

Introduction to Conscious-Quantum Computer Musicology: New Genres, Technology and Ontology of Experience

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Quantum computing (QC) is imminent; can it add to the seasoned fields of electronic and computer music? After all, it seems unwarranted to requisition time on a massively parallel peta FLOP (10^{15} , quadrillion calculations per second) supercomputer like the Chinese Sunway TaihuLight, the world's fastest, reaching 93.015 pFLOPS. There is however, something QCs will be able to do that will remain impossible on even a putative yottaFLOP (10^{24}) Turing machine if Cartesian interactive dualism is the correct solution to the problem of awareness/consciousness. A special, 2nd generation class of *conscious*-QC modeled after the mind-body interface will be able to *transduce* physically real stored (extracellular) elements of mind (qualia): thought, mood, feelings, emotion directly into the awareness of the subject in a manner breaking down the so-called 1st person - 3rd person barrier. The theoretical model introduced, a paradigm shift in terms of current thinking in Cognitive Science (mind = brain) or cognitive musicology, is sufficiently mature to be experimentally testable suggesting that conscious-QC music may only be a couple of decades away.

Keywords: Cognitive musicology, Qualia, Quantum computer music, Quantum computing, Subjectivity

1. Introduction

There is something in it of Divinity more than the ear discovers: it is an Hieroglyphical and shadowed lesson of the whole World, and creatures of God; such a melody to the ear, as the whole World well understood, would afford the understanding. In brief, it is a sensible fit of that harmony, which intellectually sounds in the ears of God - Sir Thomas Browne [1].

Quantum computing (QC) requires a paradigm shift to 3rd regime Unified Field Mechanics (UFM), Classical → Quantum → UFM; and this seminal work, a first delineation of the anticipated genre of conscious-QC music, requires a 2nd generation QC platform. First thoughts on quantum computer music (QCM) began before 2005, when the author tried, to no avail, to get his daughter Juliette (recent BA in electronic music) to be the first person ever to receive a PhD in QC music; but I still want to claim 1st published use of the term [2]. The monograph on Universal Quantum Computing [3] had a chapter section on QCM but the publisher decided 800 pgs. was too long in view of the incremental increase in e-books, wherein readers were interested in shorter books that could be read on a tablet/phone, so that chapter waits for an ensuing tome [4]. Surprisingly

however, in late 2016 senior computer music research fellow Alexis Kirke [5] demonstrated the first albeit primitive, QC music algorithm utilizing quantum parallelism. *'His music was created using the algorithm qharmony that runs on a laptop and a D-Wave 2X quantum annealing processor. The laptop sends notes to the quantum computer to harmonize, the D-Wave returns possible chords. The laptop combines all the possible chords into a single "superposition" chord that represents the superposition of solutions to the harmony problem from inside the quantum computer'* [6].

Two points, firstly, the D-Wave device is technically not a QC, but a *quantum optimization or annealing processor*, a specialized quantum logic gate performing what is called adiabatic processing, operating at standard Turing machine speeds (no quantum speedup). D-Wave itself admits their architecture differs from the true definition of a QC (not available yet). It is unable to simulate a universal QC [3] and, in particular, cannot execute Shor's basic factoring algorithm. Secondly, as teased in the abstract this is not the kind of QCM we will define, i.e. it is not conscious. It is increasingly likely that the 1st true bulk scalable universal QC implemented will be a form of anyon braid quantum Hall superconducting graphene bi-layer utilizing a fusion of dual Dirac-Majorana modes; but this initial device will

be a room-sized cryogenic US\$ 50,000,000 monster reminiscent of the city-block sized Eniac of 1946, while our model remains pinhead size, tabletop and room temperature [3].

