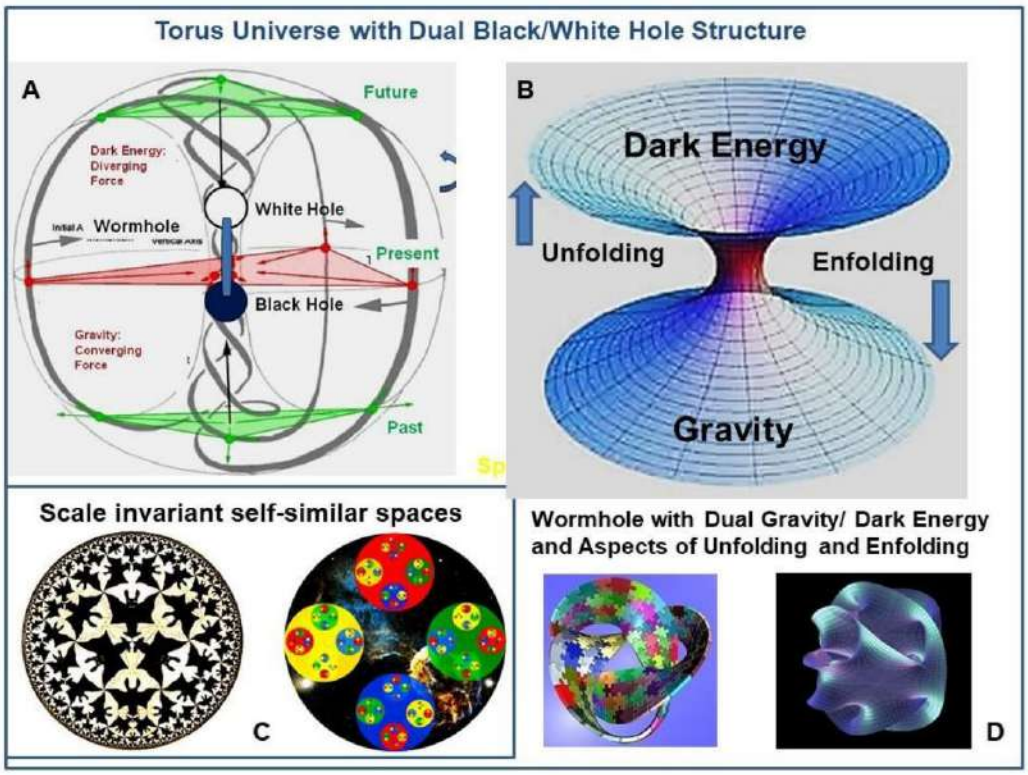

Figure 13. (A): Toroidal wormhole structure of the universe with fractal features (C) that encompasses the aspects of dark energy (expanding or diverging force) and gravity (compressing or converging force), that also can be envisioned as information-energy unfolding and enfolding respectively (B). The black hole/white hole transition in the inset A, may imply twisted (strange loop) features, as also present in multi-dimensional space models such as in String Theories (D).

Consciousness can therefore be defined, as a state of a semi-stable system that has developed in a cooperative and cyclic operating mode, so that it has become "causally self-observant." Thereby, it can, not only predict aspects of the local environment, but can also integrate memorized information and future-directed projections into a personal worldview that serves individual survival, development, and social communication (Forshaw 2016). Yet, in the present paper a much wider context for consciousness is offered, in which our individual mind is seen as a part of a larger universal consciousness, being instrumental in the maintenance of the entire fabric of reality.

Evidence for a Supervening Resonant Mental Workspace in our Brain Function

Subjective conscious experience exhibits a unitary and integrated nature that seems fundamentally at odds with the fragmented functional architecture of the brain that has been identified in neuro-physiological studies, an issue which has come to be known as the binding problem of brain regions. It is generally agreed that the supposed boundarie

between these classical "brain compartments" are arbitrary and that intentional and especially emotional factors influence the relative involvement of deeper layers of mind (Jahn and Dunne 2004; Schwartz et al. 2005; Tamietto and de Gelder 2010; Rousseau 2011; Beichler 2012; Meijer and Geesink 2017).

This property became evident in a large variety of conscious states as influenced by, for example: emotional feelings, meditation, hypnosis, vivid dream states, effects of rhythmic sound exposure, use of psycho-active agents and also in life-threatening events that can induce NDE.

Furthermore, we postulated earlier that a dedicated part of total brain activity is devoted to the dynamic and ongoing construction of an integral personal universe/worldview (Meijer and Korf 2014) in which consciousness is seen as a meta-phenomenon (Linton 2015). Such an integrated representation of the outer world should not only include our individual "autobiography," but also the related intrinsic interactions with the external world, including the physical laws that determine it.

It requires that we recognize our memories as true events as having relevance and significance for the present. The latter recognition aspect can only be realized if we see the present not only as a product of the past, but also as the anticipated (simulated) outcomes of our multiple future projections (Brueck and Meijer 2020). In other words, there is no worldview of the present without a probabilistic projection of our potential future, and the latter implicitly signifies our long-term freedom of choice (Meijer 2022).

Such an internal impression of the self, however, should be permanently evaluated and validated via an integral and versatile workspace that contains an actualized "state-of-the-art" of the self. This global biography should also include potential subliminal and unconscious interactions, including time-retrograde (backward) projections of future events. The latter could be called "remembering of the future," a process that has been physically defined and experimentally demonstrated earlier by Yakir Aharonov (2010) in soft-stimulation quantum experimentation.

A 4+1-dimensional-memory workspace is operating for the human brain, being itself in a 3+1-D setting. This brain-associated mental domain can not only take into account the hidden interaction with all natural forces, but also can integrate a symmetric bidirectional type of time (in contrast to the common linear mono-directional time) that intrinsically includes an aspect of backward causation. This "software-like" mental program should exhibit an extremely fast response time, enabling an immediate selection of "superposed"
conscious and non-conscious states, a program that is only compatible with a photon/phonon mediated information transfer rather than the relatively slow neuro-humoral mechanisms.
Such a competent information handling should offer the integral organism an optimal qualitative and quantitative impression of the current state of the whole body, as being embedded in its environment and its development (Meijer et al. 2020).

We thus envision such a monitoring system as supervening the basic neuronal communication networks, in order to generate a global type of mental field (Meijer and Geesink 2017; Meijer et al. 2019, 2020, 2023). By this photon/phonon guided space-time domain, synchronic oscillations in the cortico-thalamic region of the brain could be induced through resonant coherent and condensed electromagnetic vibrations (standing waves) and/or an attractor type of quantum information (Meijer 2023). The latter could, for example, be

derived from a bidirectional interaction with the earlier mentioned stochastic ZPF (Keppler 2012; Caligiuri 2015; Meijer and Geesink 2022; Meijer 2023).

Transcendental Experiences and the Resonant Mental Workspace

The feature of quantum back-propagation can effectively implement a form of adaptive error correction (Goncalves 2017), as has also been shown in the generation of cyclic/toroidal chaos by Hopfield networks (Akhmet and Fen 2014). The model presented here thus postulates a mental workspace in close connection to our brain. This raises a number of central questions: 1) Is there a physical basis for such a workspace or should it be seen as an intrinsic mind/matter dualistic approach? 2) If such a seemingly disembodied or rather extra-dimensional aspect of consciousness exists, how does it communicate with the physical brain? 3) If our brain is supervened by an updated inner projection of the outside world, that thereby tends to reduce “surprise,” how does this condition affect free will (choice)? With regard to the potential dualistic mind/matter aspect, we stipulate that we consider our model as non-dualistic and, in this sense, agree with the Operational Architecture model of Andrew Fingelkurts and Alexander Fingelkurts (2004, 2010) on separate phenomenal and neuro-physical aspects of consciousness, stating that both aspects have an ontological relation but are not reducible to each other.

