

Fatima Marian Apparition And TGD Inspired Theory Of Consciousness

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Abstract

A TGD (Topological Geometrodynamics) based model for the Fatima Marian apparition (FMA) is discussed. The notion of many-sheeted space-time implies the notion of magnetic body (MB). TGD based view about dark matter predicts mechanisms making possible quantum coherence in macroscopic and even astrophysical scales. TGD inspired theory of consciousness relying on the notion of zero energy ontology (ZEO) predicts entire hierarchy of conscious entities (selves) so that the notion of collective consciousness makes sense. One ends up to a general model of remote mental interactions proposed to be used routinely in the communications (say EEG) between personal MB and biological body (BB) in terms of dark photons. Sensory representations, realized in TGD universe at MB involve in an essential manner the sharing of mental images identifiable as sub-selves of self.

The model explains UFO and ET experiences as telepathic experiences, in which primitive plasmoid like life forms (apparent UFOs) using microwaves as their metabolic energy source - “food” - serve as “mediums” entangling the experiencer with magnetospheric or even extraterrestrial conscious entities. If this entity can be assigned to magnetosphere, one can understand why tectonic activity and perturbations of the Earth’s magnetic field correlate with UFO and ET experiences. The same conceptual framework provides models of homeostasis, homeopathy, endogenous realization of intentions, and remote mental interactions such as telepathy, and psychokinesis. The basic mechanism explains also many anomalous phenomena claimed by free energy researchers.

In the case of FMA the well-documented effects - in particular, the strange buzzing sounds heard by the witnesses and explainable in terms of microwave hearing - lead to a rather detailed model

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in which “Marian” could be identified as conscious entity representing collective level of consciousness.

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1 Introduction

Fatima Marian Apparition (FMA) is one of the best documented anomalous phenomena and has strong resemblances with UFO and ET experiences. Personally I learned about this phenomenon from Joaquim Fernandes, who together with Fina d'Armada has written three books on the subject [2]. There is also a book by Vallee [4] about FMA phenomenon. The very common "buzzing" sounds heard by several witnesses at Fatima spot near the oak contact only when the Lady, according to Lucia, was speaking with her. Michael Persinger and his team in Laurentian University [24] have tested in laboratory the hypothesis that UFO experiences might involve geomagnetic influence and this serves as a hint also now.

Three children, Lucia, Fransisco, and Jacinta met a brilliantly effulgent lady whom they identified as the Virgin Mary. This occurred six times at 13th of each month. The so called Sun miracle was witnessed by people in a large area measured about 20-30 miles (it is estimated that about 70.000 people congregated in the vicinity of Cova de Ira to witness the predicted miracle!).

The witnesses reported a light tunnel and little image of Mary at its center. Also reported were heat waves with sudden drying of clothes, healings, fall of white filaments ("angel hair"), and a strange auditory sensation defined by some witnesses as a "buzzing of bees within a vase". This sound was heard *only* when the seer Lucia told that "the Lady was talking to her *without* moving the lips". Also glowing globe-shaped vehicle appeared suggesting a similarity with UFO experiences.

In this article I summarize briefly the speculative picture provided by Topological Geometrodynamics (TGD) and TGD inspired theory of consciousness about bio-systems. I try to understand FMA as an example of an exotic phenomenon of collective

consciousness having no obvious explanation in the standard neuroscience framework.

The first version of this article was written about 16 years ago. During this period TGD has evolved dramatically as new ideas and principles have emerged. Mention only the hierarchy of Planck constants [29, 40] serving as a correlate for dark matter explaining macroscopic coherence of living systems, zero energy ontology (ZEO) [55] central for the recent formulation of TGD and TGD inspired theory of consciousness, so called adelic physics [76] as fusion of real physics for matter and p-adics physics for cognition and imagination [41, 77], and twistor lift of TGD [42, 43, 44]. The vision about FMA as a manifestation of collective consciousness and the idea about the role of microwave hearing have not been given up but the recent model emphasizes the general ideas.

1.1 Basic Ideas and Notions of TGD

The notion of many-sheeted space-time [39] (see <http://tinyurl.com/mf99gpv>) allows to understand how bio-systems manage to be macroscopic quantum systems. Topological field quantization implies that also classical fields have particle like aspects: these particle like aspects are crucial for the models of sensory qualia [47], sensory representations [62, 53] and long term memory [64] as well as for the general model of control and coordination in living matter [57, 58]. One can say that any physical system has besides the ordinary physical body also a field body, in particular magnetic body (MB) [66]. An entire hierarchy of field bodies is predicted. For an illustration of MB assignable to dipole field see <http://tinyurl.com/n3sgchcs>.

A crucial element is hierarchy of Planck constants $h_{eff}/h = n$ defining a hierarchy of dark matters as macroscopic quantum phases [29, 40]. In living systems dark matter residing at magnetic flux tubes (see <http://tinyurl.com/lrvtwe5>) of magnetic body (MB) would receive sensory input from biological body (BB) and control it by using dark photons with energies above thermal energy. MB would therefore serve as intentional agent. We would however identify with our biological bodies since sensory input comes from and our control actions act on it.

The effective value of Planck constant $h_{eff} = n \times h$ correspond to the number sheets of singular covering defined by space-time surface giving rise

to n discrete degrees of freedom and single-fermion states labelled by integer $0 \leq m \leq n$ and many-fermion states formed from these (all particles consist of fundamental fermions in TGD).

A further generalization of the space-time concept involves the introduction of p-adic topologies [31, 33] labelled by primes besides the real topology. p-Adic topology is difficult to illustrate: for instance, prime power p^n at the limit of infinite n goes to zero p-adic topology but infinity in real topology, and p-adic numbers differing by large power of p are close to each other. Real space-time sheet and its p-adic counterparts define pages of a book like structure, adele (see <http://tinyurl.com/1xkpj9y>). Each extension of rationals induces extension of various p-adic number fields and only finite extensions are accepted for them. These extensions define a hierarchy of adeles identified as an evolutionary hierarchy with evolutionary level identified as the complexity of the extension [76] [41].

p-Adic space-time sheets are identified as correlates of cognition. They satisfy the same field equations as the real space-time sheets but are not fully deterministic and therefore serve as correlates for imagination and correspond to the “mind stuff” of Descartes. The common points of real and p-adic space-time sheet have coordinates in some extension of rational number can be said to define cognitive representation as the intersection of reality and various p-adicities.

1.2 Basic Ideas and Notions of TGD Inspired Theory of Consciousness

TGD inspired theory of consciousness [54] can be seen as a generalization of quantum measurement theory forced by what I call zero energy ontology (ZEO). Self can be identified as a generalized Zeno effect [77]. Some aspects of selfness remain unaffected during the sequence of state function reduction whereas some aspects representing among other things sensory input change and give also rise to the experienced flow of time.

Selves form a hierarchy with sub-selves experienced as mental images. Selves can fuse together by quantum entangling. The new view about subsystems implies that sub-selves can entangle even if selves do not: this gives rise to sharing of mental images realized for instance in the fusion of

right and left visual mental images [54] (see <http://tinyurl.com/lm6hzcv>).

1.3 Sensory Representations

The notion of many-sheeted space-time (see <http://tinyurl.com/mf99gpv>) and hierarchy of Planck constants allow to understand how bio-systems manage to be macroscopic quantum systems. Topological field quantization [28, 45] implies that also classical fields have particle like aspects. These particle like aspects are crucial for the models of sensory qualia, sensory representations and long term memory as well as for the general model of control and coordination in living matter. One can fairly say that any living system has besides the ordinary physical body also a hierarchy of field bodies.

The realization of the sensory representations at the field body outside the brain represents the most radical departure from the views of standard neuroscience and leads to a vision about both “personal” sensory representations and magnetospheric sensory representations presumably responsible for the collective aspects of consciousness emerges. For the notion of sensory representations see [62, 53]. For TGD based model of remote mental interactions see [61, 67].

1.4 Summary of TGD Based Model for FMA

The TGD based model for FMA relies on the following ideas.

1. The notion of self hierarchy allows to identify the entity “Marian” as a collective higher level self, a genuine conscious field entity receiving information from human brains by TGD counter parts of dark EEG photons, realized perhaps in magnetosphere or at dark variant of the Earth’s magnetic field. The visions and also some experiences of witnesses of FMA could involve in an essential manner quantum entanglement with “Marian” allowing sharing and fusion of mental images. In TGD quantum entanglement is the basic mechanism of remote mental interactions and remote healing: the occurrence of healings during FMAs were indeed reported.
2. The interpretation of the buzzing sounds heard by the witnesses in terms of microwave au-

dition [11] (proposed by Joaquim Fernandez [2]) led to a model of FMA and also to a more detailed model of remote mental interactions and of bio-control. The topological quanta of electromagnetic radiation (“massless extremals” or briefly MEs, see <http://tinyurl.com/kczvzaz>) and dark photons with non-standard value $h_{eff}/h = n$ of Planck constant associated with them serve as a basic elements of the model.

