

# A model for remote mental interactions

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### Abstract

TGD inspired theory of consciousness together with the notion of many-sheeted spacetime leads to a theory of biosystems as macroscopic quantum systems. Quantum control is based on many-sheeted ionic flow equilibrium: the densities of the superconducting ions control the densities of the ions at atomic spacetime sheets, and are in turn controlled by 'massless extremals' (MEs) distinguishing TGD sharply from Maxwell's electrodynamics. 'MEs' are topological field quanta of the classical radiation fields and ideal for both classical and quantum communications. The hypothesis of topological self-referentiality stating that the topological field quanta of classical fields form a symbolic representation for the system's properties (system contains in its own structure a theory about system) provides a strong interpretative tool. For instance, bound state entanglement is represented by negative energy MEs and the generation of macroscopic bound states essential for the binding of the mental images is accompanied by the liberation of the binding energy as a usable energy. Hence the ability of the system to behave as a single coherent whole and nonlocal quantum metabolism are different sides of the same coin.

MEs and magnetic flux tube structures seem to provide a royal road to the understanding of living systems as macroscopic quantum systems. The pairs formed by MEs and magnetic flux tubes define 'magnetic mirrors' serving as electromagnetic bridges between systems (not only living ones). By fractality, magnetic mirrors provide a common mechanism allowing to understand seemingly totally unrelated phenomena occurring at widely differing length scales. At molecular length scales miracle like molecular recognition mechanisms could be based on MEs serving as electromagnetic bridges between the molecules: the molecules recognizing each other

would 'sing in tune' electromagnetically. In TGD framework sensory representations are realized outside brain in terms of magnetic mirrors and 'EEG MEs' are very closely related to this realization. The model of long term memories relies on magnetic mirrors: to remember what happened for a year ago is to look at a magnetic mirror at the distance of half light year. This mechanism gives rise to memories in entire hierarchy of time scales, even water memory could be conscious and realized in this manner. The transformation of p-adic ME to a real one in quantum jump provides a candidate for the transformation of intention to action and is a crucial element of remote mental interactions.

Magnetic mirrors can also serve as bridges between different brains, organisms, and also between living and nonliving systems. This provides a general mechanism for remote mental interactions like hypnosis, telepathy, remote healing, remote vision, identification phenomena, and psychokinesis. Magnetic mirrors make possible sharing of mental images and telepathy. Magnetic mirrors make also possible feedback so that the active participant (say the healer or the sender of a telepathic message) can gradually learn how to generate the desired effect. The role of the medium is to act as a relay station to which the audience and the sender of the message are connected by magnetic mirrors. The role of medium can be also taken by 'adjunct', an object owned by a healer or healee.

KEYWORDS: quantum jump, entanglement, p-adic numbers, many-sheeted spacetime, superconductivity, massless extremal, magnetic mirror.

## 1 Introduction

During years I have developed several ideas about paranormal phenomena and, believing that there must be very few general principles behind these phenomena, I try to combine these ideas into a single coherent conceptual framework in this article. The background can be found in the four books about Topological Geometro-dynamics (TGD) [28, 29, 30, 31] at my homepage. For the convenience of the reader it is good to summarize the evolution of the basic concepts briefly.

### 1.1 Progress on understanding of quantum biology

a) On the experimental side the most important boosts have come from the work of Blackman and others relating to the effects of ELF em fields on living matter [9, 14], from the lecture of Cyril Smith about homeopathy in CASYS'2001 conference [38], and from the contact with Lian Sidoroff and from reading her articles related to remote vision and healing [39]. Also the work of Peter Gari-aev's group on wave aspects of DNA [23] was important for the concretization of the ideas. Of course, without the already existing view about living matter as symbiosis of MEs (massless extremals, topological 'light rays'), superconducting magnetic flux tubes and ordinary biomatter at atomic spacetime sheets, which was inspired the information about effects of ELF em fields on brain [14] and by the strange findings challenging the notions of ionic pumps and channels [33], these developments would not have been possible.

b) One of the latest steps of progress was the understanding of energy metabolism (see the chapter "Macroscopic quantum coherence and quantum metabolism as different sides of the same coin" of [31]): living matter literally eats hydrogen ions. The dropping of protons from atomic spacetime sheet to magnetic flux tubes and kicking them back by using metabolic energy is how biosystems circulate energy in TGD universe. The notion of many-sheeted spacetime resolves the paradoxal findings related to ATP molecules, ionic pumps and ionic channels. A model for molecular machines as machines whose moving parts move at the cold spacetime sheets where dissipative effects are absent, emerges. The theory is surprisingly successful quantitatively: the liberated metabolic energy when single ATP molecule is used is predicted correctly; the value of the

threshold value of the membrane resting potential can be understood: the ratio of co-existing high and low imprinting frequencies is predicted correctly; etc...

c) The lectures of Peter Marcer about quantum holographic brain provided an important stimulus leading to the realization that MEs serve among other things also as quantum holograms. The ideas about magnetic mirrors (ME-parallel magnetic flux tube pairs) acting as electromagnetic bridges between living subsystems and about liquid crystal blobs representing and amplifying the rotational, vibrational, etc. spectra of molecules, are the most recent newcomers in the zoo of ideas.

## 1.2 Progress on theoretical side

The progress at the purely conceptual side has been of utmost importance for the development of concrete models.

a) The realization that p-adic physics provides the physics of cognition and intention was a decisive breakthrough. The realization that the notion of psychological time leads to paradoxes unless one assumes that psychological time corresponds to the spacetime region at which macroscopic volition is concentrated: this front of volition proceeding in the direction of future is where the p-adic-to-real phase transition changing intention to macroscopic action dominantly occurs. Psychological time must be also common to me and my fellow human beings, probably for entire biosphere: otherwise strange paradoxes result.

b) Topological self reference means that topological field quanta, in particular MEs, provide a representation for the properties of the material system (system contains in its structure representation of system itself). One implication is that the formation of bound states involves generation of negative energy MEs and that formation of bound states giving rise to coherent wholes is accompanied by a liberation of usable energy: this means effective over unity energy production and there is even evidence that buy no-pay later mechanism is at work at the brain level. The quantum entanglement made possible by ME can be also regarded as a quantum counterpart of a link in web: the first guess is that the transmission of nerve pulse to a postsynaptic cell is like a transmission of email message containing conscious links to other parts of brain so that web would actually mimic what happens in brain.

c) Besides classical signalling with light velocity quantum entanglement (also timelike entanglement by the non-determinism of the fundamental variational principle determining the geometry of the configuration space of 3-surfaces) mediated by MEs is key element of model and makes possible fusion and sharing of mental images. Besides remote mental interactions this mechanism is necessary for generation of social structures and genuine communication. The mechanism is at work already at molecular level allowing cells and neurons to have shared mental images and to co-operate as conscious entities.

d) The theory of sensory representations has also developed rapidly and means perhaps the most radical departure from the standard neuroscience. Magnetic sensory canvases, both personal and magnetospheric, serve as monitor screens at which sensory representations are realized. The size of the magnetic sensory canvases is measured using Earth size as a natural unit. The theory of the magnetospheric sensory representations leads to a mapping of EEG bands and brains structures to the structures of magnetosphere (see the chapter "Magnetospheric sensory representations" of [31]).

## 1.3 Overall view

The resulting concrete view is that living organisms at all levels of the hierarchy are connected by the magnetic mirrors serving as electromagnetic bridges between them and making possible high precision directed communication, remote sensing, sensory representations using magnetic sensory canvas, memory as communication between the geometric past and geometric now, and remote

control. Even the claimed communications with deceased can be seen as being based on the same mechanism as long term memory. By fractality the same basic mechanisms are at work in all length scales: water memory and our long term memory represent same phenomenon but in different time scales. Similarly, the miraculous molecular recognition mechanisms and remote healing and vision are also phenomena based on the same basic mechanisms.

In the sequel possible implications for the understanding of the paranormal phenomena will be discussed.

a) I propose a general vision about the mechanisms behind the paranormal phenomena based on the ideas briefly summarized. This involves a more precise view about self hierarchy and psychological time, the fusion and sharing of mental images by quantum entanglement, p-adic physics as the physics of cognition, imagination and intention, and the notion of magnetic mirrors.

b) The notion of magnetic sensory canvas is discussed in a rather detailed manner and experimental support and tests for various notions are discussed.

c) A general model for remote mental interactions is proposed. The model applies to parapsychological phenomena like extrasensory perception, precognition, psychokinesis, near-death experiences, and communications between living and dead. In accordance with the fractality of consciousness the model applies to phenomena like molecular recognition.