The implicit conception of a 4+1-D mental workspace that supervenes our neural system and provides the dominant part of self-consciousness and that may operate in addition to our daily experienced conscious states is supported by earlier and also more recent observations in NMR studies, that long term memory is not always correlated with scaled sizes of the brain. Savants with normal brain size can demonstrate a huge, disproportional, memory space (entire novels and even contents of telephone books are memorized in detail). Hydrocephalic patients that have only 5 percent of normal brain volume (called microcephaly), can show quite normal intelligence and social behavior (Forsdyke 2014). Other striking examples are patients with a largely destroyed forebrain that maintain a quite normal life (Sasal et al. 2016; Meijer et al. 2020). Even the known split-brain patients that seem to develop two different types of consciousness in the isolated right and left halves of the brain in fact show this aspect (McGillchrist 2016). In addition, split-brain patients with disconnected hemispheres even perform better at some cognitive tests (Sasai et al. 2016).

In more general terms, the aspect of non-material mental aspects of consciousness has been strongly pursued from neurological (Nagel 2012), bio-physical (Keppler 2016), philosophical (Kastrup 2016), quantum-physical (Henry 2005) and evolutionary viewpoints (Grandpierre 2014). Giulio Tononi, in reviewing the integration-of-information-consciousness concept, mentioned an interesting view of Philip Sullivan (1996), that another type of consciousness becomes manifest in meditative states that in fact can be considered as rather information content-less, and could reveal a hidden part of consciousness that is normally masked or filtered away by the busy default activity of our brain (Jahn and Dunne 2004; Schwartz et al.
2005; Rousseau 2011; Martin 2013). Chris Hardy (2016) also takes a space-time approach by positioning individual consciousness and the self in a hyper-dimension.

Hardy suggested that bodily death is just the severing of the link between this domain and the brain/body, supposing an independent holographic semantic field on a personal basis. The latter resembles the proposal of Klee Irwin (2014), seeing consciousness as a quantized space-time language that can be described by the quasi-crystal mathematics of E8 geometry (a 248-dimensional mathematical symmetry).

E8 geometry as a mathematical model has been applied to optical sensing and imaging "as an encoding/ decoding process in which the encoder takes the light signal or some property thereof (e.g., intensity, polarization, or spectral composition) and transduces that signal into usable information. The decoder is the software that then takes the information and converts it into something useful for the user" (Yuan et al. 2023).

It has also been suggested that self-consciousness could continue outside the body but remains at the level of Planck-scale geometry, as related to the generation of biophotons in which visual imageries are coupled to long term visual memory; NDE phenomena seem to be driven by such visual processes (Bókkon et al. 2013).

In our model, the fractal (nested) geometry of the torus takes a central position in brain physiology (Figures 12 and 14). The toroidal generation of quasi-wave particles such as polaritons and polarons, in which fermions such as electrons and protons are guided by associated sonic quanta (phonons) or light quanta (photons), may represent a global and crucial aspect of information transition and integration.

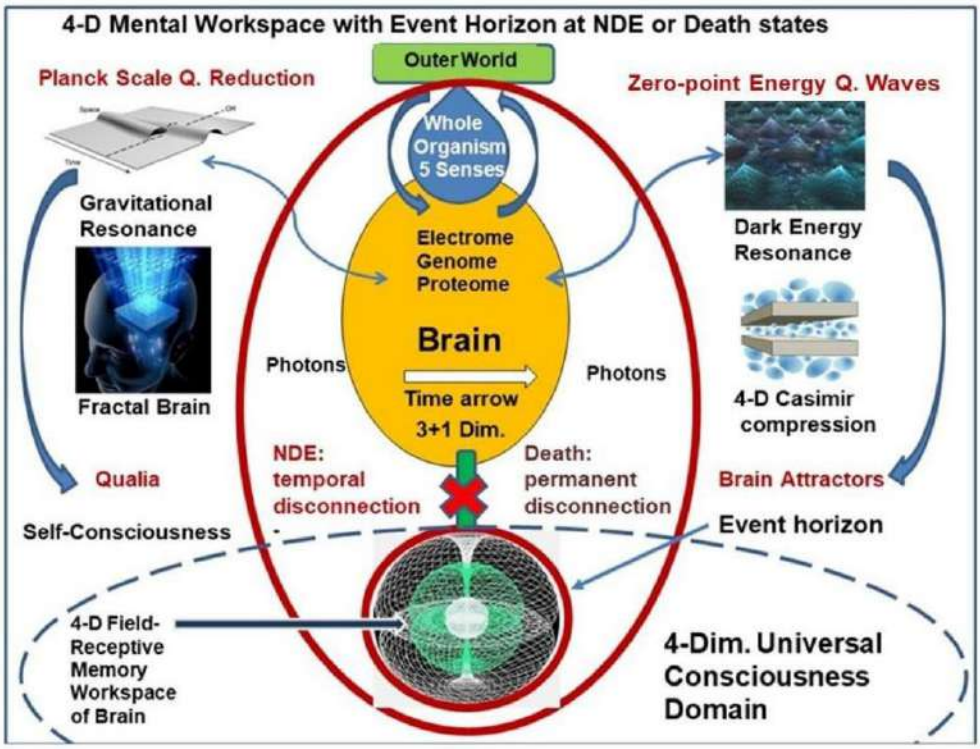

Figure 14. This is a model of the mental workspace (bottom middle) as part of universal consciousness residing in a 4-D domain, which can become disconnected from our organism. A temporal break in the connection is at stake in NDE experience, whereas a permanent disconnection occurs at bodily death (or transition, since the energy and information of elementary particles disperse but are not lost).

Solitons, also called polarons, have been proposed as axonal information carriers in the brain, in which myelinated nerve fibers function as light guides for such solitons and also for bio-photons, in this manner bridging electromagnetic and spin aspects of neural information processing (Kumar 2016). Interestingly, quasi-particles may also have played a crucial role in cosmic events at the initiation of our universe, wrongly framed as the Big Bang. Recent

studies indicate that this is realized through the involvement of various force fields such as electromagnetism, gravity, and dark energy (Meijer et al. 2023).

Recently, it was advocated that our extremely complicated human brain with at least 10 different cell types and billions of internal connections, shows a microstructure that remarkably resembles the cosmic fine-structured matrix of the universe (Vancurin 2020; and Vazza et al. 2020). This observation supports the idea that our universe may be instrumented by an intrinsic intelligence.

Even the human species could be involved in retro-causally operating a reconstructive cosmos and in this manner could act as the required quantum observer at the quantum birth of the cosmos, in addition to having a crucial role in the far future as participators in the creation of the ultimate universe, seen as a huge collective memory and information register, in the spirit of John Wheeler (Tipler 1994; Meijer 2015).

The Event Horizon Consciousness Model in Relation to an Afterlife and Immortality

With regard to 3-D to 4-D communication, we propose a multi-factorial informational connection on the basis of quantum holographic principles (Figures 12 and 14). Yet, all of the various communication mechanisms mentioned here are clearly interrelated. They include long range and bidirectional correlations of the supervening mental workspace with the physical brain through phase-locked quantum resonance, that is instrumental in the holographic sharing of quantum information through 4-D to 3-D projection and phase-conjugation (Mitchell and Staretz 2011). A similar multi-factorial process has been proposed in relation to information conservation by event horizons of black holes (Verlinde 2011, 2016; Van Raamsdonk 2010; Pourhasan

If consciousness and in particular self-consciousness is related to permanent contact with the 4-D hypersphere information workspace, in which probability is converted to meaning, this can be envisioned as a "storyline," implying that consciousness can observe itself from a geometric distance. This aspect is crucial in the understanding of the earlier suggestion made by Penrose, that consciousness contains an intrinsic non-computable component. Paola Zizzi and Massimo Pregnolato (2013) stated in this respect that, to approach the non-computable aspect, a sort of mathematical meta-language will be required. In other words: if self-consciousness observes the brain's memory and awareness states, by this very act it changes both of them. The only possibility to address this paradox seems the potential to link or integrate past and future events in the framework of quantum approaches (Brueck and Meijer 2020).