3. Massless extremals (MEs) carrying dark photons with extremely low frequencies (ELF) (say those assignable with EEG frequencies) make possible communications between distant systems using dark photon radiation propagating along them. Dark ELF photons having energy ($E = h_{eff}f$) in bio-photon range and ELF MEs would be associated with magnetic flux tube structures of Earth’s magnetic field and of the magnetic fields associated with human brain. Dark ELF photons induced by cyclotron transitions of dark, possibly superconducting, ions at the magnetic flux tubes. ELF MEs can be generated resonantly by several mechanisms. For instance, TGD counterparts of Alfvén waves and cavity resonances, in particular Schumann resonances accompanying tectonic activity, generate them [53].

Both ELF and microwave dark photons would have value of Planck constants $h_{eff}/h = n$ guaranteeing that their energy $E = h_{eff}f$ is above thermal energy, in particular in the region of visible and UV frequencies assignable to bio-photons. Conformational transitions of proteins and DNA molecules and rotational transitions of water molecules and clusters correspond to energies in microwave range and dark photons should be also able to decay ordinary microwave photons.

4. Plasmoid structures, primitive lifeforms involving plasma of charged particles and MB carrying dark ions and utilizing microwave photons as their “food”, could serve as kind of relay stations. Plasmoids could entangle perceiver with the entity “Marian”, and generate radiation at visible, infrared, and microwave frequencies and in this manner induce effects like heating and drying. Also some UFOs could be identified as plasmoid like structures entan-

gling the observer with life-forms, which could be even extraterrestrial and thus induce telepathic encounters of ETs.

5. Dark ELF and microwave photons propagate along correspond MEs plus associated flux tubes. They could induce self-organization at the end of the receiver by inducing h_{eff} increasing phase transition requiring energy and serve effectively as “food” by providing metabolic energy.

There are several candidates for the source of microwaves. Microwave static, known to have a biological origin and to strongly correlate with taos hum phenomenon [16], involves sometimes also buzzing sounds. Tectonic activity can induce microwaves (quartz crystals generate microwaves).

To help the reader I have included a vocabulary at the end of the article and include here a list of the abbreviations used in the text.

Topological Geometrodynamics (TGD); General Relativity Theory (GRT); Zero energy ontology (ZEO); Strong form of holography (SH); Negentropy Maximization Principle (NMP); Negentropic entanglement (NE); Causal diamond (CD); Massless extremal (ME); Magnetic body (MB); Biological body (BB); Exclusion zone (EZ).

2 TGD Briefly

The reader can probably skip this section in the first reading if she/he feels it too technical and start directly from the section devoted to the general theory of consciousness, which I have tried to formulate with minimal reference to TGD based physics.

2.1 Space-times as 4-D Surfaces in 8-D Imbedding Space

Topological Geometro-Dynamics (TGD) can be regarded as a unified theory of fundamental interactions. In GRT the curvature of space-time (see <http://tinyurl.com/kxrj1w8>) spoils the symmetries of Special Relativity TGD was originally an attempt to construct a Poincare invariant theory of gravitation [39].

1. Space-time, rather than being an abstract manifold endowed with metric is regarded

as a 4-surface in the 8-dimensional space $H = M^4 \times CP_2$ (see <http://tinyurl.com/kn6hn42>), where M^4 is Minkowski space and $CP_2 = SU(3)/U(2)$ is the complex projective space of 4 real dimensions [27] obtained also by identifying the points of complex 3-dimensional space C^3 differing by a complex scaling (see <http://tinyurl.com/mh9pbay>).

The size of CP_2 , which is about 2^{12} Planck lengths from p-adic mass calculations is besides Planck length a fundamental length scale in TGD Universe (it has turned out the the twistor lift of TGD leads to emergence of Planck length as a second fundamental length scale [44]). For details about CP_2 see the appendix of [27] at <http://tinyurl.com/m128c3r>.

2. The identification of the space-times as sub-manifolds of (4-D surfaces) in $H = M^4 \times CP_2$ leads to Poincare invariance (translations, rotations, Lorentz transformations) and solves the conceptual difficulties related to the definition of the energy-momentum in General Relativity Theory (GRT). Even more, sub-manifold geometry, being considerably richer in structure than the abstract manifold geometry behind GRT, leads to a geometrization of the known fundamental interactions and of elementary particle quantum numbers. In particular, classical electroweak gauge fields are obtained by inducing the spinor curvature of CP_2 to the space-time surface.
3. One can say, that the mere hypothesis that space-times are representable as 4-surfaces in $H = M^4 \times CP_2$ realizes Einstein's dream in a very elegant and economical manner: very concisely, sub-manifold geometry brings in the notion of shape besides the notions of distance, angle, and curvature. Furthermore, twistor lift exists only for this choice of H so that imbedding space can be argued to be unique both physically and mathematically.

2.2 The Notion of Many-sheeted Space-time

TGD approach forces a generalization of the conventional space-time concept to many-sheeted space-time [39] (see <http://tinyurl.com/mf99gpv>).

The topologically trivial 3-space of General Relativity (GRT) is replaced with a many-sheeted space-time containing matter as particle like 3-surfaces “glued” to the topologically trivial background space-time sheet by connected sum (wormhole) contacts (see <http://tinyurl.com/mbk9hvh>) having CP_2 size connecting the space-time sheets. They have nothing to do with the wormholes in GRT sense.

Many-sheeted space-time means roughly that various structures that we see in various length scales correspond to space-time sheets with outer boundary glued by extremely tiny elementary particle-sized wormhole contacts to larger space-time sheets representing larger structures containing them. The sheets are extremely near to each other (CP_2 size scale). Besides atomic space-time sheets which our measurements are usually about, there is an entire hierarchy of larger space-time sheets with their own physics. Space-time sheets can be connected to each other by bonds identifiable as magnetic flux tubes (see <http://tinyurl.com/lrvtwe5>).

TGD should produce GRT and standard model as approximation in long length scales, when the space-time sheets look geometrically like small deformations of empty Minkowski space locally. GRT space-time should correspond to a slightly curved M^4 such that gauge potentials and gravitational fields are sums of the induced gauge potentials and gravitational fields at space-time sheets [35]. All effects due to many-sheetedness disappear at this limit and appear as anomalies of GRT and standard model.

Space-time sheets form a hierarchical structure. Macroscopic material bodies are identified as 3-surfaces. Physical objects have outer boundary: what is its counterpart at the level of space-time surfaces?

1. The original hypothesis was that sheets have a genuine boundary identifiable as the outer surface of the macroscopic body.
2. A more plausible view is that sheets are actually closed - at least 2-sheeted - structures of finite size with the boundary of M^4 projection identifiable as the boundary of physical object. Sphere (space-time surface) above plane (M^4) and its projection to plane (M^4) serve as an illustration.

3. Also the surface at which the signature of the induced metric changes from Minkowskian to Euclidian is a candidate for the counterpart of outer boundary of a physical object.

For instance, my physical body would be a space-time sheet with my skin representing its effective boundary whereas external world would be represented by a larger space-time sheet at which the space-time sheet representing my body is “topologically condensed”. This generalization implies a radical reformulation of condensed matter physics. Space-time sheets are connected to each other by wormhole contacts. Various new physics effects related to the many-sheeted space-time concept are discussed in the books about TGD: see for instance, the books [38, 37, 32].

2.3 Topological Field Quantization

Topological field quantization distinguishes between TGD and Maxwell’s electrodynamics. What happens is that em field and classical fields in general decompose into field topological quanta represented by space-time sheets. Each physical objects creates classical fields and - unlike in Maxwell’s theory where the fields superpose - one can tell the physical system to which a topological field quantum defining a classical and quantum coherence region belongs to. Every physical system has field body, field identity.

For instance, radiation field decomposes into massless extremals (MEs) [56], which are cylindrical structures carrying em fields propagating with light velocity (see <http://tinyurl.com/kczvzaz>). MEs are ideal for classical communications: classical signal propagates with light velocity inside a cylindrical tube and without weakening making high precision targeted communication possible, and the non-determinism of the associated vacuum current propagating also with light velocity allows a coding of arbitrary signal.

Magnetic flux tubes and their electric counterparts represent also general solution families to field equations [66]. This leads to the notion of magnetic body (MB).

1. The hierarchy of Planck constants and identification of dark matter as phases with non-standard value of Planck constant implies that dark matter both receives sensory information

from BB and controls it. The value of Planck constant $h_{eff} = n \times h$ - integer multiple of its standard value - scales up quantum lengths and times since typically they are proportional to h_{eff} as also energy $E = h_{eff}f$ associated with a photon with given frequency. This allows to understand the quantal effects of ELF em fields to vertebrate brain [22].

2. $h_{eff} = n \times h$ means that quantum length scales such as Compton length are scaled up by factor n . This makes possible macroscopic quantum coherence and non-locality. Magnetic flux tubes are identified as carriers of dark matter with non-standard value of Planck constant.