## 2 Concepts and ideas crucial for the model of paranormal phenomena

In the following I summarize basic aspects of TGD inspired theory of consciousness relevant to the paranormal phenomena. The basic philosophy behind TGD inspired theory of consciousness is crucial for the model but I discuss it only briefly here. Material about the underlying philosophy (neither monistic nor dualistic but 'tripartistic') can be found in the chapter "Matter, Mind, Quantum" of [30].

### 2.1 Quantum jump between histories as moment of consciousness and self as a subsystem able to remain unentangled

The basic notions of TGD inspired theory of consciousness are quantum jump between quantum histories (rather than time=constant snapshots of single quantum history) as moment of consciousness, and the notion of self as subsystem able to remain unentangled in subsequent quantum jumps (see for instance the chapters "Matter, Mind, Quantum" and "Self and Binding" of [30]).

Each quantum jump replaces the solution of field equations (universe) with a new one. Quantum jump involves three steps: the unitary time development  $U$  giving rise to the S-matrix summarizing quantum physics as it is understood by particle physicist, the counterpart of state function reduction, and state preparation. Both state function reduction and preparation cease to be phenomenological concepts in TGD framework. The sequence of quantum jumps defines subjective time whereas geometric (or physicist's) time corresponds to the fourth spatial coordinate. The distinction between these times allows to resolve the basic paradoxes of modern physics and philosophy of mind.

Self is by definition a subsystem able to remain unentangled in subsequent quantum jumps. Only bound state entanglement is stable in quantum jump and selves correspond to regions of the spacetime surface having local topology in a given number field (real or p-adic number fields labelled by primes). p-Adic regions are interpreted as physical (nonconscious) correlates for imagination, intention and cognition whereas real regions correspond to matter. p-Adic and real selves cannot entangle. The unitary operator  $U$  could in principle generate entanglement even between p-adic and real regions (rational entanglement

coefficients make sense in any number field), which is destroyed in state function reduction step. This might be crucial for the generation of cognitive maps assigning to the states of matter (say reading of physical measurement apparatus) cognitive states (say mental image about the reading of the measurement apparatus).

The contents of consciousness of self are determined as the average over the quantum jumps occurred after it was created (the real or p-adic spacetime region corresponding to self appeared in quantum jump). Selves can have subselves and self experiences them as mental images. Self can represent a mental image of a higher level self. Self experiences only the average of its subselves. Thus statistical averaging is involved in both subjectotemporal sense and spatially and is of central importance in the theory of qualia. This suggests that the foundations of, not only quantum measurement theory, but also statistical physics, reduce to the theory of consciousness. Quantum entanglement between subselves means fusion of mental images. The simplest assumption is that entangling self loses its consciousness. The subselves of two separate selves can entangle and this corresponds to a fusion and sharing of mental images.

p-Adic numbers are of central importance for the theory. They are crucial for the notion of self, p-adic physics provides the physics of cognition, and p-adic self hierarchy defines cognitive hierarchy. Locally evolution corresponds to a gradual increase of the finite prime characterizing a given spacetime region, and at the level of the entire universe to the increase of the infinite prime characterizing the universe (the theory of infinite primes is more or less isomorphic to called arithmetical quantum field theory for which second quantization is performed again and again). Also ethics can be reduced to p-adic mathematics: a deed (quantum jump) is good if it promotes evolution: in other words, it induces the increase of the infinite p-adic prime characterizing the universe.

## 2.2 What is the most general structure of the self hierarchy?

Selves form a hierarchy. This hierarchy need not be a simple nested hierarchy represented by a tree or a union of disjoint trees. On the other hand, arbitrary connections between the levels of the hierarchy imply paradoxical situations. Simple questions help to get a grasp on the problem. What happens if the branches of a given tree or separate trees are connected? What kind of connections are allowed without ending up with a paradoxical situation in which one cannot tell which one of the two selves is the subself of another self. The appearance of loops in the self hierarchy certainly leads to this kind of paradoxical situations since self can become its own subself.

This kind of paradoxical situations are avoided if only those selves which belong to the same level of the self hierarchy can fuse so that one has a collection of trees which can have horizontal connections (both intra- and inter-tree) between the nodes belonging to the same hierarchy level. The presence of a horizontal connection means that two separate selves share the mental image resulting in the fusion. Of course, the same mental images could be shared by an arbitrary number of selves, and this could be one of the mechanisms making possible both social behaviour and the propagation of memes. Also a genuine communication might necessitate sharing of the mental images rather than being only active sending and passive receipt. Sharing of mental images might occur also in hypnosis and various remote mental interactions and identification phenomena ('experiencing the sorrow of all mothers lost their son in war'). Long term memory could also involve the sharing of the same mental image by the selves of the geometric past and geometric now.

The paradox-free situation is achieved if the selves are arranged according to the local spacetime topology so that all p-adic selves with given prime are at the same level in the hierarchy and real selves ( $p = \infty$  formally) are at the top of the hierarchy. Subselves must always have smaller  $p$  than self and real

selves are at the top. Quantum entanglement allows only fusion of selves at the same level of the hierarchy and thus having the same local topology labelled by the p-adic prime  $p$ . Algebraic extensions of p-adic numbers presumably bring in more refined sub-hierarchies for a given value of  $p$  and they could correspond to various levels of mathematical cognition. This hierarchy is represented by a collection of trees which can have horizontal connections joining nodes at the same level. The sharing of mental images by the fusion of subselves is thus possible. The level of the self in the hierarchy can change and is induced by a quantum jump in which the local number field (p-adic or real) associated with the spacetime sheet representing self changes from  $R_{p_1}$  to  $R_{p_2}$ .

Anyone can do a simple but thought provoking experiment suggesting the presence of the macroscopic quantum entanglement at the level of brain and a change of the level of subself in the self hierarchy. Look at a mirror, direct your attention at your left eye, and redirect the gaze to the right eye. What you find that it is impossible to perceive the change in the direction of the eye gaze.

This might have a trivial explanation: the change in the direction of the gaze could be too small to be perceived. But also quantum entanglement might be involved. What must be crucial is that the change of the orientation of the eyeball is caused by brain itself rather than some external agent as in the case of a moving object belonging to the external world. The changing orientation of an external object of the perceptive field is consciously perceived by comparing it with the orientations of other objects of the perceptive field. That is, self compares its subselves (mental images) with each other. When the direction of the gaze is changed, quantum entanglement between self and the visual-cognitive mental image representing eyes is generated to achieve the needed motor response. The visual-cognitive subself representing eyes is temporarily lifted to a higher level in the self hierarchy and becomes part of higher level self (the change of the local number field is involved). The other subselves at the same p-adic level cannot anymore serve as a reference against which the changing orientation would be perceived. Since self cannot compare itself with itself, it cannot perceive visually the changing direction of the gaze.

## 2.3 General view about psychological time

A natural resolution of the problems related to the preferred role of single moment of time for conscious experience is based on the idea that biological growth and self-organization is a 4-dimensional phase transition proceeding in the direction of the geometric future quantum jump by quantum jump. And, in particular, that the dominating contribution to the conscious experience comes from the front of the phase transition where the volition is.

### 2.3.1 Life cycle as 4-D field body and as a four-dimensional statue carved quantum jump by quantum jump

There is electromagnetic body serving as a template around which ordinary matter self-organizes by phase transition and at the same time modifies this template. The phase transition front proceeds from the moment of birth to the geometric future in a manner analogous to the polymerization process or to the gradual build-up of a protein in mRNA-protein translation process. Electromagnetic body could correspond to the electromagnetic part of the genetic information hypothesized to be coded by transversal magnetic mirror structures (massless extremals parallel to magnetic flux tubes): see the chapter "Homeopathy in many-sheeted spacetime" of [31]. The motivation for this hypothesis comes from the TGD based quantum models for biocontrol and sensory representations, from the data about homeopathy and puzzles related to genome, from the mysteries of the biochemical self-organization, and from the experimental work related to phenomena like remote vision and healing. Among other things this model explains processes like molecular recognition which remain mysterious in the framework of standard biochemistry.