Does Individual Consciousness Still Exist after Bodily Death?

Could consciousness exist outside our body after death? Many authors, in the quantum brain research field, believe it can: according to the orchestrated objective reduction (Orch OR) consciousness model, under normal conditions, an intact, healthy brain consciousness occurs as frames or snapshots extending through the function of multiple spatiotemporal levels from networks to neurons to microtubules to quantum forces, down to and including Planck scale geometry (Hameroff 2012; Hameroff and Chopra 2013). When the blood stops flowing and metabolic energy can no longer drive microtubule mediated quantum coherence, quantum information relating to the subject's consci

or destroyed, but may dissipate to the universe at large, remaining entangled as a unified soul-like entity grounded in Planck scale geometry.

If the body is somehow resuscitated, the quantum information can return, and the subject may report an NDE or out-of-body experience (OBE). If the body is not resuscitated and the patient dies, the entangled quantum information constituting the subject's total consciousness register and personal memory imprint may persist in space-time geometry. The latter is in the supposed general information domain, which is by some phys

The entangled personal information may decide later to enter a selected fetus at birth, in the context of reincarnation. Could the universe, with its integral space-time geometry, conceivably host individual human consciousness, since its quantum information energy cannot be destroyed? There is ample energy in the form of zero-point fluctuations, so the question is whether information can be registered in the "nothingness" of space-time, and transcend from the Planck scale to the biological level?

Many will see this hypothesis as an empty speculation or, at best, an understandable illusion, but for others it will provide wide perspectives for potential answers to an ancient quest of humankind, regarding individual survival and the reality of an afterlife. Current physics opened the potential for ongoing exchange of information, including that of conscious states by a bidirectional flux, if information of life systems, from and into a general information matrix space containing all time, include future to present informational aspects (Brueck and Meijer 2020).

Relevant examples of the latter are related to the transactional interpretation of quantum physics of the soft quantum wave stimulation concept, in which future states interact with past states to create the present (Cramer 2004; Aharonov et al. 2010, 2013). In this bidirectional flow of energy according to reinterpretation of the Klein-Gordeon mass/momentum/energy equation and the retro-causality considerations of Gennaro Auletta and George Ellis, such a mechanism is plausible.

It is of interest that recent calculations of Daegene Song (2007) indicate that consciousness should, at least partly, reside outside the brain and that consciousness is applied to the brain rather than generated by it. This is so, since the conscious activity of an observer, observing the change in something observable is, per definition, mathematically not computable. Song has concluded that no matter how advanced computational machines may become, they cannot be conscious in the same sense as living systems.

Cosmological Aspects of a Cosmic Sonic Background Field

The findings on an all-pervading semi-harmonic EMF (electromagnetic frequency) pattern in life systems may also be related to the idea that an apparent musical harmony-like aspect of the electromagnetic background field reveals the hidden variables of the so-called implicate order, as supposed to underlie our daily reality. The latter aspect was later ascribed to the ZPE field by Ervin László (2011). If so, this implies that bio-molecular brain processes are coupled to a fine-scale structure of the universe as a unified, micro-wormhole entangled matrix on the Planck scale. Energy flow in the universe may in this theory exhibit a toroidal patten throughout the various scales of its frac

It is of great interest also that recent studies indicate that some black holes may predate the Big Bang on the basis of Bohmian quantum trajectories, and they do not exhibit a singularity and could in theory function as a portal to another universe, by which implicitly the loss of an information paradox is overcome (Gambini and Pullin 2013). One of the models that was conceived presents the three-dimensional universe, floating as a membrane (or brane) in a "bulk universe" that has four dimensions.

This 4-D black hole would have an "event horizon," just like the known 3-D ones. The event horizon should be defined as the boundary between the inside and the outside of a black hole.
In a 3-D universe, the event horizon appears as a two-dimensional surface. So, in a 4-D universe, the event horizon would be a 3-D object called a "hypersphere" (Pourhasan et al. 2013). The 4-D character of reality has been proposed earlier in many physics studies (Sirag 1993; Smythies 2003; Carter 2014; Hardy 2016; Sieb 2016, 2018; Tozzi and Peters 2016).

The present paper may therefore directly contribute to an answer for the famous question proposed by David Chalmers (1995): how can something immaterial like subjective experience and self-consciousness arise from a material brain? Yet, we may wonder if consciousness is indeed the most fundamental aspect of reality, and this gives rise to the question: how can consciousness lead to the manifestation of matter?

Panpsychism (the idea that every material object contains a mind-life quality), at first sight, may be a logical solution to Chalmers' question, as put forward in the information integration concept of Tononi (2015, 2016). Yet the latter theory may rather be seen as a reductionist approach in the line of current materialistic physics, since one fails to envision the issue from the point of view of consciousness as primary (Goswami 1990; Struppa et al. 2002; Keppler 2012, 2013, 2016; Pereira et al. 2015; Kastrup 2016, 2017, 2018; Pregnolato and Pereira 2016). In general, therefore, one could conceive the quantum wave vibratory aspect of reality as the mental attribute of the universe.

Interestingly, our brain model also provides the potential for extra-sensory and inter-individual communication and correlated brain signals between individuals (Wackerman et al. 2003; Pizzi et al. 2004; Radin 2004; Standish et al. 2004; Richards et al. 2005; Hasson 2012).

We propose that the postulated holographic workspace can project its active information from a dedicated virtual screen in our brain, as described for event horizons in current cosmology. These projected, multi-level, fractal wave structures thereby may contribute to the integral wave function of our universe (Figure 4).

The latter, in the form of the ultimate compressed information, in turn may provide the necessary recipe for further evolution and a future rebirth of our universe, also operating in a toroidal rebound context (Figure 15).