1.1 Quantum Computing (QC) – Current Status

QC promises polynomial and quadratic speedup, and eventually instantaneous algorithms [3]. Tests of D-Wave limited use quantum annealing processors (only component of a QC commercially available) by the likes of NASA showed no speedup or advantage over classical processors [7-9]. Generally, a Quantum annealing operation finds a global minimum of an observable function by utilizing quantum fluctuations in a search space of a superposition of many local minima such as a spin glass [10,11]. As the system evolves, the amplitudes of all candidate states continually change with tunneling between states. With adiabatic processing (occurs without transfer of heat or matter within a thermodynamic system), a higher likelihood of finding a ground state corresponding to the solution to the original optimization problem occurs.

Microsoft's theoretical topological QC utilizing 'anyon braids' is considered the most advanced QC development model [3,12,13]; and like the D-Wave device is designed to run cryogenically near absolute zero in order to overcome quantum decoherence [3,14]. We have proposed a room temperature protocol overcoming decoherence by surmounting the quantum uncertainty principle [3] which appears to solve the final problem preventing bulk QC implementation.

1.2 Music - *Tabula rasa*¹

Definitions of music usually include reference to sound with a list of music universals generated by stating aspects of sound: pitch, timbre, loudness, duration, spatial location and texture [15]. More simply music can be defined as: The art or science of 'organized' sound expression. For our purposes the definition of music needs to be adapted to include Conscious-QCM. Starting with the age-old metaphysical conundrum: 'Is there a sound in the forest if no one is there to hear it?' Such an event does create a sequence of pressure waves propagating through the air, but by definition this is not sound which requires 'sensory apparatus'. Thus, auditory perception is the ability to perceive sound by detecting vibratory changes in the pressure of the surrounding medium through time, through an organ such as the ear. However, according to Berkeley: objects

of sense exist only when they are perceived [16]. Even more saliently, Einstein supposedly asked fellow physicist Niels Bohr (a father of quantum mechanics), whether he really believed 'the moon didn't exist if no one is looking at it.' Bohr replied that 'however hard he tried, he would not be able to prove it does'.

Table 1
Some Possible Conscious-QCM Genres

1. Muzak – For example, transduction of scenes/feelings from a film like *The Sound of Music* fed into music score.
2. VR – 'Mind blow out', any imaginable world, scene or event - psychedelic or Dali-esque realms of experience.
3. Emotive – There has always been mood music. Physically real emotions fed into a music score.
4. Transformative – A new form of Music Therapy – transducing Qualia of wellness
5. Mystical – spiritual – Transduction of qualia designed to simulate mystical or religious experience.

In *Music as Heard*, from the phenomenological position of philosophers Husserl, Merleau-Ponty, and Ricœur, Clifton [17] defines music as "*an ordered arrangement of sounds and silences whose meaning is presentative (capable of being known) rather than denotative (translation of sign to meaning) This definition distinguishes music, as an end in itself, from compositional technique, and from sounds as purely physical objects.*" More precisely:

Music is the actualization of the possibility of any sound whatever to present to some human being a meaning which he experiences with his body—that is to say, with his mind, his feelings, his senses, his will, and his metabolism. It is therefore a certain reciprocal relation established between a person, his behavior, and a sounding object [17].

We stretch the 'horns of the dilemma' of defining music with mention of modern composer John Cage's composition titled 4'33", which Cage stated was, in his opinion, his most important work [18] as our *Tabula rasa*. Our proposed model of C-QCM need have no 'sound' pass through air; will be able to have qualia of any sense or emotion 'transduced' directly into the mind of the participant from extra-cellularly stored noumenal experience breaking down the 1st person – 3rd person barrier [19-21]; and representing a new class of presentation and transforming of our understanding of the phenomenology of subjective experience to include

impressions (Latin – "erased slate").

¹ *Tabula rasa*: the mind in its hypothetical primary blank or empty state before receiving outside

the ontological noumenon of mind [19-21]. Music has always been an emotive system, both spiritually and secularly. Innovation is ongoing, even perhaps a renaissance is occurring with numerous variations of instrumentation, interfaces and genres; but our C-QCM work centers on extending the field of electronic/computer music to as yet unimaginable genres.