Each choice made during life cycle is analogous to an addition of a new protein in mRNA-protein translation process. There is a lot of freedom of choice associated with the addition of the new building blocks to a growing protein. The freedom to modify the already existing structure is however relatively restricted. The already existing part of protein can adopt a highly restricted repertoire of conformations but the ordering of the component aminoacids remains essentially fixed as also the chemical structure of the individual aminoacids. Translating this to the level of evolution of individual: presumably only the non-determinism associated with various sensory and cognitive representations is present whereas the non-determinism associated with say macroscopic motor actions and decisions affecting dramatically future is absent in our geometric past. Thus the classical (and also quantum) non-determinism is concentrated at the phase transition front propagating towards the geometric future quantum jump by quantum jump. As a consequence, also the contents of conscious experience are strongly concentrated around the value of the geometric time characterizing the location of this front.

Quantum criticality of TGD universe suggests that also the reverse phase transitions can occur and could proceed most naturally towards geometric past like the depolymerization of a protein. The fractality of the TGD universe in turn suggests that these phase transitions and their reversals occur in all length and time scales.

The idea that 4-D body is kind of a 4-D sculpture constructed gradually by trial and error process suggests that the 4-D growth process proceeds by trial and error and when dead end appears the reverse of the phase transition (counterpart of depolymerization) occurs (or can occur) and proceeds backwards in the geometric time to the moment when the wrong choice was made. Thus our life would not end at the physical death but could be an iterative process.

### **2.3.2 Field body does not die**

Physical death means that the 4-D body becomes mature and could survive at least for some time in a state in which conscious experience does not contain the dominating input from the phase transition zone. Some kind of a meditative, timeless form of consciousness should be in question. This vision conforms with the idea that physical life is only one stage in much longer lasting process of conscious evolution. These 4-D bodies can in principle communicate with the living ones and long term memories about the deceased might represent one form of this communication. The communications would be based on the same mechanism as long term memories in general: by looking at magnetic mirror with length of order lightlife or more I can see, not only me of the past, but also my fellow (not only) human beings. At quantum level this means timelike quantum entanglement making possible to share experiences.

### **2.3.3 p-Adic-to-real phase transition transforms intentions to actions**

What is then this fundamental phase transition giving rise to what we call life? We know that the front of phase transition corresponds to volitional consciousness. We also know that volition as a transformation of intention to action in TGD universe corresponds to the p-adic-to-real phase transitions of spacetime sheets taking place in quantum jumps. Thus the natural conclusion is that p-adic-to-real phase transition is the fundamental phase transition inducing the biological self-organization. This phase transition could occur for massless extremals (MEs) and perhaps also for the flux tubes of wormhole magnetic fields (and thus for magnetic mirrors) representing the plan for the evolution of the biological system and induce biological self-organization of matter around the resulting electromagnetic hologram like templates.

At least the selves at the same level of self hierarchy possess same value of psychological time. It might even be that the entire living biosphere (with



magnetosphere included) could be seen as a phase transition front proceeding to the direction of the geometric future. This conclusion is of utmost importance since it leaves no other possibility that to accept that even biosphere defines conscious self and we correspond to only single level in the self hierarchy. In particular, the notion of collective consciousness is more or less 'a must' in this framework.

The fractality of TGD Universe suggests that there are phase transition fronts inside phase transition fronts each with their characteristic span with respect to the geometric time and age with respect to subjective time suffering the 4-dimensional analogs of cell decay and regeneration. One can imagine a fractal hierarchy of phase transition fronts in which subselves experience a common psychological time and experience the systems, whose psychological time is in the geometric future, more or less as dead because the degree of non-determinism in the geometric past of the four-dimensional body is low. Perhaps what we call non-living matter corresponds to life for which self-organization front is in the distant geometric future. Also the idea about gradual build-up of four-dimensional sculptures by 4-D phase transitions and their reversals at all levels of the self hierarchy looks attractive.

### 2.3.4 Paraphysics and p-adic-to-real phase transitions

p-Adics-real phase transitions and p-adic teleportation (discussed in the chapter "p-Adic Physics as Physics of Cognition and Intention" of [30]) could provide the physical correlates for the intention involved with paranormal phenomena. The very fact that experimenters usually do their best to eliminate subjective elements from the experimental arrangements might explain why paranormal phenomena are so poorly reproducible. It is also quite possible that in the statistical averaging these phenomena indeed disappear and it might be more reasonable to concentrate on the character of the fluctuations around the average. An interesting analogy is the research of Shnoll related to the fluctuations of radioactive and chemical rates which demonstrated clear periodicities in fluctuations correlating with astrophysical periods [36]. Perhaps this approach might be applied also to the claimed paranormal phenomena.

## 2.4 Self-referentiality and spacetime topology

The notion of self-referentiality is one of the deepest and most fascinating notions of mathematics but for some reason it has not caught the full attention of physicists. I encountered the mystic variant of this notion during my 'great experience' (the idea about living system as a computer sitting at its own terminal) and a more mathematical variant of the idea for a year or two later while reading the book "Gödel, Escher, Bach" of Douglas Hofstadter. It took however more than fifteen years before I managed to identify a possible concrete realization of the notion in TGD based physics.

### 2.4.1 Does physical system provide a representation for a theory about physical system?

MEs and magnetic mirrors play a key role in TGD based model of living matter. The connection with standard chemistry has been however lacking. It seems that some deep principle is needed to build this connection. The hints about the big principle come from the following observations related to the topological field quantization implying what might be called Bohr orbitology for the classical fields.

a) TGD predicts the existence of negative energy spacetime sheets, in particular MEs. The prediction is based solely on the assumption that the spacetime is representable as a 4-surface.

b) One can understand gravitational binding energy only if negative energy MEs represent this energy. This suggests that binding energy of a system has a

very concrete representation as a negative energy MEs.

c) Quantum entanglement has as a geometric correlate join along boundaries bonds, in particular MEs and possibly also magnetic mirrors. Only the entanglement associated with the bound states is stable against the state preparation process leading to a maximally unentangled state in each quantum jump.

d) Classical superposition for em fields could mimick quantum superposition for states. The multiples of the fundamental frequency for ME could represent the BE condensate of bosons with energy defined by the fundamental frequency  $f = c/L$ .

e) The phase increments of the complex  $CP_2$  coordinates around closed loops could represent phase increments of spinor fields and superconducting order parameters around them as suggested in the chapter "Macroscopic Quantum Phases and Geometry of  $CP_2$ " of [28].

f) Join along boundaries bonds can represent even half-odd integer spin topologically. The join along boundaries bonds connecting 3-surface to a larger 3-surface get entangled in  $2\pi$  rotation but in  $4\pi$  rotation no entanglement results : this is due to the fact that the bonds provide a representation for the homeotopy group of 3-dimensional rotation group. A good manner to visualize the situation is to think of a cube inside a larger cube with threads connecting the corresponding vertices of the cubes. An interesting question is whether also spin and statistics connection could be represented classically somehow.

These observations suggests a far-reaching generalization. Perhaps many-sheeted spacetime allows the system to represent in its own structure the theory about itself. All theoretical concepts usually thought to have rather ethereal existence would have a concrete topological representation. These representations would exist already at the elementary particle level. Not only biomolecules, but even hadrons, would be accompanied by a topological representation about their theory analogous to a written language. p-Adic-to-real transition would actualize this theory. Thus not only cognition but also symbolic representations of thoughts would be present in all length scales.

This idea of self-referentiality is actually an essential part of the basic philosophy of TGD. TGD inspired theory of consciousness implies that the Cartesian division to a world and theory about it is an illusion. Quantum histories, which are TGD counterparts for the solutions of field equations *are* the reality, there is no need to postulate any 'real' reality behind them since conscious experience is associated between quantum jumps between quantum histories rather than the 'real' reality. 'Ontogeny recapitulates phylogeny' principle states that quantum histories have geometric and topological correlates at spacetime level. This is just what the idea about topological representation of a theory about the system as a part of the system itself means. System could consist of a hierarchy of levels such that  $N + 1$ :th level represents  $N$ :th level. Or perhaps more precisely, what results in the interaction of  $N$ :th level systems.