3 TGD Inspired Theory of Consciousness in Nutshell

The recent form of TGD inspired theory of consciousness [77] relies on zero energy ontology (ZEO). Quantum entanglement binding selves to larger selves is in central role. In the adelic physics [76] the entanglement is number theoretically universal - entanglement coefficients are always in some extension of rationals characterizing the evolutionary level of the system - allowing interpretation as both real and p-adic entanglement for various primes p . The definitions for real and p-adic entanglement negentropy are different and - unlike real entanglement - p-adic entanglement is negentropic. The interpretation is as cognitive information.

Negentropic entanglement gives rise to potentially conscious information resources, “Akashic records”. ZEO allows to solve the conceptual problems of the previous approach. The emergence of adelic physics [76] fusing the physics of matter and cognition simplifies the theory radically since negentropy maximization principle (NMP) [55] in statistical form is a consequence rather than postulate of the theory.

3.1 Zero Energy Entology (ZEO)

In standard ontology of quantum physics physical states are assumed to have positive energy. In zero energy ontology (ZEO) [36] physical states decompose to pairs of positive and negative energy states such that the net values of the conserved quantum numbers vanish. The interpretation of these states

in ordinary ontology would be as time evolutions between initial and final states, physical events. Quantum events - state function reductions - are quantum jumps between classical events.

By quantum classical correspondence zero energy states must have space-time and imbedding space correlates.

1. Positive and negative energy parts of zero energy state reside at future and past light-like boundaries of causal diamond (CD) identified as intersection of future and past directed light-cones (2-D projection is diamond, see <http://tinyurl.com/mh9pbay>). The analog of CD in cosmology is big bang followed by big crunch. Penrose diagrams provide an excellent 2-D visualization of the notion. CDs form a fractal hierarchy containing CDs within CDs. Disjoint CDs are possible and CDs could also intersect.
2. The interpretation of CD in TGD inspired theory of consciousness is as an imbedding space correlate for the 4-dimensional(!) perceptive field of conscious entity: the contents of conscious experience is about the region defined by CD. At the level of space-time sheets the experience come from space-time sheets in the interior of CD. Whether the sheets can be assumed to continue outside CD is still unclear. An attractive possibility is that they do so and CDs are analogous to a covering of manifold by open sets defining charts of an atlas: CDs would be kind of conscious chart leafs.
3. Quantum measurement theory must be modified in ZEO since state function reduction can happen at *both* boundaries of CD and the reduced states at opposite boundaries are related by time reversal. One can also have quantum superposition of CDs changing between reductions at active boundary followed by localization in the moduli space of CDs with the the passive boundary fixed. Quantum measurement theory generalizes to a theory of consciousness with conscious entity - self - identified as a sequence of state function reductions at active (changing) boundary of CD [46].

3.2 ZEO Based Quantum Measurement Theory as a Theory of Consciousness

Let us first briefly recall what ZEO based theory of consciousness says.

1. In ZEO self corresponds to a generalized Zeno effect (see <http://tinyurl.com/qbs7cbz>) that is a sequence of state function reductions leaving the passive boundary of CD unaffected as also the members of state pairs associated with 3-surfaces at it. At active boundary the members of state pairs change and the active boundary drifts reduction by reduction farther away from the passive boundary. The temporal distance between the tips of CD, clock time, increases gradually and corresponds to the experience about the flow of time.

This gives the correlation between clock time and subjective time identified as sequence of state function reductions at same boundary of CD. These two times are not identified unlike in standard physics, and this saves from the basic paradox of standard quantum theory.

2. Eventually the first reduction to the passive boundary of CD takes place [55] and forces self to die. Passive boundary becomes now the active boundary: a new time reversed self is born. For this self the arrow of geometric time is opposite since now the formerly passive boundary is active and shifts in opposite direction of imbedding space time: in this manner CD steadily increases in size and in principle can evolve to a new sub-cosmology.
3. Also the time-reversed self will eventually die and make the first reduction to the opposite - the original passive boundary of CD: the self with the original arrow of time can be said to re-incarnate: this is like falling asleep and waking up in the morning. The position of the active boundary for re-incarnated self will be shifted to the geometric future from its position at the moment of death. One can make only guesses for the time lapse from death to re-incarnation. This time lapse is expected to be rather short as compared to the size of CD itself.

Remarkably, ZEO does not only reduce consciousness theory to quantum measurement theory but would also explain what happens in birth and death and predict re-incarnation. The repeated death and re-incarnation of mental images (sub-selves) could be seen as support for this vision. What the time ghostly time reversed selves could be is a fascinating question: phase conjugate laser beam is one example of a system for which time runs backwards and could be seen as primitive time reversed self. Fantappie postulated long time ago that time reversal is a basic aspect of living systems [25]. Fantappie called entropy for the reversed arrow of time syntropy.

Quantum entanglement is the central quantum notion and Schrödinger cat able to be living and dead simultaneously is the classical manner to “illustrate” the notion (see <http://tinyurl.com/1pjcjm9>). The earlier vision about self as a system able to remain unentangled corresponds now to the passive boundary of CD at which nothing changes during the lifetime of self: subsystems there are maximally unentangled. These sub-systems correspond to unchanging aspects of selfness whereas the active boundary gives rise to sensory percepts and experienced flow of subjective time. The earlier vision about integration of quantum jumps to self corresponds to the identification of self as a generalized Zeno effect.

So called negentropy maximization principle (NMP) [55] stating that quantum jumps must increase entanglement negentropy was earlier postulated as a basic variational principle of consciousness but in adelic physics NMP in statistical sense is a prediction [77]. The dimension of the extension of rationals defining the adele can only increase in statistical sense and this implies generation of negentropic resources in statistical sense.

TGD Universe thus allows also temporary reduction of negentropy but in the long run it increases - we do not live in the best possible Universe. The increase of negentropy realized as negentropic entanglement (NE) is a correlate for evolution. NMP in this sense states that the negentropy associated with NE increases as Universe learns more about itself. One can also say that NE defines kind of Akashic records. One might say that fundamental ethical principle is that increase of negentropy promoting evolution.

Self hierarchy is a fundamental prediction. Selves can have sub-selves which it experiences as mental

images and self itself is mental image of higher level self. This hierarchy continues to the level of entire Universe. The entanglement of sub-selves of same or of two separate selves means fusion of mental images to a more complex shared mental image (see <http://tinyurl.com/1m6hzcv>). The sharing of mental images crucial, not only for remote mental interactions, but also for genuine communications. For the notions of self, self hierarchy, and sharing and fusion of mental images by quantum entanglement see [54] [77].

3.3 *p*-Adic Physics as Physics of Cognition and Imagination

p-Adic number fields are labelled by primes $p = 2, 3, 5, \dots$ and, just like real numbers, they can be regarded as completions of rational numbers $q = m/n$, m, n integers to contain the *p*-adic counterparts of algebraic and transcendental numbers [31, 33]. Most *p*-adic numbers are infinite as real numbers. *p*-Adic numbers emerged to TGD first only as an effective mathematical tool but it has turned out that *p*-adic physics is a fundamental element of TGD. TGD spacetime decomposes into regions obeying real and *p*-adic topologies analogous to pages of a book (see <http://tinyurl.com/1xkpj9y>).

p-Adic space-time regions obey the same field equations as the real regions but are characterized by *p*-adic non-determinism since the functions having vanishing *p*-adic derivative appearing as analogs of integration constants of differential equations are only piecewise constant. Therefore one cannot fix the solutions of dynamical equations by giving the initial values of dynamical variables for fixed value of time (for instance, initial positions and velocities are integration constants for Newton's equations and fix the solution). Pseudo constant depends on a finite number of positive binary digits of its arguments. *p*-Adic space-time regions are obtained by glueing together regions for which integration constants are genuine constants. *p*-Adic space-time sheets are only piecewise realistic - like cubistic paintings.

The interpretation of the *p*-adic regions is as correlates of cognition and intention [63]. The intersections of real and *p*-adic space-time sheets consist of points with coordinates having values in the extension of rationals inducing in turn extensions of *p*-adic number fields. This discrete intersection between reality and various *p*-adicities defines cogni-

tive representation.

Freedom of imagination would be due to the p-adic non-determinism. p-Adic regions perform mimicry and make possible for the Universe to form cognitive representations about itself. Real/p-adic spacetime sheets are interpreted as geometric correlates of sensory/imagined experiences.

The original idea that realization of intention as action corresponds to quantum jump replacing p-adic space-time sheet (intention) with real space-time sheet (action) turned out to be wrong. Rather, so called strong form of holography (SH) implies that 2-dimensional data given at string world sheets plus fixing the cognitive representation as points of space-time surface with coordinates in the extension of rationals defining the adele, allow to continue these 2-surfaces to 4-D surfaces. This is a direct analogy for the continuation of 2-D data to analytic function of complex variables. p-Adic non-determinism allows always this continuation but in the real case this is not always possible. One can say that only some imaginations can be realized.

3.4 Adelic Physics as Fusion of Real and Various p-Adic Physics

Adelic physics has emerged during last few years as a fusion of real and various p-adic physics. The basic notion is fusion of real number and various p-adic number fields to a book like structure with one page of the book identified as real numbers and the remaining pages as extensions of p-adic numbers fields induced by a given extension of rationals, which therefore characterizes a given book. One has infinite hierarchy of these books - adeles - with increasing complexity and with increasing negentropy resources. The interpretation is in terms of an evolutionary hierarchy: evolution would reduce to number theory [76, 77].