2. Mind and Body - Transducing the 1st Person – 3rd Person Barrier by Supervening Uncertainty

This is the most challenging section of the paper as the model of awareness applied is in stark contrast to the currently dominant cognitive approach ‘insisting’ that mind ≡ brain. It is also a deep philosophical and ontological issue whether other minds are in fact ‘knowable’ first hand which is a salient requirement for the form of conscious QCM presented here. In the interest of space limitations, we make that issue extracurricular; providing sufficient references for any wanting immersion [19-22].

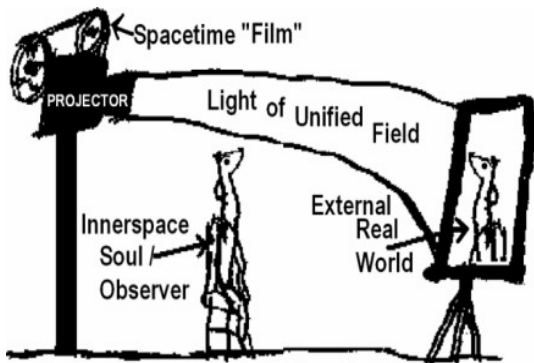


Fig. 1. A simplistic Movie Theater metaphor of consciousness as a similitude of Plato’s *analogy of the cave*; where an observer (self) seated in a unique chair within his theater observes a continuously transforming virtual reality as a macroscopic projection appearing as the continuous flow of qualia (awareness) on a screen.

In Fig. 1, one especially notes that the film and projector are not in the brain, as this is a Cartesian model of interactive dualism (Fig.3). The key role of the brain in terms of consciousness is as a transducer of sensory information, whereas the mind resides within the *psychosphere* boundary of the individual spirit, hard to accept if one does not believe in the timelessness of intelligence. This *fact* will be difficult to prove by usual epistemological techniques, but the imminent step will demonstrate additional dimensionality (XD) beyond the current 4D limit of the standard model [3,19-26].

Correlated with access to XD will be the utility of

the unified field in new classes of technology. Currently quantum mechanics is called the *basement of reality*; with violation of the uncertainty principle this will no longer be true [25].

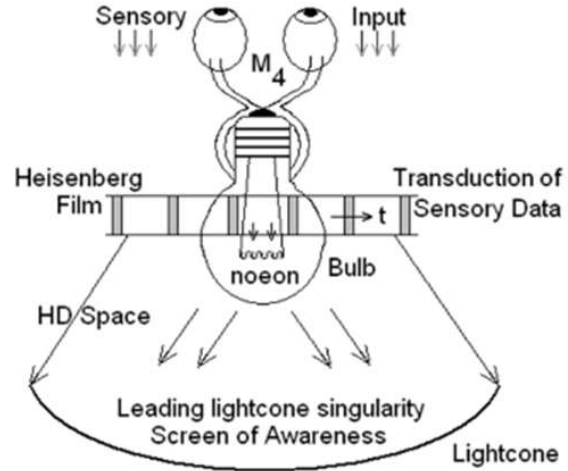


Fig. 2a. The mind-body interface is a form of *conscious quantum computer* which from a UFM perspective, discrete Least Cosmological Units (LCU) (bundled as frames of film) tessellating space, pass through a projector (spacetime) lit by coherent energy of the U_F streaming through the observers mind embedded in the theatre and appearing as the continuous super-radiant flow of reality (awareness) on the screen (Casimir boundaries).

In Fig. 2a, the bulb when on represents the spark of life or *élan vital* inherent in every point of spacetime and every atom of a living systems biochemistry. The film represents the informational basis arising from quantum activity in sensory processing and mentation by the brain or cognitive domain acting as a transducer. The lightcone is oscillating at the speed of light. Only one Casimir element of the screen is depicted. In actuality hundreds of billions of these screen components are utilized in the hyperhologram raster to represent qualia and awareness.