In atomic and molecular physics the basic implications would be following.

a) Atoms and biomolecules would carry a representation about their own theory based on MEs. Since MEs carry lightlike four-momentum, strict momentum conservation would require that they appear as pairs of parallel MEs with opposite momenta and with frequency corresponding to one half of the binding energy:  $f = E_B/2$ . The momenta involved are however rather small could be absorbed by biomatter in which case one would have  $f = E_B$ . The frequencies associated with ME come as multiples of its fundamental frequency  $f = c/L$ ,  $L$  the length of ME. This dictates to a high degree the lengths of the MEs associated with a given binding energy. The most natural length corresponds to the wavelength defined by one half of the binding energy. In the spirit of Bohr orbitology justified by the absolute minimization of Kähler action, one can also require that ME pair has a classical energy equal to the binding energy: this requirement correlates the field strength and the thickness of the negative energy MEs.

b) Atomic binding energies would correspond to MEs with wavelengths in

UV region. The binding energies of typical covalent bonds would give rise to MEs with lengths in wavelength region which corresponds to UV and visible light. The binding energies of hydrogen bonds in turn would give rise to MEs with lengths which correspond to wavelengths in the near infrared, cell size would be the typical length scale.

c) In the case of a potential well, such as the one associated with a harmonic oscillator or constant magnetic field, a natural representation would be in terms of positive energy ME allowing various harmonics. Vibrational and rotational frequencies would correspond to infrared and microwave region and magnetic energies to ELF region. The idea that these frequencies correspond to high level representations for the system is of course already now a basic element of TGD inspired theory of consciousness and conforms fully with the idea about topological self reference.

#### 2.4.2 Possible biological implications of topological self reference

The notion of topological self-referentiality, if correct, means the possibility to combine enormous amount of knowledge from biochemistry to build a concrete view about em bodies of molecules and about how living matter represents itself in its own structure. One could also try to identify the chemical counterparts for the special frequencies predicted by the p-adic length scale hypothesis. One might even hope that one could at some level understand how such very high level phenomena like written language emerge from the topological self-referentiality. What is so interesting is that the hypothesis connects various length scales. For instance, the binding energies of atoms with nuclear charges  $Z \sim 10$  are in keV range and correspond to MEs with size of order nanometer. Perhaps even the structure of condensed matter is partly coded into the representation of the binding energies of atoms.

Some examples of the possible consequences in biological length scales deserve to be mentioned.

##### 1. *Do also other molecules than DNA represent biological information?*

a) The many-sheeted structure associated with a molecule would provide a representation for the molecule identifiable as its electromagnetic signature introduced in the theories of homeopathy and water memory. And not only this: this structure would also serve as a 4-D dynamical hologram serving as a photograph-like template for the self-organization of matter around the molecule. This would mean effective reductionism, but obviously only effective.

b) Genetic code would be a highly developed form of this representation. It would involve the negative energy MEs associated with various atomic and molecular binding energies. Especially important negative energy MEs would be in the visible region and associated with the covalent bonds and in the near infrared associated with the hydrogen bonds connecting DNA nucleotides together. Also the MEs associated with rotational and vibrational degrees of freedom are expected to be very important and for them liquid crystal blocks of water could serve as mimickers and amplifiers. The transparency of water to visible frequencies (covalent bonds have energies 4.7 eV in UV region) means that water is an ideal medium in the visible region for communications by MEs since coherent visible light can propagate long distances with attenuation caused only by the absorption by biomolecules.

This picture gives a justification for the suggestion of Peter Gariaev that DNA is accompanied by laser mirror pairs [19]. The negative energy ME pairs associated with various binding energies would correspond to the laser mirror pairs. This picture differs slightly from the earlier proposal for the realization of genetic code involving orthogonal pairs of MEs associated with each nucleotide giving rise to 4 different pairs of polarizations and suggests a simpler realization in which the four polarization pairs associated with a pair of parallel MEs would realize the genetic code in a given length scale.

## 2. Overunity energy production and metabolism

Topological self-referentiality allows also to understand what happens in overunity energy production and these insights might be also crucial for the understanding of how life has evolved as a parallel development of macroscopic quantum bound states and the ability to metabolize. The components of the system can bind mutually or with the environment and negative energy spacetime sheets represent binding energy. Bound state energy is liberated as a usable energy. The resulting bound states have entanglement irreducible under state function preparation process: this makes possible fusion of subselves to larger subselves. The bound states correspond to spacetime sheets having typical sizes given by the p-adic length scale hypothesis and the process means basically spacetime engineering. The typical wavelength of the radiation emitted in the process gives estimate for the electromagnetic or gravitational size of the bound state. In ELF frequency range the electromagnetic size is of order Earth size.

Electrolytic processes are especially interesting from the point of view of overunity energy production. For instance, the production of hydrogen molecules in the electrolysis of water might be accompanied by the formation of large bound states of water molecules and the liberation of the binding energy as a usable energy. The signature for the process is simple: the energy liberated is larger than the energy deduced from the binding energies of water and hydrogen molecules. Rather interestingly, the hydrogen bond energy deduced from the evaporation energy per water molecule is .485 eV and is very near to the photon energy  $E(167) = .4844$  eV corresponding to p-adic length scale  $L(167) = 256L(151)$  for  $L(151) = 10$  nm:  $k = 167$  is one of the four subsequent p-adic length scales  $k = 151, 157, 163, 167$  which correspond to Gaussian Mersennes.

Biology provides an important area of applications. Biomolecules and cells are indeed bound states of macroscopic size. The first form of life evolved under conditions in which electrolytic processes occurred: perhaps bound state formation led to the generation of biomolecules and cells. What is nice that the development of long range order (negative energy MEs) would have been automatically accompanied by the development of metabolism (positive energy MEs!). Sol-gel transition crucial for the cellular locomotion would be a particular example of this process. Thus a natural path to follow in the attempts to build new energy technologies is to try to mimick what living nature has already achieved. This kind of energy production would be also wasteless and support evolution.

## 3. What about the role of gravitational interaction?

Gravitation has been suggested to have a key role in living matter and also TGD suggests this but the direct and decisive connection to experiment is still lacking.

a) Quantum gravitational states are state functionals in the world or worlds (3-surfaces). The so called supercanonical degrees of freedom correspond to the degrees of freedom distinguishing TGD from string models and quantum states in these degrees of freedom represent genuine quantum gravitational degrees of freedom. The model for color qualia relies on this kind of states (colored photons).

b) TGD predicts that classical fields generate classical gravitational fields which give additional contribution to the gravitational interaction mediated by graviton ( $CP_2$  type extremal) exchange. The gravitational constant involved with this 'electrogravity' is by a factor  $10^8$  larger than the ordinary gravitational constant so that electrogravity and its  $Z^0$  variant might be of fundamental importance in living matter.

c) Quantum spin glass analogy means that Kähler action has an enormous almost ground state degeneracy and only classical gravitational energy differentiates between different ground states. Thus the classical gravitational binding and also the generation of coherent gravitons by MEs might have a role to

play in the quantum physics of living matter.

d) A rough order of magnitude estimate for the gravitational binding energy for a blob of water having size  $L(k)$  is

$$E_{gr} \sim \frac{GM^2}{L(k)} = G\rho^2 L(k)^5 \sim \frac{Gm_p^2}{L(137)} \frac{L(k)}{L(137)^5} = 2^{-127} 2^{5/2(k-137)} \frac{1}{L(137)} .$$

Gravitational binding energy is larger than the p-adic energy  $\pi/L(k)$  for  $L(k = 179) = .169$  mm. In the range  $L(163) = 640$  nm and  $L(167) = 2.56$   $\mu$ m gravitational binding frequency varies between 1 Hz and 1 kHz, that is over EEG range up to the maximal frequency of nerve pulses. For  $k = 157$  and  $k = 151$  the gravitational binding frequency corresponds to a time scale of 9 hours and 100 years respectively so that the time scales relevant for life are spanned by the Gaussian Mersennes. Perhaps gravitonic MEs carrying vanishing em fields accompany the basic building blocks of the cell. Neither the connection with EEG is excluded.

## 2.5 Magnetic mirrors and plasmons

Magnetic flux tubes and MEs are basic structures in TGD based model of biosystems based on the symbiosis of MEs, magnetic flux tubes and ordinary biomatter at atomic spacetime sheets. Magnetic flux tubes are topological field quanta of magnetic field whereas MEs ('massless extremals') are topological field quanta of radiation field, 'topological light rays'.