The extension of rationals is obtained by adding algebraic numbers (roots of irreducible polynomials) to get a finite-dimensional extensions of rationals. Also roots of Neper number e can be added since e^p is ordinary p-adic number so that extension of p-adics is finite: this conforms with the idea that cognition is finite. Cognitive representations correspond to the imbedding space points with coordinates in the extension of rationals and the complexity of extension increases with the dimension of extension.

Galois group (see <http://tinyurl.com/>

`mrvqhz2`) permuting the roots of polynomial defining the extension has natural action on cognitive representation and therefore also on space-time sheets containing the cognitive representation. Space-time can be regarded as n -sheeted singular covering with n identifiable as the dimension of the extensions dividing the order of Galois group. The natural conclusion is that the hierarchy of Planck constants identified in terms of hierarchy of dark matters is a prediction of adelic physics. Galois groups would become symmetry groups of adelic physics and of cognition.

p-Adic length scale physics [38] states that primes $p \simeq 2^k$ and possible also powers of other small primes such as 3, are physically preferred being assignable to physical systems such as elementary particles. In particular, Mersenne prime $M_n = 2^n - 1$ seem to define fundamental length scales. These primes characterize the size scale $L_p \propto \sqrt{p}$ of the system. For instance, $k = 151$ corresponds to the length scale 10 nm associated with the cell membrane thickness. p-Adic length scale hypothesis is absolutely crucial element of TGD and gives it much of its predictive power.

Adelic physics [76] suggests an explanation of p-adic length scale hypothesis. Given extension of rationals contains so called ramified primes (ordinary primes) for which the decomposition to a product of primes of extension involves higher powers of some primes of extension whereas some primes of extension are missing. These primes should be physically preferred. It could be that extensions for which the ramified primes satisfy p-adic length scale hypothesis are survivors in number theoretical fight for survival. For instance, the algebraic complexity for these extensions could be exceptionally large. The extensions of extension preserve the ramified primes so that they would be analogous to conserved genes [76].

4 Some TGD Inspired Biology

TGD inspired quantum biology relies on following general ideas.

1. The hierarchy of dark matters with levels labelled by Planck constant $h_{eff}/h = n$ makes possible macroscopic quantum coherence. The hierarchy of p-adic length scales labeled by primes $p \simeq 2^k$ defines second important hierarchy.

2. Magnetic body (MB) (see <http://tinyurl.com/lrvtwe5>) carrying dark matter act as intentional agent using biological body (BB) as sensory receptor and motor instrument and communicating with it using dark photons able to transform to ordinary photons identifiable as bio-photons. Bio-chemistry could be seen as shadow of the dynamics of MB. For instance, basic biomolecules would have analogs consisting of sequences of dark proton triplets (analog of DNA codon) realizing genetic code [73].

4.1 MB as Intentional Agent

Magnetic field associated with a given system decomposes to flux tubes and sheets so that system has magnetic body (MB). The physics of MBs could be a new chapter in physics and MB could define a basic space-time correlate for non-locality.

1. Flux tubes of MB would serve as correlates for quantum entanglement, which in TGD framework can be negentropic and for this reason rather stable under state function reductions. Magnetic flux tubes carrying monopole flux are stable since flux conservation prevents their pinching. The pairs of flux tubes with opposite fluxes can however split to two U-shaped flux tubes by reconnection. Also the reverse process is possible. Note that magnetic flux tubes are necessarily closed and can be regarded as fluxes running along different space-time sheets in opposite directions and from sheet to another through the wormhole contacts at ends.
2. Magnetic flux tubes and ME associated with them form two-sheeted structures so that flux tubes could be seen kind of waveguides for MEs. MEs carrying dark cyclotron or generalized Josephson photons would be crucial for communications from BB to MB and control of BB by MB [48, 65]. EEG would be only special case of these communications and fractal hierarchy of analogs of EEG is highly suggestive.
3. MB and dark matter at it would serve as intentional agent in biological systems [40]. The organism-environment duality is replaced by the trinity MB-organism-environment. For instance, EEG and its strong correlation with brain state and consciousness could be understood in terms of communication of sensory

data from cell membranes to MB and control and coordination signals from MB to BB [48].

Signals generated by MB (presumably) DNA would consist of dark cyclotron photons with energies $E = h_{eff}f = n \times hf$ in bio-photon energy range and thus above thermal energies. Cell membrane would generate dark (generalized) Josephson photons to communicate sensory input to MB. For instance, the recently observed synchrony between hemispheres in absence of corpus callosum [23] could be understood in terms of MB serving as “boss”.

4. The formation of flux tube reconnections would serve as a correlate for directed attention - the attention could be directed to objects of external world or to their representations in brain. The reconnection would take place for U-shaped flux tubes serving as kind of magnetic tentacles and lead to a formation of pairs of flux tubes connecting the two systems. If flux tubes carry monopole flux as one has reasons to expect, the flux tubes would be actually closed two-sheeted structures (also elementary particles would be this kind of structures) and flux tube pair would be pair of these. The flux tubes of MBs would serve as analogs of wave guides along with precisely targeted communications of dark photon signals (“massless extremals”, MEs) would be possible. Also supra currents would be possible and the TGD based model of high Tc superconductivity relies on the same mechanism [59]. These communications would be essential in living matter.
5. The magnetic field strengths are expected to have spectrum but there seems to be especially important value of magnetic field that I have called endogenous magnetic field B_{end} . The flux tubes of $B_{end} = 2/5B_E$, where $B_E = .5$ Gauss is the Earth's magnetic field would explain the findings about effects of ELF em fields on vertebrate brain in terms of cyclotron transitions [22, 59]. These flux tubes would carry dark matter. Closed magnetic flux tubes plus ions and their electric analogs (involved with bio-electrets and liquid crystals and also with cell membrane) would be fundamental electromagnetic life forms around which ordinary bio-matter self-organizes.

4.1.1 About the Dynamics of MBs

The dynamics of MBs containing dark matter would be central in quantum biology.

1. The formation of reconnections and phase transitions $n \rightarrow m$ changing $h_{eff} = n \times h$ would be one of the basic mechanisms behind biochemistry. U-shaped flux tubes would act like tentacles emerging from the system and the reconnection of the tentacles would build a connection between two systems serving as a correlate for directed attention.

The reduction of h_{eff} would shorten the connecting flux tubes and could force the systems in the vicinity of each other after which biocatalysis could take place. Braiding and its 2-braid variant for string world sheets and partonic 2-surfaces in 4-D space-time instead of strings in 3-D space would make possible realization of quantum computer program like structures.

2. The proposal [49] is that the braiding of magnetic flux tubes makes possible topological quantum computations and DNA and lipid layers of cell membrane form an ideal hardware for topological quantum computer with the braiding of flux tubes connecting lipid layers with DNA nucleotides defining the TQC programs.

Braiding provides also a universal memory storage mechanism since liquid flow induces braiding of the particle in the flow. The lipid layers of the cell membrane are indeed liquid crystals so that their flows update quantum computer programs coded by space-like braiding. Dance metaphor gives the idea: imagine dancers with threads connecting their feet to a wall. As dancers move along the parquette, their temporal dancing patterns generate a braiding of the threads representing the dance as a memory.

3. Flux tube pairs connecting two system can be superconducting. The members of Cooper pairs are at parallel flux tubes for which fluxes are in same or opposite directions. The Cooper pairs are spin triplets or singlets in these two cases. Large value of h_{eff} makes possible the needed macroscopic quantum coherence [59, 60]. This high T_c superconductivity would be crucial for life.

4. The phase transitions changing h_{eff} reduce or increase the length of the flux tube and could be responsible for the dramatic volume changes of cytoplasm. The contraction of flux tubes provides also a general mechanism allowing the reactants to find each other in bio-catalysis in the dense molecular soup. Reconnections and contractions/expansions of magnetic flux tubes make topology of the web formed by magnetic flux tubes - tensor network [75] - dynamical.
5. The binding energies of atoms are proportional to $1/h_{eff}^2$ and cyclotron energy scale to h_{eff} . This explains why metabolism is essential for life. The transformation of ordinary matter to dark matter requires energy feed and metabolic energy provides it. Also the basic mechanism of catalysis can be understood. Reacting molecules contain dark atoms. In the catalysis some dark atoms return to normal state and emit energy used to kick the reacting molecules over the potential wall. Reaction proceeds fast and after that energy is returned back and the atoms become dark again.

4.1.2 Pollack's Exclusion Zones and MB

The discovery of negatively charged exclusion zone (EZ) formed in water bounded by a gel phase has led Pollack to propose the notion of gel like fourth phase of water [7, 19, 18] (see <http://tinyurl.com/oyhstc2>).