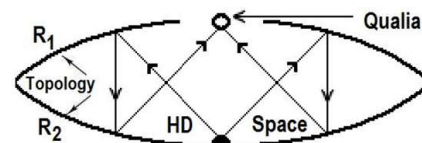


Fig. 2b. The raster of mind driven by the *élan vital* or light of awareness comprising the flow Qualia requires a multiplex of Casimir boundaries. Like phoneme components of sound, quanemes summate into Qualia, in a manner similar to raindrops becoming a rainbow.

Nagel discussed the difficulties associated with developing a scientific explanation for the nature of experience, stating that current reductionist attempts fail

by filtering out any basis for consciousness and thus become meaningless since they are logically compatible with its absence [30].

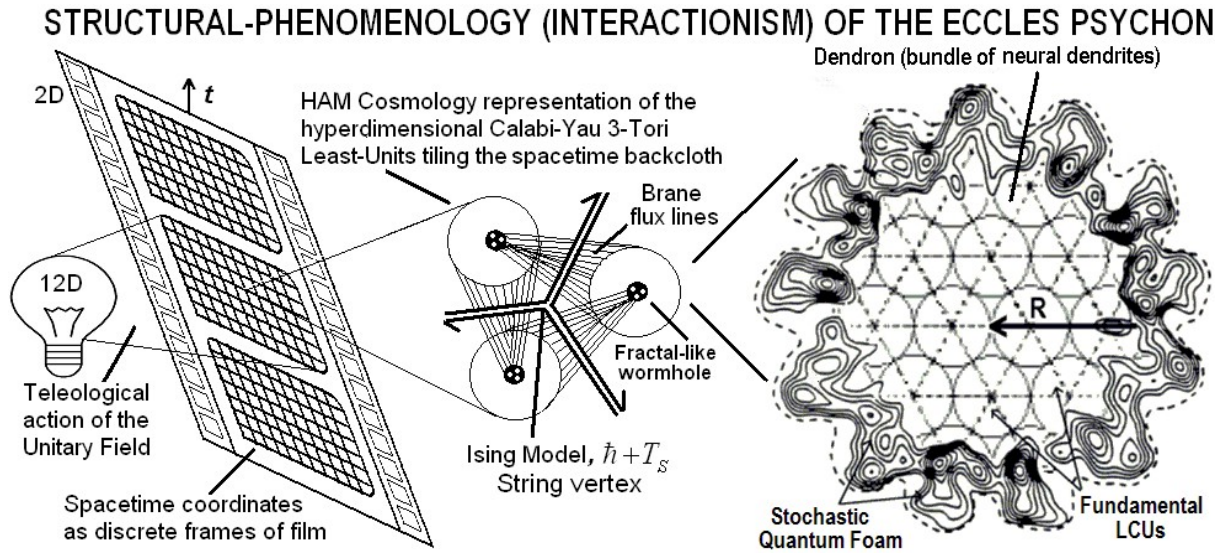


Fig. 3. a) Microscopic details of transduction of the U_F through the complex spacetime raster into every point, atom and thus molecule of Self-Organized Living Systems (SOLS). b) Showing relativistic injection of the noetic field into spacetime points (LCUs); the gating mechanism between the local reality of time and nonlocal atemporal regime of the U_F . c) Coherent interaction of the U_F bridging the stochastic quantum barrier coupled to a brain dendron (Bundle of neural dendrites) of radius R correlated with an underlying array forming one Eccles Psychon unit within the brain.

Our view calls into question the fundamental philosophy of the mind-brain identity hypothesis of Cognitive Theory: ‘*What processes in the brain give rise to awareness?*’ and the associated search for ‘neural correlates of consciousness’. The proper scientific manner of posing the query should simply be ‘*What processes give rise to awareness?*’. We formalize the Eccles psychon and summarize fourteen empirical protocols to test this putative model [19-29] requiring a new science of Unified Field Mechanics [24]. Until now the quest for psychophysical bridging has typically been in the arena between brain and quantum geometry; where contemporary science is insufficient for the task. Nagel further asks ‘*what would be left if one removed the viewpoint of the subjective observer*’ and then suggests ‘*that the remaining properties would be the physical processes themselves or states intrinsic to the experience of awareness*’[30]. We examine a new theoretical framework for introducing and experimentally testing the underlying physical cosmology of these noetic parameters [25].