### 2.5.1 MEs are not possible in Maxwell's theory

To avoid misunderstandings, it is important to emphasize that MEs are not possible in Maxwell's theory and the classical fields associated with MEs differ in many crucial aspects from those possible in Maxwell's theory. Most importantly, MEs are ideal for classical communications. The signal is effectively one-dimensional wave packet with fixed local polarization, it propagates with a light velocity without change in shape, and is channelled and thus does not weaken with distance. There is no dissipation involved: in TGD framework dissipation can be seen only a phenomenological trick to model the dynamics of quantum jumps between nondissipative quantum histories using single dissipative quantum history. Of utmost importance is that MEs should not respect Faraday cage since they are spacetime sheets outside the spacetime sheet where the cage is. The whole TGD approach to sensory representations fails if this assumption does not hold.

### 2.5.2 Magnetic mirrors

Magnetic mirrors formed by the magnetic flux tube-ME pairs occur in many different contexts in TGD inspired theory of consciousness. For example, magnetic mirrors of length of order lightlife appear in the model of long term memory. Classically: when I look at sufficiently distant mirror I see the me of the geometric past. Quantum mechanically: timelike quantum entanglement made possible by the magnetic mirror makes it possible for the self of the geometric now to share the experience of the subself of the geometric past. Magnetic mirrors are crucial for the model of the sensory canvas and there seems to be no sharp difference between different types of memory which suggests that there is an entire hierarchy of memories in various p-adic time scales. Magnetic mirrors play a key role in the model of frequency imprinting and provide a general molecular recognition mechanism. Magnetic mirrors allow also a generalization of many-sheeted DNA so that magnetic mirrors represent genetic information in electromagnetic form (see the chapter "Homeopathy in Many-sheeted Spacetime" of [31]).

In accordance with the fractality of consciousness, the wide applicability of the magnetic mirror notion suggests that various functions associated with the

magnetic mirrors are different aspects of the same basic phenomenon. Magnetic mirrors would thus provide sensory canvases, long term memory mirrors and recognition mechanism at all length scales. Even many-sheeted DNA would possess sensory canvas and long term memories, perhaps an entire hierarchy of them. Taking the ideas of fractality and quantum hologram to extreme, one can even consider the possibility that our long term memories are average of those associated with genes associated with various neurons!

Nothing precludes the possibility that magnetic mirrors can also serve as electromagnetic bridges between different organisms (even the notion of organism must be generalized if the idea of multibrained magnetic selves is taken seriously). For instance, communications with the deceased might be basically like looking in magnetic mirror and seeing the image of the deceased. This could make possible effects similar to observed at DNA level (such as self-assembly and translation of RNA to proteins made possible by electromagnetic recognition mechanism based on em bridges).

### 2.5.3 Plasmons

Plasmons correspond to closed toruslike magnetic flux tube structures and ions part of which flow as supra currents at the magnetic flux tubes and part as ohmic currents at non-superconducting spacetime sheets. The model for the magnetic sensory canvas leads to the identification of plasmons as candidates for fundamental magnetic life forms crucial for the self-organization of magnetic fields and also of biological matter. Plasmons appear in all length scales. The magnetic energy of plasmon is extremely small: one cell length of magnetic flux tube of Earth's magnetic fields weighs one eV, one billionth of proton mass. Thus there are no strong energetic constraints against self-organization of magnetic field by plasmon generation.

For instance, plasmons could serve as templates for DNA and neural circuits, and plasmonic self-organization might have preceded the development of the molecular life. Sun generates plasmons. Plasmons are generated also in the plasma sheet of the magnetosphere of Earth. In case of magnetosphere, plasmon should contain sensory representations about living organisms. Perhaps Earth and Sun as magnetic selves (much more intelligent than us) have discovered spacetravel! Plasmons would be the spaceships but the crew would be somewhat ghostly, consisting of sensory representations. The subselves of plasmon can entangle with the magnetosphere, which can therefore share the mental images of plasmon. Plasmons clearly make possible for a magnetospheric self to extend its senses to the interstellar space and one can consider the possibility that some of UFOs are extraterrestrial plasmons managed to leak into the magnetosphere through the magnetopause acting effectively as magneto-immune system (most of them might be plasmons generated by the tectonic activity)

## 2.6 The role of the classical $Z^0$ force

One of the basic predictions differentiating between TGD and standard model is classical  $Z^0$  field, which is very much like classical electromagnetic field but couples to neuron number and has only very small coupling to protons and electrons. All ions are completely ionized  $Z^0$  ions so that condensed matter at cellular spacetime sheets is in  $Z^0$  plasma state. Classical  $Z^0$  force is strongest in the cell length scale and provides elegant explanation for the chirality selection in living matter plus explanations for long list of anomalies, one of them being the acceleration anomaly for spacecrafts found during last quarter century by NASA [1].

These observations together with other applications of  $Z^0$  force encourage to think that  $Z^0$  MEs could have an important biological role and motor control from sensory canvas or a separate motor canvas consisting of flux quanta of  $Z^0$  magnetic field, could be this role.

Although neutrinos seem to correspond to  $k = 13^2 = 169$  spacetime sheet, the quantum model of hearing (see the chapter "Quantum model for hearing") forces to assume that neutrinos can temporally reside at  $k = 151$  spacetime sheet (cell membrane length scale) and have appropriately scaled-up mass (scaling factor is 512 just like between ordinary hadron physics associated with  $M_{107}$  and its scaled-up version associated with  $M_{89}$ ). This encourages a generalization: perhaps neutrinos can reside in all spacetime sheets  $k = 151, 157, 163, 167$  corresponding to the biological Gaussian Mersennes.

One can test the role of classical  $Z^0$  force in several manners.

a) The correlations of radioactive process rates with biological or even astrophysical periodicities would be a clearcut direct evidence for classical  $Z^0$  force. The lifelong work of Russian scientist Shnoll demonstrates the fluctuations for the rates of various chemical and radioactive processes vary with periods related to astrophysical phenomena (see [36] and TGD based model in the chapter "Anomalies explainable by the many-sheeted spacetime concept" of [29]). According to [43], even radioactive decay rate of Am241 has been influenced by intent.

b) Anomalous classical information transfer in living matter with light velocity would be a direct signature of  $Z^0$  force and could be a part of explanation for why remote mental interactions seem to penetrate Faraday cage (also em MEs could penetrate Faraday cage).  $Z^0$  MEs could be responsible for the neuronal synchronization occurring in millisecond time scale.

c) If living matter at cellular spacetime sheets is neutrino conductor it might act as Faraday cage preventing the penetration of classical  $Z^0$  force into region surrounded by living matter: perhaps to the spacetime sheets smaller than cellular spacetime sheets at which classical  $Z^0$  fields indeed are very small.  $Z^0$  MEs would be of course an exception. If living matter is neutrino superconductor the penetration of  $Z^0$  magnetic fields into cellular spacetime sheets would not be possible except as flux quanta.

## 2.7 History editing

The possibility of history editing implies exotic paranormal phenomena. For a few years ago the issue 62 of "Network", the journal of the Scientific Medical Network [26] contained a report about the experiments carried out by Dr. Rene Pepoch, working at Fondation ODIER at Nantes. In these experiments chickens and rabbits apparently influenced signals composed by a random-number generator for a robot close to them, and human subjects apparently influenced the movements of the robot even though its signals had been generated by a random-number computer program six months earlier.

### 2.7.1 The experiments

Chickens stayed close to the robot "imprinted" on it as their mother and followed it about. The robot had a random-number generator inside it controlling its movements, which checks showed to be truly random. The chickens were then removed and one placed so it could see the robot but could not follow it. Under these circumstances the robot spent measurably more time close to the chicken than away from it. The effect was that the chick was influencing the robot's generator. The generator was then removed to a computer away from the experimental area. The same effect occurred. "Non-imprinted" chickens however had no apparent effect on the robot.

In the rabbit experiment, baby rabbits were frightened by the robot and kept away from it. When the rabbits' movement was inhibited, the robot's movements became non-random and it kept away from them. However, when one rabbit was starved and food was placed on the robot, this behaviour was reversed and the robot brought the food to the rabbit. It was found that humans likewise could influence the robot.