1. This phase would correspond to negatively charged regions - EZs - with size up to 100-200 microns generated when energy is fed into the water - say as radiation, in particular solar radiation. The stoichiometry of the EZ is $H_{1.5}O$ and can be understood if every fourth proton is dark proton residing at the flux tubes of the MB assignable to the EZ and outside it [72, 70].
2. One application is a model for prebiotic cell as EZ. Dark protons are proposed to form dark nuclear strings, whose states can be grouped to groups corresponding to DNA, RNA, tRNA and amino-acids for which vertebrate genetic code is realized in a natural manner [30, 50]. The voltage associated with the system defines the analog of membrane potential, and serves as a source of metabolic energy as in the case of ordinary metabolism. The creation of dark

nuclear strings requires metabolic energy. The energy is liberated in a reverse phase transition in which dark protons transform to ordinary ones. Dark proton strings serve as analogs of basic biopolymers, and one can imagine analog of bio-catalysis with enzymes replaced with their dark analogs.

3. Pollack's EZs might for instance explain why DNA is negatively charged. EZs or their generalization could play fundamental role in metabolism with dark protons running through mitochondrial membrane. Also other biologically important ions involved would be dark. EZs could be important even in electrolysis and allow to explain what happens in cold fusion [74]. These hypothesis could be tested.
4. Water has an especially complex many-sheeted space-time structure [50] and the proposal of Andrzej Brodziak [1] is that the spring water associated with places where apparitions are claimed to have occurred plays some important role. We ourselves consist mostly of highly self-organized water and it would not be surprising if water would not have varying degree of self-organization depending on external parameters such as the structure of the local magnetic field. Perhaps highly self-organized water helps to generate the quantum entanglement.

The TGD based explanation [50] for the exceptional properties of water is that it involves besides ordinary phase also the dark phase in the temperature interval containing the physiological temperatures. The dark fraction corresponds to water molecules connected by hydrogen bonds to form molecular clusters perhaps identifiable as EZs. The magnetic tentacles of these clusters would be able to build contacts to to invader molecule and form a representation for the cyclotron frequency spectrum of the invader molecules characterizing its quantum biological effects. This would give rise to water memory. Immune system would have evolved from these representations. Also homeopathic remedies might represent the biologically active substances in this manner. If true, this would mean that medicines could be replaced with chemically harmless homeopathic remedies.

4.1.3 Magnetic Flux Tubes as Tensor Net

Some highly interesting new physics is related to the transfer of matter between different space-time sheets, in particular super-conducting ions from magnetic flux tubes of Earth's magnetic field to the atomic space-time sheets, where these currents become ohmic currents and dissipate.

1. The many-sheeted circuitry provides the basic model of homeostasis as a many-sheeted ionic flow equilibrium, and metabolism at the basic level reduces to the circulation of protons and ions between atomic space-time sheets and magnetic flux tubes. The notion of tensor network [75] realizing maximal quantum entanglement would be realized in terms of flux tubes.
2. Crucial elements of this circuitry are the bridges connecting different space-time sheets to each other, in particular atomic space-time sheets and magnetic flux tubes [50, 51]. Magnetic flux tubes are an essential element of the model of sensory representations at magnetic sensory canvas. Schumann resonances could transmit horizontal communications between brains [53] and could make possible collective shared experiences characteristic for FMA. Hypnagogic states give also rise to analogous experiences and probably involve Schumann resonances.
3. The nodes of the super-conducting circuitry formed by the magnetic flux tubes could be of special importance for phenomena involving communications with higher levels of self hierarchy. Therefore special geomagnetic features could characterize the places where apparitions can possibly occur.

4.2 Dark Photons and Quantum Biology

The hypothesis that biophotons result from dark photons by a phase transition reducing $h_{eff}/h = n$ to $n = 1$ is discussed in [68, 69].

4.2.1 Dark Photons and Biophotons

There are several proposals for the source of biophotons: for instance cell membrane [10], DNA [14], mitochondria [15], linear molecules [17], microtubules are proposed as sources of bio-photons.

The existence of several sources conforms with the universality of production mechanism. The spectrum of bio-photons is continuous, which does not favor the idea that they are induced by molecular transitions.

The TGD inspired hypothesis is that bio-photons correspond to dark cyclotron photons emitted in phase transitions of Bose-Einstein condensates of bosonic ions or of their Cooper pairs at the magnetic flux tubes.

A further assumption is that $\hbar_{gr} = \hbar_{eff} = n\hbar$ hypothesis holds true. Gravitational Planck constant $\hbar_{gr} = GMm/v_0 = (Mm/m_P^2) \times h$ (m_P denotes Planck mass) was originally introduced by Nottale [26] and suggested to explain planetary orbits as Bohr orbits. The proportionality to the masses M and m guarantees Equivalence Principle. M correspond large mass such as mass of Earth and m can correspond to the mass of particle, say electron, ion, or proton. $v_0 < c$ is a parameter with dimension of velocity.

With this assumption cyclotron energies $\hbar_{eff}QB/m = GMQB/v_0$ (Q is the charge of the charged particle) do not depend at all on the mass m of the charged particle so that the cyclotron energy spectrum is universal. Also the gravitational Compton length $\Lambda_{gr} = \hbar_{gr}/m = GM/v_0$ is universal. Macroscopic quantum gravitation would be fundamental in biology. Note that this proposal is very different from Orch-OR of Penrose and Hameroff.

The energy spectrum of dark photons would be in visible and UV and correspond to the spectrum of molecular transition energies. The phase transitions reducing \hbar_{eff} to its standard value would produce bio-photons as a kind of leakage.

Cyril Smith [8] has found that irradiation of living with extremely low frequency radiation gives rise to a radiation with much higher frequency.

1. The so called scaling law [50] predicting that high and low frequency MEs somehow accompany each other, helps to understand the situation more clearly. The scaling law is abstracted and generalized from the findings of Smith reads as

$$f_{high} = \frac{c}{v} \times f_{low} , \quad \frac{c}{v} = 2^{137-k} \times 2 \times 10^{11} .$$

Here v is some velocity parameter associated with the system transforming low frequency

waves to high frequency waves and vice versa. Also other values of v are possible. k is prime defining p-adic prime $p \simeq 2^k$, labelling the space-time sheets of the many-sheeted space-time and characterizing their sizes. $k = 137$ corresponds to the space-time sheets of atomic size and gives $c/v = 2 \times 10^{11}$. $k = 151$ corresponds to the cell membrane length scale and gives $v \simeq 6$ m/s, the phase velocity of alpha waves at the surface of skull.

2. TGD suggests a mechanism behind the scaling law: $f_{high}(k)$ corresponds to zero point kinetic energy of an ion at the space-time sheet labelled by k (p-adic prime $p \simeq 2^k$), and flow to cyclotron frequency at the magnetic flux tube of Earth's magnetic field: both these energies are inversely proportional to the mass of the ion. k refers to the space-time sheet from which the ion "drops" to the magnetic flux tube. The value of c/v is inversely proportional to the local value of Earth's magnetic field and thus varies somewhat. In the case of $k = 151$ this could explain the variation of the nerve pulse conduction velocity and EEG phase velocity.
3. These transitions could also correspond to the transitions $\hbar_{eff} = \hbar_{gr} \rightarrow h$. It is not clear whether the two mechanisms are related. One would have $f_{high}/f_{low} = \hbar_{gr}/h = c/v = (Mm/m_P^2) \times c/v_0$ giving $v = v_0 \times (m_P^2/Mm)$. Note that v might be more fundamental than v_0 . The transformation of the dark photons to bio-photons could be in question.

4.2.2 Interactions of Ordinary and Dark Photons

Pair of flux tube and ME as space-time correlate for the interaction. One can imagine a great variety of different kind of interaction of ordinary and dark photons with matter and dark matter. I will use the notation $n = \hbar_{eff}/h$ in the following. The following mechanism could be called metabolic.

1. Ordinary photons can provide the energy needed to transform ordinary atoms or cyclotron states to their dark variants. The basic function of metabolism could be generation of dark matter in this manner. More general process would be the increase $n_i \rightarrow n_f$ induced by dark photons.

These states could decay back to state with $n_i < n_f$ by emitting dark energy. This could be basic mechanism of bio-catalysis allowing to overcome the potential wall preventing the reaction to occur swiftly.

2. Cyclotron transitions for the dark charged particles at the magnetic flux could be induced by ordinary or dark photons and lead to a population reversal. Energies are proportional to n and therefore above thermal energy for sufficiently large n . Population reversed state can decay to the state with lower energy by a phase transition producing dark photons. Also other than cyclotron states can be considered. Also dark photons could decay to n ordinary photons inducing population reversal for ordinary states.

For instance, one can imagine also more exotic option in which dark photon radiation “kicks” super-conducting ions to a larger dark space-time sheet or that the space-time sheet expands being scaled by n_f/n_i . The reversal of the process emits dark photons. The ions having large zero point kinetic energy at space-time sheet with larger scale can “drop” back to high n cyclotron states at the magnetic flux tubes and decay by emitting a large number of ELF photons.

3. In ZEO negative energy dark photons propagating and dissipating in reverse time direction are possible. This could give rise to remote metabolism which I have called also quantum credit card mechanism [51]. The system that needs metabolic energy can send negative energy signal (phase conjugate laser beam would be example of this) to a source of energy analogous to population reversed laser.