Conscious-QCM requires a special class bulk universal QC modeled after the mind-body interface, which assumes unlike current thinking that the qualia of awareness can be digitally stored for transduction into the mind of the C-QCM subject. We imagine there would have to be some sort of volume control to account for subject variability and degree of experience desired. The figures below suggest the form C-QCM technology will take [31-33]. Noetic theory/tests (unpublished) suggest the UQC should be wearable and powered by the skin. Selections and other programming could be best interfaced by a device like the Rufus Cuff [34].

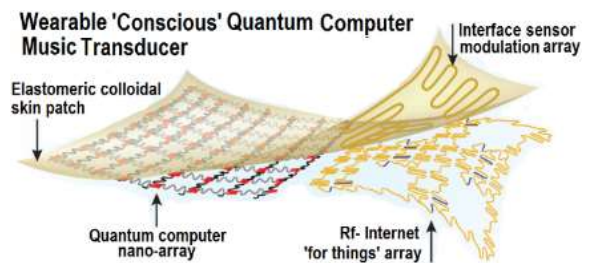


Fig. 4a. Wearable electronics: Skin powered quantum computer design possibility. Adapted from [32,33]

3. Universal ‘Conscious’ QC Requirements and Likely Conscious-QCM Technology



Fig. 4b. Wearable electronics: Rufus Cuff, interface for CQC music [34].

4. The Physical Basis of Qualia

Qualia, plural of *quale*, as defined in philosophy of mind is ‘the subjective quality of experience; a *qualitative feel* associated with an experience’. The physics of noetic cosmology with an inherent *élan vital* based on U_F mechanics provides a physical basis for representing quale in a rigorous empirically testable manner. Every experience has a specific subjective nature. If one removed the viewpoint of the subjective observer; *what would be left?* Nagel suggests the remaining properties might be those detectable by other beings, the physical processes themselves or states intrinsic to the experience of awareness. This changes the perspective of qualia to the form “there is something it is like to undergo certain physical processes”. “*If our idea of the physical ever expands to include mental phenomena, it will have to assign them an objective character*” [30].

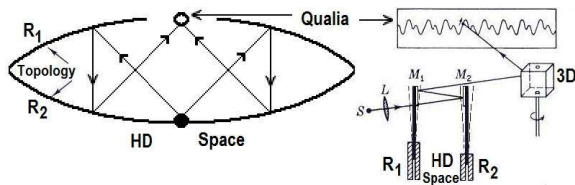


Fig. 5a. Left, 2D rendition of an HD holographic process. An object (black circle) placed inside two parabolic mirrors, R_1 , R_2 (like Casimir domain walls) produces a virtual image (white circle) representing creation of a point in spacetime. Our virtual holographic reality is produced in a similar fashion by Cramer future-past standing-wave parameters from the 6D Calabi-Yau mirror symmetric brane florets from the infinite potentia of the U_F . As in Fig. 2b this same process produces qualia with each lit point like a raindrop producing a rainbow. Right, R_1 , R_2 Casimir mirrors oscillate with the noeton U_F field evanescing into flow of qualia.

These are questions an integrative Noetic Science can now answer theoretically and empirically. Standard

definitions of qualia are an inadequate philosophical construct describing only the subjective character. In the physical sense of Noetic Field Theory (NFT) components describing qualia from the objective sense are introduced for the first time - i.e. distinguishing the phenomenology of qualia from the underlying ontological ‘nonlocal noumenon’ or physical existence of the fundamental absolute *thing in itself*. NFT suggests that a comprehensive definition of qualia is comprised of three component forms considered physically real because the noetic fields of Holographic Anthropic Multiverse cosmology on which the noetic model for the quantization of mind is based are all physically real. The proposed triune basis of quale is as follows:

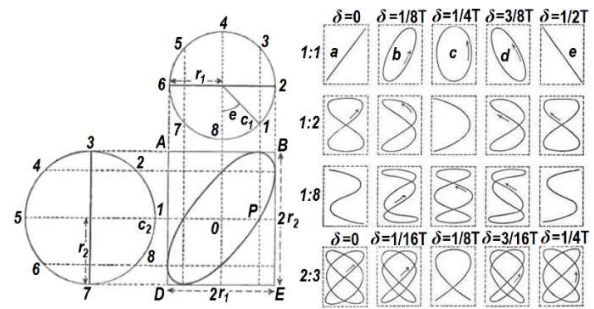


Fig. 5b. In a) the result of the vibrating amplitudes of two simple harmonic motions r_1 and r_2 of the same period is shown as an ellipse around O generated by the motion of a quaneme element of Q-II. The map of the resultant quaneme motion depends on the phase difference between the advanced and retarded motions of the two *Casimir* modulations to be compounded. The ellipse around O represents a phase difference of $1/8$ th period; if the phase difference were zero the path would be a straight line as shown. If the periods differ slightly, one vibration will gain on the other and the motion of the quaneme elements will run through the complete cycle of forms shown. The ratios on the left are frequency ratios across the columns phase.

Type I. The Subjective - The *what it feels like* basis of awareness. Phenomenological mental states of the qualia of experience. (This is the current philosophical definition of qualia, Q-I)

Type II. The Objective - Physical basis of qualia phenomenology independent of the *subjective feel* that could be stored or transferred to another entity breaking down the 1st person 3rd person barrier. Noumenal nonlocal U_F elements and related processes evanesce qualia by a form of superradiance, Q-II.

Type III. The Cosmological - SOLS by being alive represent a Qualia substrate of the anthropic multiverse, acting as a ‘blank slate’ carrier (like a television set turned on but with no broadcast signal) from within

which Q-II are modulated into the Q-I of experience by a form of superradiance (noeon exciplex gating mechanism) or hyper- holographic evanescence. Note: Q-III has sub-elements addressed elsewhere [19-23].

A standard image requires a screen or other reflective surface to be resolved; but if the foci of two parabolic mirrors (Casimir-like vacuum plates) coincide; the two images superpose into a real 3D holographic image that does not need a screen. A science toy called the ‘magic mirage’ is used to demonstrate this effect of parabolic mirrors. Objects placed in the bottom appear like solid objects at the top of the device. In 12D reality Calabi-Yau brane topology performs the same function as the locus of quaneme-qualia propagation.

The holophote (light house) action of *élan vital* energetics arises from the harmonic oscillation of close-packed LCU boundary conditions tiling the spacetime backcloth and pervading all SOLS. The inherent beat frequency of this continuous action produces the Q-III carrier wave that is an *empty slate* modulating cognitive data of Q-II physical parameters into Q-I awareness states as a superposition of the two (Q-III and Q-II). This modulation of qualia occurs in the HD QED cavities of the psychosphere’s cognitive domain. The QED cavities are a close-packed tiling of LCU noetic hyperspheres; the Casimir surfaces of which are able to reflect *quaneme* subelements. While the best reflectors of em-waves are polished metal mirrors, charged boundary conditions also reflect em-waves in the same way radio signals bounce off the ionized gases of the Kennelly-Heaviside layers in the Earth’s ionosphere. This reflective ‘sheath’ enclosing the cognitive domain is charged by the Noeon radiation (exchange particle of the noetic field) of the *élan vital*, the phases of which are ‘regulated’ in the complex HD space of the fundamental least units of Multiverse cosmology.