Also humans were invited to influence the robot as before, but in fact it was being driven by a code generated six months earlier and recorded on a CD, now being played back. The robot was influenced as in the contemporary study. The CD was then examined and it was found that the first half of its code was indeed non-random, but the unused code was truly random. This gave the effect that the computer somehow "knew" six months earlier not only that half the code would be used for such an experiment, but also the general direction of the movements that would be required.

### 2.7.2 Interpretation as history editing

The interpretation of the reported results in terms of psychokinesis and human-animal-machine symbiosis suggests itself. The experiment with humans can also be interpreted as a dramatic verification for the prediction that in quantum jumps between quantum histories also the geometric past changes: the recent experiment suggests that the change occurred in a time scale of six months. If the crucial assumption about the randomness of the random number generator is correct, the effect is also very strong. This could mean that we are changing our geometric past all the subjective time in macrotemporal time scales, as indeed suggested by the paradigm of four-dimensional brain. A further suggestion is that this hypothesis can be indeed tested empirically by developing further these experimental arrangements.

To better comprehend what might be involved, recall that in TGD subjective time and geometric time are not one and the same thing. Accordingly, subjective memories are memories about conscious experiences and geometric memories are memories with respect to the geometric time for which time is in a precisely same position as space: geometric memories give prediction of the future and past changing quantum jump by quantum jump like weather broadcasts (except that one usually is not interested in the predictions of what weather will subjectively be in geometrically last summer). The crucial point is that the contents of say computer files representing purely geometric memories (such as number sequences) can change in the quantum jumps whereas the possible subjective memories about their contents can remain unchanged. This peculiar contradiction between subjective and geometric memories, which I have christened as 'tribar effect', serves as a possible experimental test for the reality of notions of the subjective and geometric time. These experiments are bound to involve human memory as a subjective element: nothing however prevents several human subjects store to their memory the original memory to guarantee objectivity in a statistical sense.

If the randomness of the original random number series produced six months before the experiment involving human-robot interaction has not been checked, it can be argued that random number generators (if genuine) accidentally produced a number series which was not random in the time scale involved. This problem could be circumvented by modifying the experiment by checking already six months earlier whether the number series is really random or not. Humans can indeed remember whether the series is genuinely random or not although they are not able to remember long number series. On the other hand, if the non-randomization effect appears only under special conditions (effect is present for the imprinted chickens only), one has even without the check good reasons to believe that machine-mind interaction has occurred.

An important question of principle is whether the random number generators are genuine or whether the numbers are generated by some algorithm yielding only pseudo random numbers. If genuine randomness is due to quantum phenomena at atomic or molecular level, then the p-adic teleportation would affect basic atomic or molecular physics. If some algorithm produced them and there is no noise affecting the outcome, the only changes which can occur is the modification of the algorithm or of the initial conditions for the algorithm. In the latter case the production of the desired behaviour might however be impossible since the algorithm need not even allow the needed regular behaviour of the



random number sequence. This of course could be checked.

If the p-adic teleportation is involved with the psychokinesis, then the conclusion would be that p-adically represented intentions/memes are able to interact with random number generators. If the p-adic memes are actually chicken's intentions mediated by magnetic mirrors and transformed to real ones when intention is realized, the interaction mechanism is basically ordinary electromagnetic interaction with the machine. The question about the detailed mechanism allowing chicken's volition to affect the geometric past of the robot allows endless variety of answers. One possibility suggested by the more precise views about psychological time is that the robot has primitive consciousness and that the p-adic-to-real phase transition of robot proceeding to the direction of geometric future is undone by the reverse real-to-padic phase transition down to the moment when the random numbers were generated and regeneration of them occurs and gives rise to a new chicken friendly behaviour. Again trial and error might be involved.

### 2.7.3 Blessed are the meek

The results of experiments, if replicable, suggest that animal-machine anomalous interactions might be much stronger than human-machine interactions, perhaps because animal is totally confident that the desired interaction happens (Blessed are the meek since they will inherit the kingdom of Heaven!). One could imagine experimental arrangements analogous to the chicken-robot experiments in which the chicken is replaced by a human who genuinely believes that the robot can do what (s)he wishes: this could be achieved by telling the subject person that machine is programmed to deduce her/his wishes, from say EEG. Various modifications of the imprinting mechanism could be applied in more complicated situation. The results might be also used as guidelines in the attempts to generate artificial life. The systematic use of genuine random number generators as control tools of robotic motion suggests itself as a basic principle to guide the attempts to build artificial life. This would optimize the flexibility of the robot behaviour so that it could be affected by the p-adic intentions.

## 3 Magnetic sensory canvas

The notion of magnetic sensory canvas is certainly the most radical departure of TGD inspired theory of consciousness from standard neuroscience. In the following the motivations for introducing this notion and some tests for it will be discussed.

### 3.1 Are the ultimate sensory representations realized outside brain?

There are very general objections against the idea that ultimate sensory representations are realized inside brain.

a) Any computer scientist, unless informed about materialistic dogmas, would argue that the processing of the sensory data must be separated from its representation. How this could occur if sensory and other representations are realized inside brain, is however difficult to see.

b) The motion of eye or head does not induce the sensation that the world is moving although the sensory image moves around the cortex. Rather, brain acts like a (possibly moving) canvas at which the sensory input is projected and monitored by an external observer. This very simple observation is a strong objection against the idea that the ultimate sensory representations reside inside brain.

These objections lead to the view that the magnetic flux tube structures associated with the primary and secondary sensory organs define a hierarchy

of sensory representations outside brain. Magnetic flux tube structures would serve as the sensory canvas to which sensory images are projected from brain and possibly sensory organs and even neurons. MEs serve as projectors and place coding by magnetic transition frequency associated with ME wakes-up sensory subselves at various positions of magnetic flux tubes having varying thickness and associate thus various sensory qualia and even more complex attributes to the objects of the perceptive field.

EEG MEs correspond to our level in this hierarchy of projections. The simplest possibility is that the sizes of these sensory selves are of the order of EEG ME sizes ( $L(EEG) = c/f(EEG)$ ) and thus can be of the order of Earth size (Schumann frequency 7.8 Hz corresponds to the circumference of Earth)! Thus the ultimate sensory representations are magnetic giants in TGD and diametrical opposites of the neurophysiological dwarfs of standard neuroscience populating also TGD brain.

One can also understand long term memories in this framework. To remember something in the geometric past at temporal distance  $T$  is to look at a magnetic mirror with length  $L = cT/2$ . At quantum level quantum entanglement is involved and means sharing of mental images between recent me and the me of the geometric past (or some other self responsible for the memory representations). This requires that magnetic sensory canvases involved with long term memories have astrophysical sizes with light year being the natural length unit. For magnetic fields this indeed makes sense.

The known strange effects of large scale perturbations of Earth's magnetic field on consciousness (say, statistics about the effects of magnetic storms in mental state and tectonic activity inducing UFO experiences) provide a rich palette of anomalies supporting this view. The model for magnetospheric sensory representations at the magnetic body of Earth provides rather detailed view about how magnetic storms can affect our consciousness (see the chapter "Magnetospheric sensory representations" of [31]). The conservation of magnetic flux makes the magnetic flux tube structures of (say) Earth size very stable: thus physical death presumably means only that our magnetic body redirects its attention to something more interesting. Near death experiences discussed in more detail in the chapter "Biological realization of self hierarchy" indeed support this view.

Imagination very might involve p-adic-to-real phase transitions transforming p-adic imagery to nerve pulse patterns which would usually generate sensory experiences at our level of self hierarchy. The genuinely p-adic aspect of imagination could be analogous to the free choice of initial values in a computer simulation and transformed to their real counterparts initiating neural activity. As in case of imagined motor actions, these imagined sensory experiences must however be 'amputated' at the step that would give rise to a genuine sensory experience. This means that the MEs waking-up magnetic subselves on the sensory canvas outside body are not activated during imagination. The motor output and the ultimate output giving rise to our sensory experience are very closely related: just like printing or some control activity and picture on the monitor screen in case of computers. Imagination is like simulating without any kind of output outside computer by selecting initial values using random number generator.

### 3.2 Personal and magnetospheric sensory canvases

Are our sensory representations at the magnetic flux tubes of the Earth's magnetic field or are also personal sensory canvases needed? Since moon travellers have experienced the world very much like us and have survived, the most plausible conclusion is that the magnetic sensory canvas is personal. The direction of Earth's magnetic field would only fix the orientation of the flux tube structure defining the personal sensory magnetic canvas. Pyramidal neurons contain magnetic crystal and also haemoglobin molecules are magnetic and their alignment

with the local magnetic field of Earth would make this possible.