One can imagine also other interaction mechanisms.

1. The value of $p \simeq 2^k$ can change inducing a change of p-adic length scale by factor $2^{-k/2}$ and also the value of n can change such that $n_f/n_i = 2^{k/2}$. No net change of size scale would take place. Zero point kinetic energy is $\hbar_{eff}^2/2mL_p^2$ is invariant under change of h_{eff} whereas p-adic scaling increases it by factor 2^k so that this transition requires energy feed. The reverse transition involving reduction of

h_{eff} and increase of p-adic length scale liberates energy as one can indeed expect.

2. Ordinary photons can experience phase transition to dark photons with the same energy: dark photon is n -sheeted consisting n effectively n photons with $1/n$ -fractional quantum numbers.

4.2.3 Dark Photons and Remote Mental interactions

TGD based model of remote mental interactions is discussed in [61]. The model is based on the notion of negentropic entanglement (NE) [55] having as a geometric correlate the formation of magnetic flux tubes. Many-sheeted space-time (see <http://tinyurl.com/mf99gpv>) makes in principle entanglement possible in even astrophysical time scales. Also time-like entanglement is possible and could be involved with quantum mirror mechanism of long term memory [64] as analog for seeing in time direction (ZEO is essential here). Essential is also the notion of adjunct serving as a kind of relay station entangling any two subjects during remote mental interaction, say healer and healee, and inducing sharing and fusion of mental images and making possible also classical communications. An object possessed by the healer or healee is one example of an adjunct.

The classical signals are associated with pairs formed by flux tubes and MEs having a length, which is a multiple of the wavelength of the radiation involved and therefore the frequencies involved are typically ELF frequencies. Human intention and attention could be able to generate dark magnetic flux tubes accompanied by dark microwave MEs giving rise to the bonds between the systems involved.

Brain and body generate microwaves (GHz frequency scale corresponds to protein and DNA conformational dynamics and water's rotational transitions), and the intention could be remotely realized also using these microwaves. The problem is to understand how ELF MEs and microwave MEs are related to each other. Fractal hierarchy of flux tubes within flux tubes and associated MEs is suggestive.

4.2.4 Dark Photons and Healing

How dark photons could be involved with healing? The simplest form of disease is that some part of

body does not receive metabolic energy so that dark matter degenerates to ordinary dead matter, loses quantum coherence, and does not self-organize anymore. One can also imagine more complex forms of illness such as those with genetic origin and due to the failure of the tensor network formed by flux tubes. For instance, some connections could be missing. In particular, communications to and control by some layer of magnetic body (MB). The depression caused by lack of Lithium could be due to the lack of dark cyclotron photons at cyclotron frequency of Li so that the control by MB is lost [52].

For the simplest form of disease the challenge is revival of the body part by getting a local feed of metabolic energy needed to transform some matter to dark matter. Healing in the simplest form would provide metabolic energy. This energy could arrive as dark photons along dark flux tubes from healer, from the MB of healer, or some other MB.

In [50] it is proposed that the magnetic bodies for clusters of water molecules can mimic the cyclotron energy spectrum of various molecules as spectrum of cyclotron frequencies of their own MB, and that the ability to reproduce the cyclotron frequency spectrum of the medicine molecule is an essential element of homeopathic healing. The level of self-organization of water would thus be measured by how complex mimicry it is able to perform. How dark cyclotron photons with energy above thermal threshold could transform to ordinary photons with say energies in microwave range assignable to molecular conformational degrees of freedom and rotational spectrum of water molecules?

1. Cyclotron photon associated with electron is about 6×10^5 Hz for $B_{end} = .2$ Gauss. To get photons with frequencies in microwave range .3 -300 GHz one should have magnetic field in the range .01-10 Tesla. The upper bound is unrealistically high.
2. If $h_{eff}/h = n$ has integer m as a factor, dark cyclotron photon can decay to a bunch of dark of m dark photons with $h_{eff}/h = n/m$. In particular, dark photon with energy in bio-photon range and frequency in microwave range can decay to a bunch of ordinary microwave photons. Dark cyclotron photon decaying to m dark photons with energy of cyclotron photon and transforming to ordinary photon with energy of microwave photons could produce

microwave photons. Dark cyclotron photons would thus provide a rather general mechanism of metabolism with quantized metabolic energies.

4.3 Plasmoids as Primitive Life Forms

The view about MB as intentional agent carrying large h_{eff} dark matter leads naturally to the view that plasmoid structures consisting of closed magnetic flux tubes plus atomic space-time sheets containing plasma ions represent primitive life forms. All life forms metabolize since energy is needed to increase h_{eff}/h creating phases of dark matter. Ordinary bio-matter is assumed to self-organize around plasmoids and nerve circuit could represent an example of a structure resulting in this manner.

Plasmoids from outer space could leak into the magnetosphere mostly through pole gaps, where the magnetic field of Earth is weak: elsewhere magneto-pause serves as a magneto-immune system, which does not allow the penetration of the external magnetic life forms to compete about energy sources. In accordance with magneto-immune function, planetary magnetospheres are known to be self-organizing structures and the fact that Mars does not possess magnetosphere might relate to the disappearance of Martian life. Also the magnetic field of Earth is getting weaker and the change of the polarity expected to occur within two thousand years might have rather dramatic consequences for the life as we know it.

Plasmoids, being extremely light structures, could easily follow the energy beam flowing from the spot of tectonic activity, and the random variation of the beam direction could explain the random butterfly like motion of UFOs often observed and very difficult to understand if UFOs are structures built of steel and copper. The strange apparent motion assigned with Sun in the case of Sun miracle might allow interpretation as an example of this kind of rapid random motion of plasmoid possible following microwave beam of tectonic or some other origin.

Also plasmoids need energy feed to self-organize. Plasmoids could populate magnetosphere and only wait for energy sources to self-organize. The basic metabolic mechanism would be the same as in the case of living matter [51]. The feed of micro-waves could induce a primitive metabolic cycle. The fol-

lowing is just one guess amongst many and besides microwaves also waves with other wave-lengths can be involved.

1. Microwave photons (in particular) could provide the metabolic energy by kicking ions and also atoms, and even molecules to dark flux tubes and transform them to dark ions. One can also imagine that plasmoids generate partially their “microwave food” (also other frequencies are possible) themselves via the cyclotron transitions of electrons. This would require that the magnetic flux tubes in question carry a magnetic field of about .2 Tesla: the p-adic length scale in question corresponds to the thickness of the cell membrane. Solar convective zone contains magnetic fields with this strength.
2. Dark ions could “drop” from the magnetic flux tubes and transform to ordinary ions at atomic or some other space-time sheets, where they dissipate and induce ionization and UV and visible light possibly identifiable as bio-photons and then “drop” back to the magnetic flux tubes. If the intensity of the magnetic field is about .2 Tesla, which by the quantization of magnetic flux, corresponds to p-adic prime $k = 157$ and p-adic length scale of 80 nanometers), electronic cyclotron transitions generate microwaves with frequency of about 2.4 GHz and the system can thus generate its “food” itself.
3. Microwaves can also “kick” ions from magnetic flux tubes to $k = 151$ space-time sheets since the zero point kinetic energies for $k = 151$ correspond to microwave frequencies. It seems that the process involves at least the following space-time sheet: $k = 137$ (atomic), $k = 151$ (cell membrane), $k = 157$, and $k = 169$ (magnetic flux tubes of Earth’s magnetic field). UFOs are often observed near the lines of the tectonic activity could represent this kind of life form using the energy of microwaves of tectonic origin (quartz crystals are piezo-electrics and can amplify wide range of microwaves) as their “food” and therefore following the microwave beam emanating from the spot of tectonic activity. Also the UFO like structures associated with the FMA could be plasmoid like life forms.

The role of water making possible Pollack’s EZs could be also essential. The realization of genetic code at magnetic flux tubes in terms of 3-proton units could be predecessor of the chemical realization of genetic code [73].

5 Model for FMA

One can build a model of FMA using the above described view about TGD, TGD inspired theory of consciousness, and TGD inspired quantum biology. In the case of FMA the interaction of dark photons with various frequencies would generate entanglement between the brains of people seeing the visions and the conscious entity “Marian” representing mental image in collective consciousness. Plasmoid like life forms could serve in the role of medium connecting humans with “Marian”. Same mechanism applies to UFO and ET experiences in general.

There are strong resemblances between TGD based models for UFO experiences, NDE experiences and FMA. Also in the case FMA structures, which might have been interpreted as UFOs in our cultural context appeared and even “Marian” could have been interpreted as UFO in modern cultural context.

The TGD based model of UFO experiences discussed in [53] involves in an essential manner quantum entanglement between conscious electromagnetic entities (plasmoids), and unifies Persinger’s theories [24] with the view that ETs are real, although not in the sense usually thought. Plasmoids could be seen as advanced counterparts of space ships having a rather ghostly crew consisting of mental images (sub-selves) entangled with the magnetosphere of some distant astrophysical object serving as its tele-sensory system and able to entangle also with the person having UFO experience. Translating directly to this case this would mean that plasmoid like structure in the vicinity of the apparition place would have served as kind of relay station entangling with both seer and entity “Marian”, which could have been even extraterrestrial intelligence (for more detailed mechanism see [67].