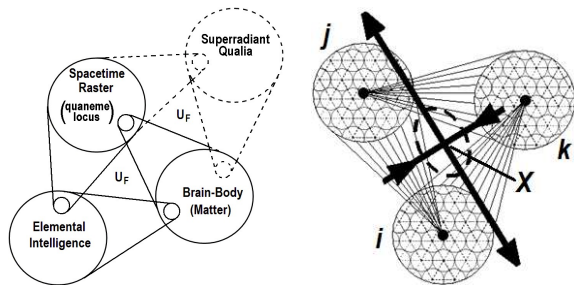


Fig. 6. a) Physical basis of the continuous superradiant generation of qualia from the three components of mind: eternal Elemental Intelligence, Brain-Body (Descartes *res extensa*), and the superradiant qualia (Descartes *res cogitans*), b) Mediated by the spacetime raster that exciplex gates the *light of the mind* or U_F energy.

How does noetic theory describe more complex aspects of qualia? Like a rainbow, light quanta (drop) are microscopic in contrast to the macroscopic sphere of awareness (rainbow). It thus seems reasonable to assume that scale-invariant properties of the least units of awareness would apply. Like phonemes as fundamental sound elements for audible language qualia-nemes or *quanemes* are proposed for awareness; all based on the physical modulation of Q-II states by the geometric structural-phenomenology of the Q-III carrier base of living systems. The quaneme is a singular Witten point in the raster of mind like a locus of points forming a line. Each of these ‘quaneme points’ of noeon entry through the LCU exciplex gating array are like an individual raindrop that summate into a rainbow or thought train of awareness. This again takes us back to the movie theater metaphor of Figs. 1-3 where the discrete frame of film (exciplex gated) is projected continuously on the screen, in this case the mind.

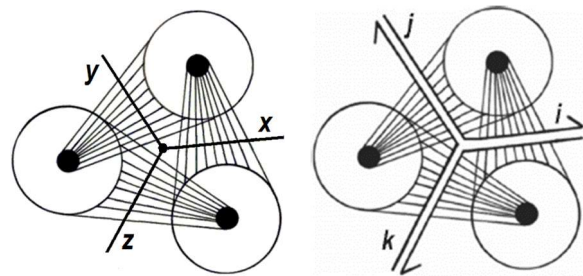


Fig. 6. c) Duality of LCU construct complex de Broglie-Bohm potentials hidden nonlocally behind a 3-space x, z, x 0D singularity vertex. d) Addition to c) of the Witten 1D string vertex able to undergo topological switching.

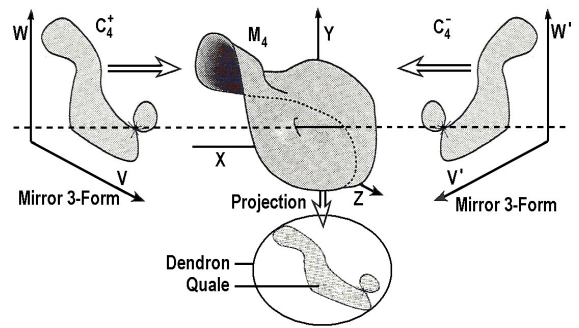


Fig. 6. Complex HD Calabi-Yau mirror symmetric 3-forms, C_4 shadows in Minkowski space, M_4 and the U_F energy of this resultant is projected into brain dendrons as continuous Q-streams of evolving evanescing-superradiant qualia. C_4^\pm , 1st of three 12D levels cycles into local 3-space; the additional dualities are required to separate the infinite potentia of the U_F from local time.

To achieve this result, we utilize a battery of new physical assumptions:

- The LSXD regime of U_F dynamics is a ‘sea’ of infinite potentia from which the 4D reality of the 3D observer cyclically emerges as a nilpotent resultant. Nilpotency - technically meaning *sums to zero* [24,39], is a required basis for the noetic cosmologies infinite potentia simplistically like the entangled alive-dead quantum state of Schrödinger’s cat before a realized local event occurs.
- Action of the U_F mediated by noeon ‘flux’ (noeon is the exchange unit of the U_F) is the life principle both animating SOLS and supplying psychon energy for the physical evolution of qualia [19,23].
- The U_F does not operate as a usual phenomenal field (mediated by an energetic exchange quanta like the photon of the electromagnetic field) but as an energyless field by a process called *topological switching* transferring a force of coherence ontologically between M-Theoretic branes [3,4,24]. Note: This property of U_F dynamics removes the problem of violation of the 2nd law of thermodynamics or the conservation of energy from Cartesian interactive dualism.
- The key process for the topological transformation of noeon exchange is a holophote action (like a lighthouse beacon) providing a gating mechanism acting as the psychophysical bridge between the potentia of the U_F 12D space and the localized 4D spacetime and 3D matter it embeds [3,4,38-42].