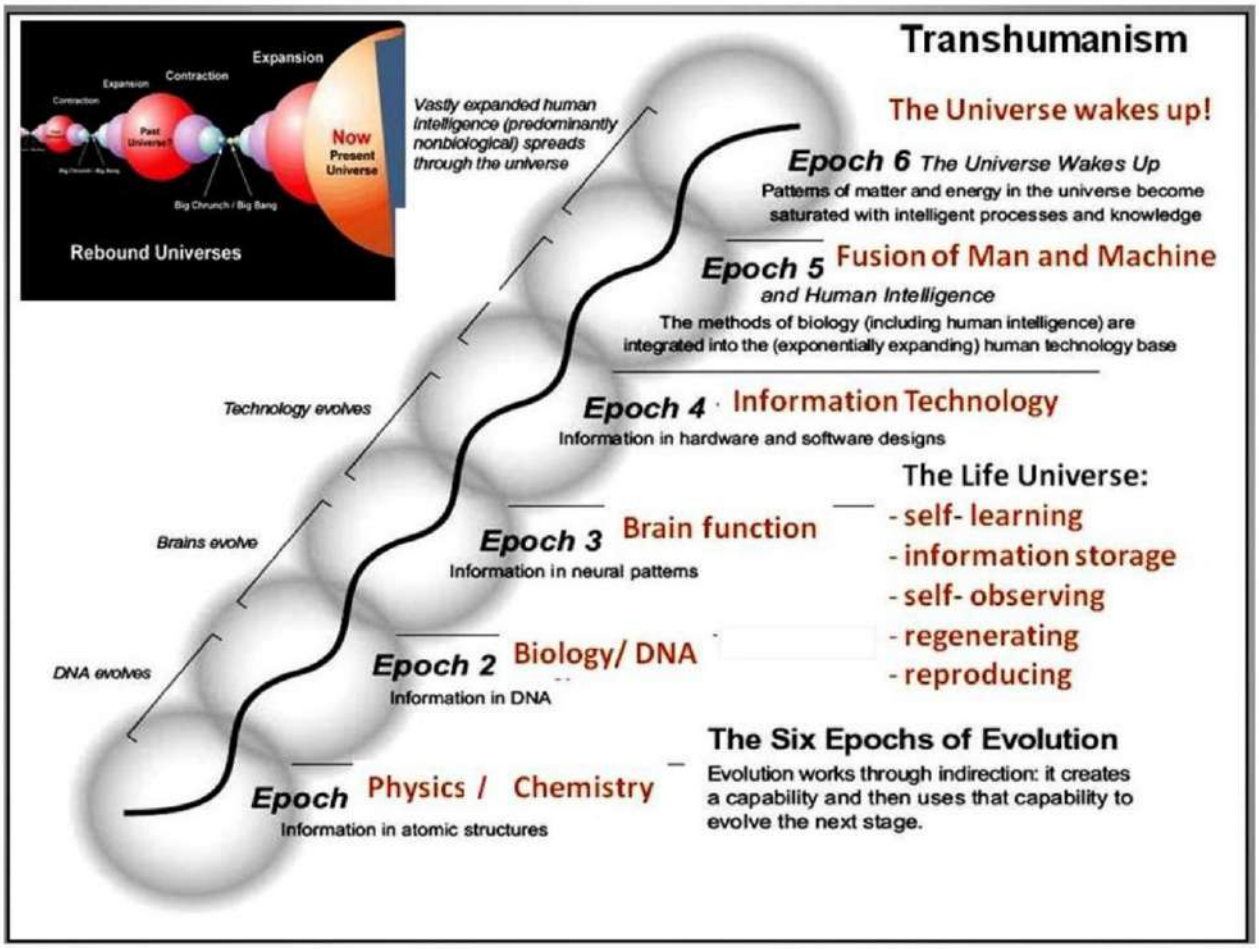

Figure 15. This is a model of the sequential epochs in the evolution of our universe, also depicting the very far future of a "living" universe (The Life Universe), in a cyclic (rebound) time model (top left) in which the universe takes care of its own reproduction, as earlier suggested by the scientific giant John Wheeler.

The Role of Humanity in the Creation of Reality and the Final Destiny of the Universe

John Wheeler sincerely believed that science will ultimately be able to provide an explanation of the origins of human intelligence in the future (Wheeler and Feynman 1994). This view corresponds to his implicit desire to treat both intelligence in general as well as the intelligible image of the universe as emergent properties. He fully believed that, finally, physics would find an answer to how and why we are here. He envisioned this as genesis by observership. Wheeler represented the universe as a self-excited circuit that is generated through a cycle (closed loop) which excludes reference to any preexistent foundation outside this circuit.

Here, the sense of physical reality is not a pre-given compendium of laws and facts. Rather, it originates from the very constitution of this reality, through formation of meaning in the universe by communication in the network of its observers. Wheeler thought that any observer participates in choosing the now of physical laws for the entire past and future history. He coined this vision "law without law" (Wheeler 1983). Wheeler wrote: If the views that we are exploring here are correct,

> **one principle, observer participance, is able to build everything. The present expansion of the universe from the time of its inception up to a certain point is maintained until the system has had**

enough time to mature and create enough sentient beings that the conversion of information into software reaches a tipping point. It then may reverse from a state of deceleration to acceleration and in the shrinking phase, information will be condensed and compressed in order to create the conditions for rebirth of the entire Universe. (see Meijer 2015)

The question is which role humankind and its successors, as well as other intelligent species, will play in the latter process. Wheeler, therefore, developed a model, not only taking into account the particular future of intelligence, but interestingly also the past human history of our universe.Yet, if Wheeler claims that observers bring the universe into being, including its space and time, then one can reasonably ask: where do human observers do this from, if there is no pre-existent space and time? One way to conceive of this question is to conjecture that human beings belong to "something" which is beyond and prior to space and time and which, at the same time, contains in itself the potentiality of being explicated in terms of space and time. Then the process of the constitution of the universe in Wheeler's participatory scheme can reveal itself. That is: the universe itself becomes no more than an event related to the history of humanity, a flash of the universe's self-consciousness as depicted in Wheeler's writings by a diagram of the human eye emerging in the bold letter U (symbolizing the universe), which itself is the formation of this eye (Figure 16, inset). Representations of such a unity is like the image of the Ouroboros (Figure 7), symbolizing the interconnectedness of physical entities at different spatial scales of the universe.

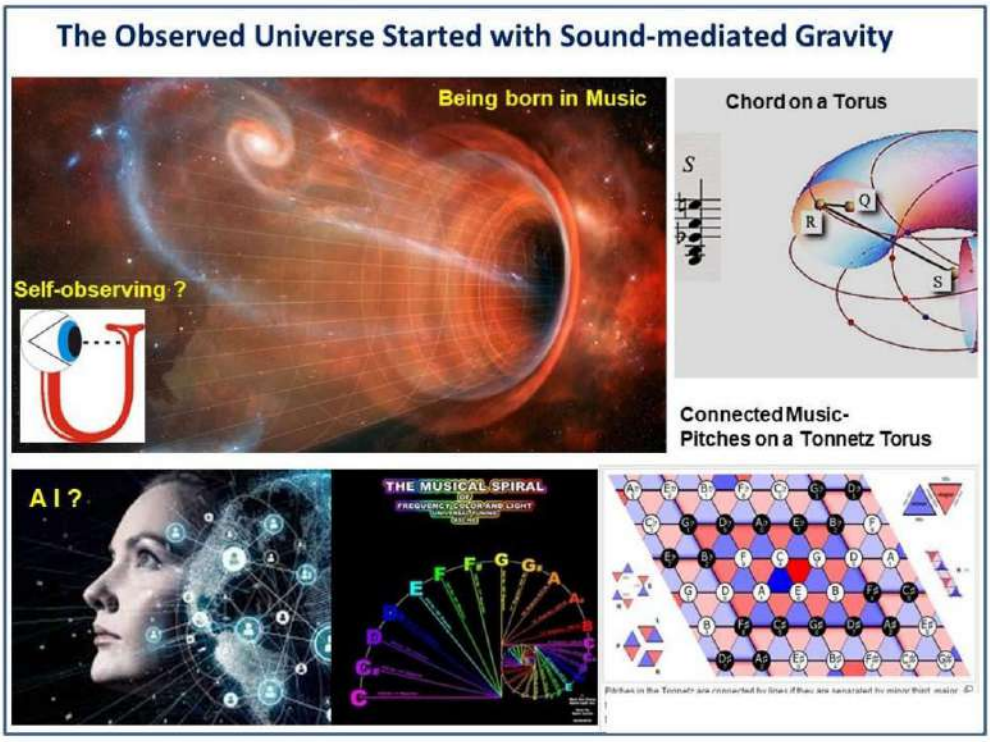

Figure 16. The "symphonic" birth of the universe in a toroidal (wormhole) context, either assuming a primordial eternal observer or an omnipotent artificial intelligence associated with human offspring (bottom left). The phonon guided creation process can be expressed as a toroidal evolution of musical chords (inset upper right) that may exhibit double spiral golden mean geometry (inset bottom middle) and was earlier depicted as a triangular pattern that connects music pitches and that, by double folding, can be projected on a torus (called a Tonnetz torus).