5.1 FMA as Interaction between Collective Level of Consciousness and Humans

In TGD universe any system has besides the visible, physical, body also field/magnetic body (see <http://tinyurl.com/n3sghcs>), which has much larger, actually astro-physical size - at least in case of species possessing EEG. Personal sensory representations would be realized at the personal MB having layers with astrophysical size and fusing third person view and first person view as aspects of consciousness.

Second type of sensory representations (collective levels consciousness) would be realized at the dark part of Earth's magnetosphere and would give rise to multi-brained electromagnetic selves representing collective levels of consciousness. Amazingly, plasma sheet at the night-side of Earth's magnetosphere is known to be a highly self-organizing structure and the ionic velocity distributions represent features like "eyes" and "wings" [20].

Even religions could represent to collective levels of consciousness having a rich repertoire of collective mental images like Virgin Mary and saints. The simplest working hypothesis is therefore that the entity "Marian" is a genuine conscious entity - self - at a higher level of self hierarchy. In TGD framework any self defines a mental image of a higher level self having it as a sub-self.

"Marian" could communicate with humans using quantum entanglement making possible telepathic sharing and fusion of mental images. Plasmoid could have served as a kind of medium, relay station. Even an identification as an extraterrestrial entity becomes possible since the entanglement between flux tube ends does not depend on distance.

The TGD view about sensory perception is that we build our perceptions in terms of standardized mental images with a lot of feedback from brain - during dreams this feedback dominates. Therefore the visualization as Virgin Mary could reflect only the cultural background: nowadays the interpretation might be in terms of UFO or ET.

5.2 The Mystery Of The Buzzing Sound

The witnesses of FMA report buzzing sounds like bees in a vase [2].

5.2.1 Various Effects Related to the Microwaves

Very wide range of frequencies ranging from the frequencies of visible photons down to EEG frequencies and even below them (as the existence of slower biorhythms suggests) are expected to be of significance in biology. Microwaves frequencies correspond to the energy scale associated with conformational states of biomolecules and therefore one expects that it is of special importance.

Microwave photons have energies below thermal energy at physiological temperatures. This leads to ask whether part of microwave photons could be dark photons at energies above thermal energy, perhaps even in bio-photon energy range (visible and UV). Can one imagine that the conformational degrees of freedom are dark? Or should one assume that dark microwave photons decay to a bunches of ordinary microwave photons thus causing a large effect on ordinary matter?

Microwaves span the wavelength range 1 mm - 10 cm corresponding to the frequency range 300-3 GHz. There is support for the importance of microwaves for living systems coming from various anomalous phenomena involving microwaves. The buzzing sound might relate to several other strange sound phenomena like meteor sounds, taos hum, and physiophonic sounds. These exotic sound phenomena are discussed in [52].

1. A strange finding supporting the TGD view about sensory representations is that, contrary to expectations, the sounds generated by em fields of meteors have fundamentals around 40 Hz thalamocortical resonance band responsible for sensory representations [21]. This sound is like "pop", not buzzing. Microwaves modulated by ELF frequencies in the range 200 to 400 Hz are known to produce buzzing sounds.
2. Taos hum [16] is a strange phenomenon which might relate to the microwave audition. No source for this sound, which has frequency spectrum in the range 40-80 Hz, has been identified. Buzzing sound is also sometimes associated with taos hum. If the buzz has the character of taos hum, this would require that sounds heard also by the witnesses were endogenous and not recordable by microphones. There is strong correlation between taos hum and so

called microwave static having poorly understood biological origin [16] suggesting that microwave static is modulated by ELF frequencies.

3. Physiophonic sounds are endogenous sounds produced by electric stimulation of skin. One can transform speech to electric signals applied to skin and experienced as comprehensible speech. Physiophonic sounds are probably closely related to taos hum.
4. Microwave hearing [11] is a phenomenon in which microwaves in the frequency range .3-300 GHz (wavelength range [1 , .1] m) induce a hearing sensation. There is evidence that ears are not involved with the microwave hearing [9]. The average pressure of the radar wave at the threshold of hearing is roughly three orders of magnitude less than the average pressure of a sine wave in air at the threshold of hearing air waves. Second, the location of the most sensitive area for hearing radar is remote from the ears, on top of the head. Third, the subjective frequency spectrum seems to include higher frequencies for radar hearing than for normal hearing of air waves. Fourth, the direction from which sound seems to come does not change as the head is turned about in the radar field.
5. Microwaves in GHz range are also found to be involved with water memory [8]. According to Smith microwave frequencies are accompanied by ELF frequencies such that the high and low frequencies f_{high} and f_{low} are related by the scaling law to be discussed later. A possible explanation is in terms of a phase transition transforming dark ELF photons to microwave photons so that the ratio $f_{high}/f_{low} = h_{eff,f}/h_{eff,i} = n_f/n_i$.
6. The proposal of Joaquim Fernandez [2] that microwave hearing would also explain the strange buzzing sounds reported by the witnesses of the FMAs serves as a clue also in the TGD based model of this phenomenon. Dark photons could also transform to ordinary microwave photons and induce the effects associated with the microwaves.
7. UFO experiences are often associated with the lines of the tectonic activity could represent this kind of life form using the energy of microwaves of tectonic origin (quartz crystals are piezo-electrets and can amplify wide range of microwaves) as their “food” and therefore following the microwave beam emanating from the spot of tectonic activity. Also the UFO like structures associated with the FMA could be plasmoid like life forms.
8. Microwaves radiated in the conformational transitions of proteins and possibly amplified by the rotational transitions of water molecules and clusters of them mimicking the rotational spectra of molecules generate bridges connecting super-conducting space-time sheets and atomic space-time sheets and thus sustain the dynamical circuitry. If some protein fails to be expressed genetically, this implies the absence of certain microwave frequencies so that corresponding bridges are not present and erratic functioning of the current circuitry result. Medicines and homeopathic remedies in which water clusters mimic the rotational spectrum of the medicine molecules generate the microwave spectrum of the proteins, which are not expressed.

5.2.2 Microwave Hypothesis

It has been proposed [2] that microwave audition [11] could be involved with the buzzing sounds assigned FMA. There exists a standard physics explanation for microwave audition based on thermal effects caused by microwaves inducing small pressure pulses [11]. This explanation is however far from being established and TGD suggests an alternative mechanism.

According to [2] French and Canadian researchers have found interesting results using a source of microwaves on the subject's heads: one of the sounds

type heard was a “buzzing”. The source was between 200 and 3000 MHz with a mean intensity of from 0.4 to 2 mW/cm² to a density level of above 300 mW/cm². The modulating frequencies ranged from 200 to 400 Hz. According to [2], the insect sounds resulting from the motion of wings could be put between that interval. An order of magnitude for the resonance frequency of body guessing the sound velocity to be $v = 300$ m/s in body and body to have a size of order $L = 1$ m is $f \sim v/L = 300$ Hz. Microwaves could correspond to microwave static of biological origin [16] or be generated by plasmoid like structures.

Microwaves has been proposed as an explanation for the other physical effects reported in FMA, namely those associated with the so-called Sun miracle when the people saw the “Sun” turning around itself and produce a heat wave that dry the soil that moments before has been wet by a sudden rain, as well the clothes of people in the spot, also wet. The problem with this explanation is that microwaves with the required intensity might have had drastic physiological effects: there is no known evidence for this.

What ever the explanation of the buzzing sound is, it must involve modulation at ELF frequencies. This suggests that microwaves modulated by ELF frequencies (say EEG frequencies) are in question. A possible TGD inspired explanation is that microwave photons were dark and emerged from dark ELF photons emitted a plasmoid like structure playing the role of a “medium”.

1. At space-time level this translates to the picture about microwave flux tubes + MEs within ELF flux tubes + MEs. Any transformation of dark ELF photon to m dark photons $n_i \rightarrow n_f = n_i/m$ is possible and could have produced both visible bio-photons and dark microwave photons. The ELF frequencies could be in the range 200-300 Hz. Note that 330 Hz corresponds to the cyclotron frequency of proton in magnetic field $B_{end} = .2$ Gauss. From $f_{high}/f_{low} = n_i/n_f$ the ratio n_f/n_i would have varied in the range $10^6 - 1.5 \times 10^9$.
2. The transformation of the microwave photons to bio-photons at visible and UV range could have caused the visual sensations (Sun turning around). Dark microwave photons could have interacted with water causing its evaporation

and drying of the soil (similar interaction could take place in microwave oven and in the “burning” of water subject to microwaves [13]).

Why the buzzing sound was heard only when Maria talked with closed lips? Facial expression is important part of communications, especially so when one cannot speak loudly. Did dark ELF photons transformed to dark microwave photon inducing the buzzing sound rather than to visible bio-photons inducing the visual sensation about moving lips.