Although Figs. 2,3,5 are simplistic conceptualizations of how quanames may be modulated by the Casimir carrier wave; a mechanism for the rich structure and computational power required to support the model at this stage of development is readily illustrated. These Lissajous figures, as they are commonly known in wave mechanics, are generally described as displacement patterns traced within a plane (like the screen of an oscilloscope or ball of a pendulum) by the influence of the superposition of two independent harmonic oscillations. This is illustrated in Fig. 5b for various frequency ratios and phase differences of the two harmonic oscillations.

5. Phenomenological Philosophy of Mind

Edmund Husserl and Martin Heidegger established the school of phenomenology in the first half of the 20th Century based on *phenomenological reduction*, arguing that transcendental consciousness sets the limits of all possible knowledge [43]. Phenomenology as a

philosophical movement is based on the premise that reality consists of objects and events (phenomena) as they are perceived or understood in consciousness, and not anything independent of consciousness. In terms of the nature of experience, the phenomenological school studies structures of conscious experience as experienced from a subjective 1st person point of view, along with intentionality (manner experience is directed toward objects in the world) [44,45]. As a branch of Philosophy of Mind, Phenomenology is central to the European Philosophy tradition.

Now that the Mind-Body problem (nature of awareness) is comprehensively solved theoretically [19,23], albeit in an unpopular manner because the vast majority of cognitive scientists ‘insist’ this scenario ‘must’ under the panoply Mind-Equals-Brain [19,26]; the solution has been ignored by the community, additionally because the proposed empirical falsifications have yet to be performed [20-22].

“The essence the centuries long tradition of Indian aesthetic theory developed a splendid image for the entelechy the of art, especially the end goal of all musical performance it is called Rasa. This is an inner condition of mind and emotion induced in the audience which I mentioned earlier in the guise of a divine insight. The earliest term the founder of the Indian theory, Bharata (4th Century) used for the highest aesthetic experience was harsha, meaning ecstatic joy. But later theorists felt the need to recognize that the Harsha was not a simplex phenomenon, to be approached directly by the performing arts, the complex reflecting and unifying a variety of emotional conditions” [46].

... and the world is like an apple whirling silently in space like the circles that you find in the windmills of your mind It was so loud the windows were vibrating [47].

6. Interregnum

While perhaps most entertaining, one might readily surmise that C-QCM is only one of an assortment of mind-body related applications of CQC, such as Telecerebroscopes (of which I suppose C-QCM is a form of without the music or a variation of Cage’s 4’33’), telepathy & clairvoyance devices. A Salvador Dali might gain recognition by recording his dreams. Psychology will become a hard-physical science instead of an art, including a plethora of new medical devices (my favorite) – sensory by-pass prosthesis where all blind see, not merely the 14.5% with viable optic nerves as in retinal implant technology [19].

Mood music, music therapy and a plethora of other music promoting relaxed meditative states have been around for decades [35-37].

Computer music, in general, is the application of computing or other electronic synthesizer technology in music composition to help facilitate the creation of new music styles or to have computers independently create music, such as with algorithmic composition programs.

So as one sees, C-QCM appears of a lighter more entertaining note, QC will become the basis of very serious technologies and changes in society. Bulk UQC is essentially one experiment away (proof of concept) [3,20-22]. There may be a twist before threshold modeling of CQC that is not perceived yet as anything related to awareness with the Spirit of God as a component will entail unforeseen complexity, but essentially all of this is a given, the major unknown is when [48].

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