Thus, one way to perceive the universe is to constantly look from one perspective of scale to another. In the end, all scales may be unified in a grand unified theory (GUT). The serpent swallowing its own tail represents the current hope that gravity can link the largest and smallest sizes in a final theory (Meijer et al. 2023). As mentioned earlier, the universe started by expressing a primordial acoustic quantum code, being guided by a phonon type of quantum waves existing in a superfluid quantum space (Meijer and Geesink 2022). The fabric of reality thus seems to be a guided toroidal flux of energy that represents a beautiful symphony rather than a physical coincidence.

Both the becoming and future of the universe can therefore be viewed as an unfolding of primordial information provided by a cycling universe, encompassing a recipe from a previous version of the present Universe. Jacob Bekenstein, a former student of Wheel
more recently Erik Verlinde confirmed the idea that atoms, and their constituting elementary particles, can intrinsically store basic and physical information in the form of spin, polarization and momentum, and that this information can be seen as stored in bits or qubits through the holographic projection on the virtual screen of any object (Bekenstein 2003; Verlinde 2011). This model applies both to the micro (elementary partic
(black holes) levels. The principle of the hologram was also employed by Edgar Mitchell and Robert Staretz in a 2011 paper in relation to individual and universal consciousness.

John Barrow and Frank Tipler, in a 1988 paper, developed a dynamic model of the universe which ensures the possibility of an indefinite information processing, which, according to Tipler, must imply the persistence of life in the universe. Such an idea led Wheeler to the intuition that the evolution of the universe can be seen as a mental accompl

This process may even reach far into the future of the universe and even to its potential rebirth, (Figure 15). Transhumanists believe that our “mind children,” as very advanced, hybrid, (cyborg) machines, will ultimately travel to the boundaries of the universe, not restricted by the current limitations of the human body, and will eventually collect all the information about the universe and its total past history. The theory goes that, as long as the universe does not die in a heating process, the universe will be gradually populated, and will finally become saturated with information.

In addition, it was reported that, apart from the harmonic type of brain activity frequencies, there is a second mathematically based power spectrum that seems to be rather essential for proper wave expression and propagation in brain function: the golden mean of the phi-based Fibonacci series (Meijer 2023). This spiral wave behavior can be envisioned (in more musical terms) as leading to a proper tone separation, essential for cross-frequency atonement and prevention of non-productive wave inter

This implies that mental disorders, in principle, can arise from perturbation of harmonic and coherent wave states and can also be due to a deficient golden mean-guided brainwave organization. Of note, a spiral aspect of macro- to micro-structures is a generally recognized feature in the fabric of reality (Figure 17). This informational pattern may also explain the long-range resonance process of the global workspace theory (Mashour et al. 2020) and also may explain the supposed integration of meaningful information, as hypothesized in the integrated information theory in consciousness studie

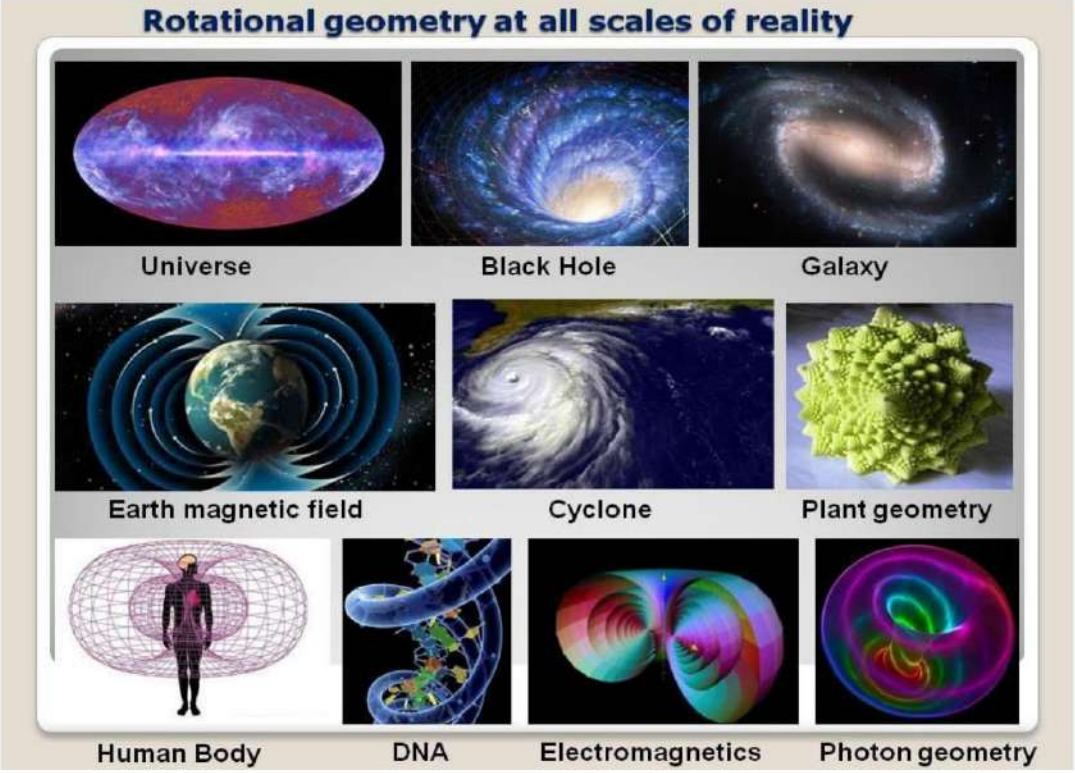

Figure 17. These are examples of spiral/toroidal geometry, from macro (upper left) to micro (upper right) scales of the fabric of reality. The inset, left below, depicts the supposed nested toroidal geometry of the human body, heart, and brain.

In this framework, an essential role of this harmonic system was assumed in the creation of first life (Meijer et al. 2020), and is seen as a sequential aspect in the earlier mentioned primordial events that preceded the very creation of our universe. These processes are driven by symmetry breaking and generation of a toroidal geometry (Meijer and W See Figure 17. Such a sound-mediated process of sonic quanta may also have played a role in biological evolution. Our proposal points at an information field of harmonic sounds that actualizes the successive steps in ongoing biological evolution and in particular, the assembly of the first reproducing living cells.

Recent studies have shown that the creation of life can be conceived as a symmetry breaking of condensed bosons from a 5-D informational phase-space, supposedly through formation of magnetic monopoles in a Hicks setting, again using an essential toric information code. The monopoles, produced in this process, interact with DNA/ RNA on the basis of the molecular entities of life such as water, carbon, and nitrogen bases, and this idea supports recent work on the role of oscillatory DNA wave resonance in cellular communication, being crucial for the problem-solving of life cells for survival in their environment (Meijer and Wong 2020, 2021).

Also, at the cosmic level, it is postulated that the generation of life requires a symmetry breaking from a 4th spatial dimension involving a "sub-quantum domain" that contains information, conceptualized as a pro-active ontological essence (Meijer et al. 2021). Thereby, a multi-layered fractal reality is conceived of as integrated by a universal toroidal/möbius-ring type of connection (Figure 17). The earlier mentioned frequency pattern of the "acoustic quantum code of resonant coherence" is fully in line with

for cosmic gravitational waves, as well as for oscillations of the ZPF at the macro scale. With regard to brain function, at the micro-scale, interestingly, an almost perfect frequency fit of the same algorithm was revealed for brain micro-tubular oscillations. Such holonomic processes were conceived also to determine the further evolution of our world (Meijer 2022; Meijer and Ivaldi 2022), in which humankind participates in the reconstruction of a self-learning universe (Meijer 2022). Such an integral holographic consciousness model, thus, integrates conscious and non-conscious conditions and invites further studies into the geometric relation of the observed and hidden processes that are instrumental in the fabric of our reality.