5.3 Connection with Schumann Resonance?

Schumann resonance associated with the Earth’s MB could be important for collective consciousness and allow fusion of personal magnetic bodies to a larger structure.

One possibility is that microwave hearing involves the “dropping” of ions from $k = 151$ cell membrane space-time sheet and liberation of zero point energy as microwaves propagating along EEG MEs. This space-time sheet could be also subject to expansion reducing the value of zero point kinetic energy. This might allow to understand the connection with the Schumann resonance at 7.8 Hz in alpha band.

1. As a cavity resonance Schumann resonance prevails in the entire Earth size scale, and is in TGD based model of magnetospheric sensory representations responsible for horizontal communications between different brains, and more generally, between various conscious entities. For instance, during hypnagogic alpha band dominates and could by the sharing of mental images give rise to the strange experiences in which one experiences of being another person. Alpha band is also associated with creativity: perhaps our ideas are not completely ours.
2. The velocity parameter v predicted by the scaling law of homeopathy for $k = 151$ (cell membrane space-time sheet) is the velocity of alpha waves at the surface of skull which suggests that alpha waves are generated in the process. For K^+ and Cl^- ions cyclotron frequencies are 7.5 Hz and 8.5 Hz respectively and near to Schumann frequency and these ions are important for brain functioning: their cyclotron

radiation could resonate with Schumann resonance (note that the local value of Earth's magnetic field in brain could be subject to homeostatic control). Thus the "dropping" of these ions from cell membrane space-time sheet could be crucial for the quantum entanglement with "Marian".

5.4 Some Special Features Assigned with FMA

The special features assigned with FMA deserved a discussion.

1. Healings and water with special healing properties have been also associated with Marian apparitions [1]. The model of healing based on the feed of metabolic energy inducing phase transitions generating dark matter could allow to understand why spring water with special healing properties seems to be a correlate of apparition places [1].

The energies for the needed transitions are expected to in a wide range. From molecular transition energies in bio-photon range down to microwave energies assignable to conformational transitions of molecules and rotational energies of water molecules. Although the cyclotron frequencies are much below the microwave range, the decay of dark cyclotron photons to a bunch of dark photons with the energy of microwave photons and transforming to ordinary photons would allow feed of ordinary microwave photons perhaps inducing the generation of dark matter.

2. The mysterious "angel hair" might have emerged as ions from magnetic flux tubes flew to atomic space-time sheets in the transformation of dark matter to ordinary matter.

Perhaps the process creates chemical compounds in molten state which then cool and solidify. Hair like appearance might reflect the geometry of magnetic flux tubes (whose thickness is about 2.5-5 micrometers for Earth's magnetic field). Many crop formations are known to contain magnetized iron [5] as well as small glass balls consisting of SiO_2 , that is quartz [3]. Meteoric iron could come from the ionosphere along magnetic flux tubes. Si ions or quartz could flow along magnetic flux tubes

from the spot of the tectonic activity to the plasmoid, and become heated to high temperature when entering to atomic space-time sheets and colliding with oxygen atoms of the atmosphere. This in turn would give rise to glass balls. An analogous mechanism might be give rise to "angel hair".

3. There is also anecdotal evidence for "vehicles". Maybe the visual percept about plasmoid was completed by sensory feedback to something familiar, which was "vehicle". .

There are those who believe UFOs are real objects rather than self-organization patterns created by (possibly dark) irradiation from a region of tectonic activity. The reduction of effective gravitational mass of a spinning magnetic system has been reported [6]. TGD allows to consider a mechanism causing this reduction and these objects are predicted to be accompanied by plasma [71]. One can of therefore play with the idea that some UFOs are some kind of space crafts and maybe even the vehicles observed by witnesses in the case of Marian apparition.

Personally I do not believe that higher civilizations would bother to use this kind of primitive technology if quantum entanglement allowing telepathy and classical communications in both time directions allowing to circumvent the barrier due to finite light velocity are available.

6 Appendix: a Little Glossary

Topological Geometrodynamics (TGD): TGD can be regarded as a unified theory of fundamental interactions. In General Relativity space-time time is abstract pseudo-Riemannian manifold and the dynamical metric of the space-time describes gravitational interactions. In TGD space-time is a 4-dimensional surface of certain 8-dimensional space, which is non-dynamical and fixed by either physical or purely mathematical requirements. Hence space-time has shape besides metric properties. This identification solves the conceptual difficulties related to the definition of the energy-momentum in General Relativity. Even more, sub-manifold geometry, being considerably richer in structure than the abstract manifold geometry behind General Relativity, leads to a geometrization of known fundamental

interactions and elementary particle quantum numbers.

Many-sheeted space-time, topological quantization, quantum classical correspondence (QCC): TGD forces the notion of many-sheeted space-time (see <http://tinyurl.com/mf99gpv>) with space-time sheets identified as geometric correlates of various physical objects (elementary particles, atoms, molecules, cells, ..., galaxies, ...). Quantum-classical correspondence (QCC) states that all quantum notions have topological correlates at the level of many-sheeted space-time.

Topological quantization: Topological field quantization is one of the basic distinctions between TGD and Maxwell's electrodynamics and GRT and means that various fields decompose to topological field quanta: radiation fields to "topological light rays"; magnetic fields to flux tube structures; and electric fields to electric flux quanta (electrets). Topological field quantization means that one can assign to every material system a field (magnetic) body, usually much larger than the material system itself, and providing a representation for various quantum aspects of the system.

Strong form of holography (SH): SH states that space-time surfaces as preferred extremals can be constructed from the data given at 2-D string world sheets and by a discrete set of points defining the cognitive representation of the space-time surface as points common to real and various p-adic variants of the space-time surface (intersection of realities and various p-adicities). Points of the cognitive representation have imbedding space coordinates in the extension of rationals defining the adele in question. Effective 2-dimensionality is a direct analogy for the continuation of 2-D data to analytic function of two complex variables.

Zero energy ontology (ZEO): In ZEO quantum states are replaced by pairs of positive and negative energy states having opposite total quantum numbers. The pair corresponds to the pair of initial and final state for a physical event in classical sense. The members of the pair are at opposite boundaries of causal diamond (CD) (see <http://tinyurl.com/mh9pbay>), which is intersection of future and past directed light-cones with each point replaced with CP_2 . Given CD can be regarded as a correlate for the perceptive field of conscious entity.

p-Adic physics, adelic physics, hierarchy of Planck constants, p-adic length scale hypothesis: p-Adic physics is a generalization of real number based physics to p-adic number fields and interpreted as a correlate for cognitive representations and imagination. Adelic physics fuses real physics with various p-adic physics ($p = 2, 3, 5, \dots$) to adelic physics. Adele is structure formed by reals and extensions of various p-adic number fields induced by extensions of rationals forming an evolutionary hierarchy. Hierarchy of Planck constants corresponds to the hierarchy of orders of Galois groups for these extensions. Preferred p-adic primes satisfying p-adic length scale hypothesis $p \simeq 2^k$, are so called ramified primes for certain extension of rationals appearing as winners in algebraic evolution.

Quantum entanglement, negentropic entanglement (NE), Negentropy maximization principle (NMP): Quantum entanglement does not allow any concretization in terms of everyday concepts. Schrödinger cat is the classical popularization of the notion (see <http://tinyurl.com/1pjcjm9>): the quantum state, which is a superposition of the living cat + the open bottle of poison and the dead cat + the closed bottle of poison represents quantum entangled state. Schrödinger cat has clearly no self identity in this state.

In adelic physics one can assign to the same entanglement both real entropy and various p-adic negentropies identified as measures of conscious information. p-Adic negentropy - unlike real - can be positive, and one can speak of negentropic entanglement (NE). Negentropy Maximization Principle (NMP) states that it tends to increase. In the adelic formulation NMP holding true only in statistical sense is a consequence rather than separate postulate.

Self, subself, self hierarchy: In ZEO self is generalized Zeno effect. At the passive boundary nothing happens to the members of state pairs and the boundary remains unaffected. At active boundary members of state pairs change and boundary itself moves farther away from the passive boundary reduction by reduction inducing localization of the active boundary in the moduli space of CDs after unitary evolution inducing delocalization in it. Self dies as the first reduction takes place at opposite boundary. A self hierarchy extending from elementary particle level to the level of the entire Universe is predicted. Selves can have sub-selves which they experience as mental images. Sub-selves of two sep-

arate selves can quantum entangle and this gives rise to fusion of the mental images and the fused mental image is shared by both selves.

Sensory representations: The separation of data processing and its representation is highly desirable. In computers processing of the data is performed inside CPU and representation is realized outside it (monitor screen, printer,...). In standard neuroscience it is however believed that both data processing and representations are realized inside brain. TGD leads the separation of data processing and representations: the “manual” of the material body provided by field (or magnetic) body serves as the counterpart of the computer screen at which the sensory and other representations of the data processed in brain are realized. Various attributes of the objects of the perceptive field processed by brain are quantum entangled with simple “something exists” mental images at the MB. The topological rays of EEG serve as the electromagnetic bridges serving as the topological correlates for this entanglement.

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