### 3.2.1 Resonance conditions

Resonant amplification is expected to be of a crucial importance for the representations.

a) The requirement that ME acts like a resonant wave cavity fixes the representation to a high degree. The requirement is that the fundamental frequency  $f = c/L$  of ME of length  $L$  equals to the magnetic transition frequency at the sensory canvas in question (personal sensory canvas or Earth's magnetosphere):

$$f = c/L = f_m .$$

This condition alone implies that various parts of the magnetosphere correspond to various EEG bands. For the personal magnetic canvas the condition  $L = kS$ , where  $S$  is the transversal thickness of the magnetic flux tube parallel to ME, guarantees resonance condition for all points of ME.

b) In case of magnetic mirrors (ME plus parallel magnetic flux tube) a further amplification mechanism is possible. Since a magnetic flux tube parallel to ME is present, also Alfvén waves, which correspond to the oscillations of magnetic flux tube, are present and satisfy the same dispersion relation as the waves associated with ME, and thus can amplify further the em (or  $Z^0$ ) fields of ME since magnetic energy can be fed to the system responsible for the sensory representation. Continual transformation of energy to magnetic energy, magnetometabolism, might indeed be key aspects of magnetospheric consciousness.

c) The cavity resonances associated with the spacetime sheet complex defined by Earth (inner core, outer core, mantle, ...) allow transversal communications and amplification. Besides 7.8 Hz Schumann resonance associated with the entire Earth, also the 40 Hz (14 Hz) resonance associated with Earth's inner (outer) core of the Earth deserve to be mentioned since they are important EEG resonances. Of course, also the 'harmonics' of these resonances are important.

### 3.2.2 Magnetic mother Gaia

The flux tube structure associated with Earth's magnetic field is expected to define sensory canvases of the magnetic Mother Gaia and lower level magnetospheric selves defining a hierarchy of collective consciousnesses. It is quite conceivable that these canvases contain also sensory (and other) representations of the information from brain and body. The intersections of the projector MEs projecting to the personal sensory magnetic canvas with the magnetic flux tubes of Earth's magnetic field provide the simplest realization for these representations. For the magnetospheric representations the resonance condition  $f = c/L = f_m$  for the projector MEs is extremely stringent since magnetic transition frequencies  $f_m$  are determined by Earth's magnetic field now and a map between EEG bands and magnetospheric regions emerges.

These representations could be responsible for the third person perspective which is also an integral part of our consciousness: the mechanism providing the third person aspect would be sharing of the mental images by quantum entanglement. Out-of-body experiences and near death experiences could be one particular manifestation for this component of consciousness. The magnetospheric representations could be also responsible for long term memory representations. Magnetospheric selves define kind of conscious copies (several of them(!), like copies of data files but not identical) about me and they, as well my personal magnetic body, should continue their existence after my physical death. These mental images of magnetic Mother Gaia are living creatures.

It is possible to construct a rather detailed quantitative theory for the magnetospheric sensory representations (see the chapter "Magnetospheric Sensory Representations" of [31]), and a surprisingly detailed structural correspondence between brain and magnetosphere emerges. In particular, highest level sensory

representations about us are predicted to reside at the plasma sheet at the night-side of the Earth's magnetosphere serving as magnetospheric counterpart of the brain area called insula with which self model is often assigned. Amazingly, there is empirical evidence that plasma sheet contains 'features' like 'wings' and 'eyes' coded to the velocity distribution of ions in plasma sheet [17].

### 3.3 Cortex as a collection of attributes assigned to the objects of perceptive field represented on magnetic canvas

One of the basic problems related to the understanding of the information processing in brain is how various attributes are assigned to the object of the perceptive field. What is known that brain recognizes features and these features/attributes seem to be located in a more or less random looking manner all around cortex. This brings strongly in mind random access memory or computer game in which various little program modules realized as records in random access memory represent collection of standard sound effects. A strong hint is the empirical evidence for the view that the resonance frequencies associated with the autocorrelation functions of nerve pulse patterns, and thus presumably also coding EEG frequencies, are same for the features associated with a given object of the perceptive field. The challenge is to understand how the picture based on a collection of MEs projecting features to the magnetic canvas could allow to understand what is behind these observations.

#### 3.3.1 Brain constructs features

The view about MEs associating attributes to the object of the perceptive field by waking up subselves in the magnetic flux tube structure serving as a sensory canvas suggests an elegant interpretation for these facts.

a) Cortex can be regarded as a collection of regions specialized to represent various kinds of standard features. Features need not be simple qualia: arbitrary complicated collections of them, such as familiar faces are also possible features. Even entire dynamical processes could serve as features.

b) Basic feature-regions are like computer records containing besides the standard feature data also information about the position of the object of the perceptive field with which this feature is to be associated. The information about the position could be variable but a more attractive view is that also this information is completely fixed. Thus feature records would be fixed triplets ( $feature, d, \Omega$ ) where  $d$  and  $\Omega$  code for the distances and direction angles of the object of the perceptive field to which the feature is assigned. Frequency coding could be used to wake-up these feature selves and this could give rise to the sensory representation.

c) Features must somehow be represented by MEs. The activated ME associated with the feature record codes the direction and distance of the object of the perceptive field to which this particular attribute is to be associated. Basically the direction and frequency of ME code for the direction and distance of the object of perceptive field. Feature becomes conscious when magnetic quantum phase transition occurs. The distance dependence of the magnetic flux tube thickness makes possible the cyclotron frequency scale coding of the distance.

MEs (records) form pre-existing dynamical radial bundles (files) associated with a fixed feature and a specific ME (particular record in file) is activated selectively by frequency coding. The radial bundle of MEs has a natural interpretation as a topological field quantization for the classical radiation field.

#### 3.3.2 MEs are either active or passive

Projector MEs should be in two states: active and passive. In active states MEs should correspond to em MEs. In passive state they could correspond to either p-adic MEs or  $Z^0$  MEs. It is yet too early to choose between these options.

a) For the p-adic option p-adic-to-real phase transition would transform passive em ME (intention) to active em ME defining sensory projection. One might argue that since sensory representations do not involve intention about sensory experiencing something, this option cannot be correct.

b) For the  $Z^0$  option color rotation would transform  $Z^0$  ME to em ME and might be induced by a reference beam of configuration space photons. There are some arguments supporting the view that  $Z^0$  MEs are responsible for the communication of motor commands from the sensory canvas to brain and body and involve the transformation of p-adic  $Z^0$  MEs to  $Z^0$  MEs. In fact, the  $Z^0$  MEs generated by p-adic-to-real transformation in the p-adic-to-real phase transition front could serve could in turn become sensory projectors in the color rotation. Thus 'sensory' would follow 'motor' rather at the level of the sensory magnetic canvas.

### 3.3.3 Model for the sensory projectors

It is perhaps worth of trouble to consider a more detailed just-for-definiteness model for the mechanism behind sensory projections.

a) There is a radial bundle of pre-existing MEs (file consisting of records) associated with each feature with a fixed distance  $d$  such that these MEs are transformed to em MEs when activated and in turn waking up magnetic 'position-self' and assigning the feature with it. Feature files with a fixed distance  $d$  of object could form linear stripe like structures for which  $d$  corresponds to linear distance along stripe and coded to EEG frequency of MEs varying with this distance. Thus there is a coding of the distance of the object by the distance along the linear structure. These stripe like regions could in turn correspond to linear or at most two-dimensional regions coding for the variants of feature, such as colors. One-dimensional coding by frequency is in principle always possible. Strictly speaking, topographic organization of records is not necessary but is presumably present.

b) The problem is to selectively activate a ME corresponding to a given distance and orientation. Frequency coding is a universal manner to achieve this. Each distance corresponds to a frequency interval such that the ordering of the intervals reflects the ordering of distances. The direction angles for the object of the perceptive field corresponding to a fixed distance are coded by the frequencies in the corresponding frequency interval. Therefore a given EEG frequency activates definite ME. Note that the frequency activating ME, is variable in some range, and is not the same as the frequency at which ME activates magnetic quantum phase transition.

c) There is an important consistency constraint on this picture. If the orientation of the cortex changes, the frequency coding for the orientations is altered and the perceptive field is experienced to rotate if ME is fixed to the reference system of head. Thus feature files should not corotate with head but should be fixed to a kind of a compass needle. This suggests that ME bundles are anchored to the magnetic crystals filling the brain whose orientations are fixed by the orientation of Earth's magnetic field.

d) Second important point is that the radial bundles of MEs and magnetic flux tubes must form dynamical units. For instance, MEs and magnetic flux tubes could be parallel and thus maximize the probability for a contact interaction. This would also bring in TGD counterparts of Alfvén waves (oscillations of magnetic flux tubes) as amplifiers of resonance.