In the foregoing, an analysis is carried out on the basic mechanisms inherent in the functioning of the living and conscious universe that seems permeated by an intrinsic intelligence (Meijer and Ivaldi 2022). In this scenario, a primordial acoustic quantum code in the form of a BSE-condensed polaron field is assumed to provide the conditions for the guided formation of the cosmos in which also gravity and dark energy forces were created (Meijer 2023). As to the latter, it was proposed that primordial proton/electron composite units, covered with multiple phonons (forming quasi-particles), exhibit internal attractive and external repulsive features, thereby generating the forces of gravity and anti-gravity (dark energy). With regard to brain function, at the micro scale, an almost perfect frequency fit of our algorithm was revealed for brain microtubular oscillations. This affords a comprehensive concept for the fabric of reality and the creation of life through the generation and integration of information, modeled through toroidal processing of wave energy. It follows that human consciousness cannot be understood in a reductionist context, but that it is rather an expression of a cosmic modality or a universal consciousness. Therefore, a mental attribute of the entire cosmos was introduced that, for our world, requires a wave-like holonomic description, thereby, in fa

Our universal unified information theory can, in principle, be viewed as a superdeterministic phenomenon, as currently debated in physics, in the sense that all that happens is pre-determined by an underlying algorithm. Yet, this paper rather proposes that such a potential super-determinism is relaxed by a dynamic information field that is retro-causally updated (involving back-reaction) (Meijer 2022). This field is affected through choices made by intelligent life systems that collect, use, and dissipate information, including the human species. This dynamic process can be envisioned as a permanent retro-causally actualized information domain that is instrumental in the ongoing evolution of our world (Figure 1) and implies a relaxed super-deterministic mode, collectively defined as a retro-causally reconstructive universe that allows humans free choice. It is postulated that crucial processes such as the primordial creation of our universe, as well as anthropic fine tuning of the universe, including the biological evolution of life, coupled to the manifestation of consciousness, should therefore not be regarded as coincidental, but rather as a manifestation of a grand design.

Transcendental Aspects of NDE and Related Conditions: A Preview of an Afterlife?

The phenomenon of near-death experiences (NDE) is extensively studied now and invariably raises deep philosophical questions. This experience shows that consciousness, under those circumstances, apparently can observe a physical world without involvement of the normal senses. There are even documented cases in which, during NDE, observations were made by the patient at great distances from the body, that later were verified as being correct (Van Lommel 2007; Greyson 2010, 2024).

Figure 18. This is a visual representation of transpersonal experiences: the known researchers (bottom right), the techniques for them to arouse or experience (top right), and the postulate of the internal filters in our brains (top left); personal information from a supposed quantum field is experienced as clairvoyance or sometimes described as an inner voice (called "daemon" in classical Greece philosophy).

The question arises whether our normal sensory perceptions act as a filter for these kinds of conscious extra-sensory perceptions? Transpersonal experiences have been studied by Greek philosophers, referring to the "daemon" as an inner advising voice, and more recently by various scientists, such as Anthony Peake (Figure 18). Rosicrucian philosophy refers to this inner voice as the Master Within (not in a religious sense, but rather as our interface with Universal Consciousness). See Figure 18.

From the testimony of many persons reporting NDE, it is inferred that their perception during the experience is faster, broader, more realistic, and purer in nature than during an ordinary dream. Although during the use of certain drugs, meditation, and rapid change of gravity (falling down and traffic accidents), "out-of-body" and NDE-like experiences are generated but do not have the quality and character content of the expanded

A study was presented by Maureen Venselaar in 2011, in which an NDE is described fully physically as a 5-stage process that includes a) separation of photonic consciousness from the body, b) a journey through a tunnel of light after a strong contraction involving a mini-black hole and wormhole modalities and observations of cosmic structures, c) being at the presence of light at a border, having a life review and experiencing specific light shifts, d) a subsequent return to the body and e) final unification

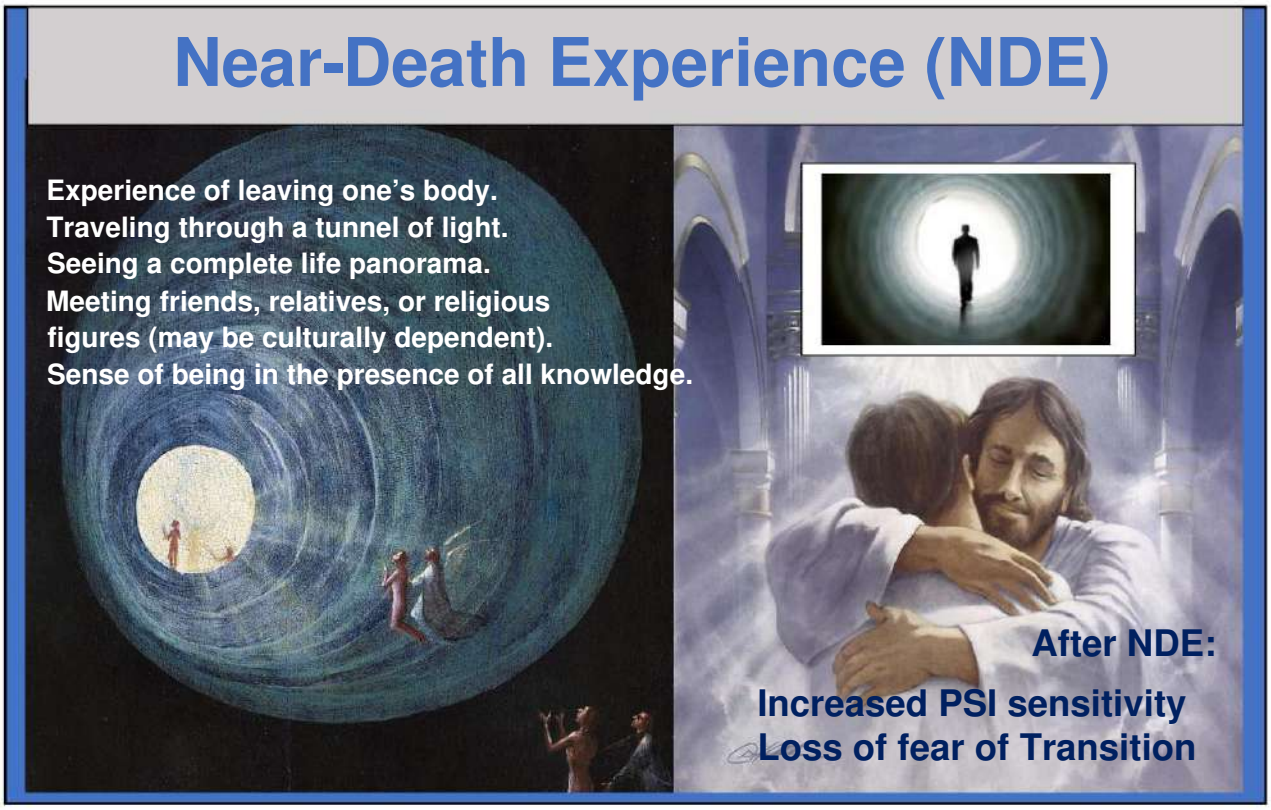

Figure 19. This is a visual representation of the general characteristics of a near-death experience. The tunnel on the left is from *Ascent of the Blessed* by Hieronymus Bosch c. 1500; the painting on the right is entitled *Home at Last* by Danny Hahlbohm.

"Embodiment" in a "Life after Life" is pictured as a being of light, due to the fact that damaged or dying atoms of our physical body release countless photons; light energy or biophoton release is a known fact and is studied in medical literature (Rose 2024). Since our daily consciousness is connected to the brain, these exotic photons are speculated to be transformed into another broader transcendent consciousness, in which such photons are indestructible. This particular photonic body is capable of "carrying" information about who we were and are.

The Panorama of Life: Better than Our Common Memory

During NDE, the patients can, in some cases, be confronted with a full and bright panorama of their entire life, in which they not only relive their life from their own ego perspective, but also from the perspective of each person with whom they have been in contact during their lifetime. This experience from the perspective of the other includes the thoughts and feelings of every person who crossed their path in life. The majority of NDE witnesses, subsequent to their profound experience, live a more conscious life, being more open to others and more interested in the big questions of life (Carter 2012; Bokkon et al. 2013; Pregnolato and Pereira 2018; van Lommel 2018; Greyson 2019).

Are NDEs only Due to Previously Stored Images in the Brain?

The extraordinary near-death experience of Vicky Noratuk (Ring and Cooper 1997) showed that even blind people can see again during an NDE. From her birth she had a shrunken

eyeball and optic nerve and an undeveloped visual cortex. So even if there would be a yet-unknown activity of the brain during NDE, Vicky Noratuk did not possess a healthy sense organ that could transfer her visual impressions to her consciousness through the brain, nor a memory for such detailed images. After she had her experience, she said "it felt like the place where all knowledge is." A study with 31 similar cases of blind vision (Ring and Cooper 1997), revealed that blind people, including those who were blind from birth, do report classic NDEs of the kind common to sighted persons.

The article states:

> **Thus, what we have here is an adumbration of a process that begins with mind, fully independent of the brain becoming self-referential, that is, becoming identified with consciousness itself, and then converting this noumenal consciousness into a dualistic modality that generates the familiar phenomenal world. What we have called transcendental awareness is at least the beginning of the reversal of that process by which, even though the traces of an everyday dualism remain, the individual is enabled, however temporarily, to experience the world from a perspective independent of brain functioning and the operation of the senses. Each of these theories formally entails such a state of awareness, and specifically in blind persons, during NDEs or OBEs.**

Modern NDE research can lead to the hypothesis that consciousness continues to exist in some form after death. Death, according to this hypothesis, is only an illusion. It is, in this consideration, only a transitional state to another form of conscious life, but without the experience of a physical body. According to some quantum physicists, such as Alan Wolf (1996, 1999, 2008), bodily dying is more precisely not a transition to another phase, but rather every individual is at every moment of one's life already represented in the non-material dimension of the aforementioned quantum information field. In other words, conservation of individual information, in this view, is a continuous process and seems a permanent phenomenon.

Many authors in consciousness studies conclude that, in a manner not understood, some people (or detailed data of them) persist, at least temporarily, after their death. This, in some way, leads to the transfer of personal information to young children that become aware of this information and interpret it as their former life (Braude 2003; Greyson 2010, 2019; Carter 2012; Phipps 2012). It is clear that we arrive here at the borders of knowledge and that we experience something that is far beyond our present human understanding.

The notion that can be inferred from the sections above, namely that consciousness of all living entities belongs to a collective "web of information," should implicitly be supplemented with the reverse side of this concept: that individual consciousness, through this interfacing, is just as much an expression of the universal (nonlocal) consciousness.

In this respect we are, according to this quantum concept, truly part of the unity of nature, as Baruch Spinoza already postulated. These phenomena could also be related to an underlying non-local information field because they concern influences at a distance or messages from the future experienced by people. The central question is how the necessary information for these phenomena can reach the brain and how these extra-sensory communications/perceptions occur from a mechanistic point of view. The latter is of great importance for future investigation, because it may provide answers to the study of the evading aspects at sequential PSI observations, as well how the signal

experiences could be improved. Both aspects could be related to the in-built filters in our brain that should protect us against too much disturbing information (Radin 1996, 2006; Jahn and Dunne 2007; Kastrup 2016, 2017, 2018).

The entity that we define as consciousness, or the soul, or the Self, (that which makes me who I am), according to some hypotheses, does not stop existing upon bodily death (Parnia 2013). Therefore, since science cannot explain the source of the most basic characteristic of "waking" consciousness, the sense of self, this opens the door for a new hypothesis. Does "waking consciousness" independently take shape as the result of brain-based abilities that arrive around ages one to three in most humans? Or does it result from adaptation of an already present "consciousness" to life on Earth, if the cognitive brain faculties become active and our experiences expand? It is worth noting that the idea that self-awareness may originate outside the brain is not new. A thorough explanation of the idea of the "Self" was one of philosophy's most prized, yet unexplainable, possessions, reaching back to ancient Greece.

Sam Parnia, in his research on NDE, appears to convey immortality on the new entity. As such, it reasonably might be expected to possess a unique identity of its own. Would this then continue to serve waking consciousness as our perceived self-identity? Remember that we normally are not aware of memories stored in our right cerebral hemisphere, hence why we forget the source of our self-identity. Personal information from a supposed quantum field, is experienced as clairvoyance or is also described as an inner voice (called "daemon" in classical Greece philosophy and the "Master Within" in Rosicrucian philosophy). As early as 1994, the Nobel Laureate and Australian neurophysiologist John Eccles claimed, "The odds are 10 to the power 10,000 against the uniqueness of the individual self being derived from the genetic uniqueness that built the associated brain. The uniqueness of the individual self must therefore arise from some 'external source.'"

But is this also true for the personal wave information, that is the non-material aspect of these atoms/ elementary particles? In other words, is this information destroyed? Some quantum physicists claim that entangled information bearing meaning cannot be lost (the law of conservation of information), and that due to entanglement of the wave type of these building blocks, the personal structure and functional organization of individual life will survive bodily death (Wolf 1989, 1990, 1999; Hameroff and Chopra 2013). As the consequence of the persistent storage of this information in the universal quantum field, together with the total imprint of our personal experiences (our complete biography) in this domain, the personal profile would be retained and would also be available for resurrection (Tipler 1996; Hameroff and Chopra 2013), and, in principle, may be preserved until a later reincarnation.

Here is what those who have had NDEs report about space and time, as well as the implications of their reports:

- **Time does not run in the usual way; instead, there is an experience of an eternal now.**
- **Time does have representation of past, present, and future states, but not as a unidirectional flow, such as we experience here. Instead, different times correspond to different locations in a multidimensional space which is reported to be higher than the usual four dimensions of space-time.**
- **An observer located within the universal consciousness is able to simultaneously view segments of the past, present, and future at will (the future is at times reported to be fuzzy).**

- **Space has a form of reality in the universal consciousness realm, because entities are experienced in perception to be separated from each other, and at varying degrees of separation.**

- **One of the remarkable features of the function of consciousness operating within the universal domain is that our integral mental workspace, or "the soul," is able to move about and across any "distance," however great it appears to be, with apparent instantaneity.**

- **The treated reports from NDE/OBEs and paranormal phenomena imply that there is a reality hidden from ordinary materialistic sense perception, that informs our brain and mind to provide a true and integral knowledge. The latter process requires in our view a physically defined interfacing of a 4-D realm with our 3-D world. This unique feature can be realized by a toroidal event horizon workspace that allows a symmetric 4-D to 3-D information flux and holographic personal memory integration. A further prerequisite for such an information transfer between the subconscious brain and the associated workspace is a type of non-neuronal information processing that may operate under NDE conditions during a flat EEG.**

NDE phenomena should be envisioned in a broad context, while keeping in mind the way to advance the evidence for the idea of the survival of consciousness. Here the central question is: where does the extensive and often verified information come from? This evidence must address a wide variety of psi–phenomena, for which there is a growing field of research, especially online.

Conclusions

In his book *Beyond a Materialist Worldview Towards an Expanded Science* **(2019), Harald Walach argued for approaches to science that are non-traditional and take into account some of the phenomena listed in this paper. Wallach argues no human intellectual activity, including science, can escape the fact that it has to make assumptions that cannot be proven using its own methodology (i.e. absolute presuppositions). The prevalent underlying assumptions, or world model, of the majority of modern scientists are narrowly naturalist in metaphysics, materialist in ontology, and reductionist-empiricist in methodology.**

Wallach stated that this results in the belief that consciousness is nothing but a consequence of the complex arrangement of matter or an emergent phenomenon of brain activity. This belief appears to be contradicted by well-documented empirical phenomena, including veridical reports of NDEs with complex intuitions, perceptions, cognitions, and emotions during well-documented absences of brain activity. There are also veridical reports of non-local perception that were confirmed independently during such near-death states of absent brain activity. The large database of parapsychology and anomalous cognition research shows in a series of meta-analyses that such non-local perceptions are indeed possible.

An increasing number of open-minded scientists are already researching these frontier areas using existing scientific methods and are reaching empirically grounded conclusions that challenge the mainstream majority view. They argue that we need a model of consciousness that is non-reductive and allows consciousness its own ontological status.

A minimum-consensus model is a dual aspect or complementarity model, in which matter and mind, consciousness and its physical substrate, are two aspects of reality that are irreducible and simultaneously occurring perspectives of an underlying reality to which we

otherwise have no direct access. If that is granted, we can immediately see that consciousness can have its own direct access to reality, not only through sense perception, as in classical empiricism, but also through inner perception or radical introspection. As a result, there may be a different and valid access route to reality, through consciousness, in addition to the classical one science is offering.

This might include direct access, under certain conditions, to deeper structures of reality, which may provide important insights into ethics, meaning, and values. Indeed, insights from NDEs and other transformative experiences suggest that we are all embedded within a larger field of consciousness, with profound implications for ethics in an interconn
Integrating an enlarged view of consciousness into science will also yield a new methodology that will have to be developed: the methodology of radical introspection or inner experience.

In treating hard problems in consciousness conceptions, a question arises: why do we propose a mental consciousness on the basis of a 4th dimension? In the present work, we propose an extra-spatial dimension together with the symmetrical time concept, and thus a bidirectional arrow of time. We also emphasize the importance of proper definitions: one should clearly differentiate between consciousness in general (awareness due to integration of information from the environment that all living beings have in order to survive and that is for 90 percent of people automatic or subconscious [Kastrup 2016, 2017]) and self-consciousness, representing the ability that we can be conscious of being conscious and can perform introspection. The latter requires an extra degree of freedom, like a certain distance fr

The memory workspace that is conceptualized in the present study is called mental, since it is not observable but, according to known principles of physics, can be localized in a 4th dimensional domain. Why is such a construction necessary anyhow? This is in order to communicate with the supposed mental and 4th dimensional universal consciousness. In fact, the event horizon workspace can take care of interfacing a purely mental domain with a 3-D material brain. The 4-D downscaling to 3-D world occurs by known holographic dimensional reductive principles: our 3-D brain collects only the shadows of a 4-D mental world (Deli et al. 2019).

In order to study NDE experiences, we depend on the material verbal report of NDE experiencers. At the same time, some of us can feel the 4-D world under meditative introspective conditions and other special conditions as treated above, that is, if the normal filter for such experiences of our material brain is somehow removed (the previously discussed alternative filter hypothesis). The mechanism of holographic communication likely occurs by wave inference of photons and solitons, as known from the ZPE field. The latter is an immaterial and not observable wave phenomenon that se
It can be conceived as a reality-steering implicate order, that entertains pilot waves, including their implicit back reaction to this information field. The latter implies also a non-static and permanently updated universal consciousness, to which all individuals contribute through bidirectional information flux. Self-consciousness of humans, thus, depends on contact with a 4-D personal workspace that we conceive as mental and, as such, is an integral part of 4-D universal consciousness. This theory pictures how our 3-D material brain can interact and communicate with the 4th dimension. Therefore, by definition, it can be seen as a mental workspace associated with the brain but not reducible to the brain (and not necessarily produced by the brain) (Fingelkurz 2010, 2

The latter implies a potential independence of this personal memory workspace from the material brain that becomes manifest if connection with the material brain is temporarily disconnected (NDE) or permanently broken down (bodily death/ transition). In reverse, we can faithfully hypothesize that NDEs are a direct and strong demonstration of the existence of universal consciousness, since they can produce impressive individual life panoramas and deep visions not explainable by material modalities.

This combination of the physical aspects of NDEs (mental/physics bridging) presented here is broadly supported in current literature with respect to harmonic brain oscillations (Atasoy 2018; Deli et al. 2019), the concept of a mental workspace associated with the brain (Fingelkurz 2016; Hardy 2018), and the aspect of a fourth spatial dimension in brain function (Tozzi and Peters 2016), as well as that of the toroidal geometry of brain function (Atasoy et al. 2016; Tozzi and Peters 2017; Deli et al. 2019).

All this, as an integrated model, leads us to the long-standing question of immortality and survival of consciousness in a cosmological context. In his thesis on the beginning and end of our universe in 2012, Clément

> **Vidal implied: But how can we imagine to seriously care for such an issue as cosmological immortality? We can summarize five steps towards it. The first is to realize that your individual bodily death is normal and inevitable in the long term. The second is to develop psychologically, and fulfill all your needs to grow the hierarchy of needs up to the need of self-transcendence. You then surpass yourself to become compassionate and identify with the process of cosmic evolution. Even if you accept individual death, you still refuse death as a whole, namely the idea that nothing would continue to evolve after the predictable death of your body, society, species, the Sun, galaxy, and universe. You then set the immortality of the evolutionary process as a go**

Finally, in closing this paper, the present author wishes to revisit the world of a giant in physics, John Wheeler, by recounting an anecdote about this remarkable scientist from *"The Universe as a Cyclic Organized Information System, John Wheeler's* ***World*** *Revisited"* **(Meijer 2015). John Wheeler could never stop teaching nor stop learning. During one of his academic visits, Wheeler was approached by a young physicist who briefly explained a "new cosmological theory," postulating that the universe is riddled with knot-like spatial "defects."**

"I can't believe space is that crummy," Wheeler declared. Noting the young physicist's somewhat perplexed expression, Wheeler touched the younger person's arm and said: "To hate is to study, to study is to understand, to understand is to appreciate, to appreciate is to love. So maybe I'll end up loving your theory."

It stands to reason: John Wheeler's vision that the fabric of reality may finally be understood and humankind may ultimately perceive the grounds of its own existence, could be correc This final perception may even turn out to be surprisingly transparent, beautiful, and compelling. At that time, albeit in the far future, we may also uncover the purpose of human existence and fully see personal responsibility for our planet and the entire cosmos in a different light. To know that all of us have a role to play in the universe should matter to each and every one of us and motivate us to take our personal responsibility. When we become real participants, we may truly make our world, and the universe as a whole, a better place for ourselves and all that is living. Ultimately, we ma

this grand design as Wheeler formulated: "Someday we'll understand the whole thing as one single marvelous vision that will seem so overwhelmingly simple and beautiful that we may say to each other: 'Oh, how could we have been so stupid for so long? How could it have been otherwise!'"

Conflict of Interest Statement

The author declares no conflict of interest.

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