Only in this manner the sensory experiences can be private and the contribution from the other brains remains negligible. Note however that people in very intimate contact could gradually share their magnetic sensory canvases: the anecdotes about gradually developing telepathic communications between the teachers and students of the meditative practices could involve this kind of sharing of computer screen between several users.

There are certainly variants about this basic option. For instance, the sphere defined by the orientation angles could be decomposed into sectors of fixed

solid angle coded spatially so that ME bundles would span only a fixed solid angle. The extreme situation is the one in which the direction angles are coded spatially. Thus one would have three-dimensional gridlike structure coding the directions and distance of MEs. In this case each point would contain only single ME which does not mean very effective information representation capacity. By the fractality of consciousness, this architecture is expected to be realized at various length scales. Perhaps even at the length scale of genes.

### 3.3.4 Spectroscopy of consciousness

In the proposed coding EEG MES would contain essentially all information about perceptive field and the spectroscopy of consciousness (see the chapter "Spectroscopy of Consciousness" of [31]) would be realized in a strong sense. There is indeed evidence for the spectroscopy of consciousness. According to [16] the EEG at skull correlates strongly with cognition and behaviour whereas intracranial EEG correlates only weakly and does not add anything new to the information from the EEG at skull. This obviously supports sensory canvas hypothesis.

In the same article also the notions of operational synchrony, rapid transition periods, and quasistationary segments are introduced. The motivation comes from the finding that EEG in various frequency bands and various areas of the cortex decomposes to quasistationary segments and rapid transition periods between them [16]. Quasistationary segments could represent subselves (mental images). Rapid transition periods might in turn have interpretation as control commands represented as simple reference waves or memetic codewords generating much more complex holograms.

### 3.3.5 Realization of motor commands

The remaining question is how motor activities are realized in this picture. The metaphor for consciousness as a computer sitting at its own terminal, which originally stimulated my personal attempts to understand consciousness, might help here. Computer screen corresponds to the magnetic canvas. The one who sits presumably corresponds to higher level in fractal magnetic hierarchy (flux tubes inside flux tubes). The central unit corresponds to the brain. Sensory projector MEs correspond to records organized as files formed by the radial bundles of MEs and coding the picture on the monitor. MEs as active quantum holograms acting as control commands seem to provide a realization of keyboard. The hypothesis that  $Z^0$  MEs are responsible for the motor control from the personal magnetic body has survived hitherto the tests that I have been able to imagine. One of its nice features is that motor control and sensory representations separate neatly (see the chapters "Macroscopic quantum coherence and quantum metabolism as different sides of the same coin" and "Magnetospheric sensory representations" of [31]).

## 3.4 Anomalous visual percepts and sensory canvas hypothesis

Sensory canvas hypothesis means that at the perceptual level we see using ELF—rather than visible light. This suggests the possibility of the vision based solely on the ELF input from brain and body having no correlate with the visible light entering into retina nor with neural activity. Even genuinely three-dimensional vision in which own body is seen as it would be seen by the external world suggests itself.

There is some evidence for this kind of anomalous vision.

a) Yogis have reported altered states of consciousness in which they see their own body three-dimensionally, that is simultaneously from all directions.

b) Becker tells in his book "Cross currents" [4] about a young cancer patient who told that he can see the interior of his own body. The patient could "see"

the calcium residue left as the tumour vanished. This supports the view that ELF MEs could project from the entire body to the personal or magnetospheric sensory canvas.

c) Also the OBE experiences, for instance those associated with NDEs, could have a similar interpretation. The sensory input from eyes and even the input from the neural activity could be absent during NDEs so that the visual experience should be determined by the background ELF component emanating from the brain and body. The third person perspective associated with OBEs might be always present but be masked by the strong sensory input.

The dropping of ions from the atomic spacetime sheets to the magnetic flux tubes so that they end up to high  $n$  cyclotron states decaying via the emission of photons at frequencies which are harmonics of the cyclotron frequency could generate the projector MEs needed for the sensory representation of the physical body or part of it as seen by the environment.

What has been said applies also to other senses. Interestingly, I often wake-up partially and realize that I hear my own snoring as an outsider! Sometimes I have an experience which might be interpreted by saying that the hearing in the first perspective is superposed with the hearing in the third person perspective. The third person hearing has a time lag so that a kind of double breathing results.

### 3.5 Place coding of features inside brain

Place coding for various geometric parameters characterizing simple geometric 'features' inside brain could be realized using the variation of the cyclotron frequency along a magnetic flux tube of varying thickness. The hierarchy of the sensory canvases allows a modular structure in which a geometric feature such as triangle, line, or ellipse represented at a lower level sensory canvas is projected to a *single* point of 'our' sensory canvas. Also the magnetic flux tubes inside brain could provide similar coding of abstract geometric information, such as scales of a geometric figure.

Becker tells in his book "Cross Currents" [4] about a technique discovered by Dr. Elizabeth Rauscher, a physicist, and William Van Bise, an engineer. The technique uses magnetic fields generated by two coils of wire, each oscillating at a slightly different frequency and directed so as to intersect at the the head of the subject person. When two energy beams with different frequencies intersect at some point in space, a third frequency, so called beat frequency is formed as the difference of the frequencies. What Bise and Rauscher found that this ELF frequency (unfortunately, I do not know what the precise frequency range was) generates simple visual percepts like circles, ellipses and triangles and that the variation of the second frequency induces the variation of the shape of the percept.

The simplest interpretation is that the beat frequency is extracted by non-linear effects in brain and induces a magnetic quantum phase transition at magnetic tubes whose thickness varies and codes for a parameter (say scaling in some direction) characterizing the geometry of the primitive percept (or 'feature'). An analogous phenomenon occurs also for auditory inputs with slightly different frequencies fed into ears and makes it possible to 'hear' sounds below the audible range. The mechanism could be the same.

One can imagine two options concerning the ultimate representation of a simple geometric feature depending on whether the feature corresponds to a *collection* of points or *single* point at 'our' sensory canvas.

a) The visual percept corresponds to a *collection* of activated points at 'our' sensory canvas and activated geometric point corresponds to a standard mental image represented at brain level and assigned to a point of sensory canvas. The magnetic phase transition would initiate a process eventually activating particular projectors and the position of the quantum phase transition at the magnetic flux tube would determine the shape of the feature. One can criticize

this option. The brain applies modular hierarchy in the information processing and simple percepts like triangles and circles which are also fundamental in the elementary geometry, are ideal for basic features assignable with a *single* point of 'our' sensory canvas rather than being represented as composites of elementary features (points). The very fact that the place coding for the geometric shape of the feature is involved, suggests the same.

b) The visual percept is represented as a mental image inside brain or at some lower level sensory canvas so that the hierarchy of the sensory canvases would directly relate to the modularity of our sensory representations and sensory canvases would be in an intense interaction by quantum entanglement much like various subprograms of a computer program. This geometric mental image is assigned with a *single* point of 'our' sensory canvas by quantum entangling it with a projector ME projecting to a particular point of 'our' sensory canvas. The position of the feature at the sensory canvas might be determined by the position of the volume of intersection for the beams.

### 3.6 The relation of mental imagery to sensory experiences

Mental imagery is something which is difficult to understand in the framework of the standard neuro science. There are empirical results suggesting that visual mental images correspond to patterns of activity inside cortex, which are three-dimensional and continuous so that neural activation provides a concrete recognizable image about object. Also imaginative thought resembles very much visual imagery as is clear from the fact that language is full of visual metaphors. It is also known that imagery uses same regions of the cortex as real sensory experience and the problem is to understand why there is almost sensory experience involved with imagery.

In the framework of the standard neuroscience the obvious question is why the pattern of the imagery activity is not accompanied by a direct sensory experience. Also the boundary between direct sensory experience and imagination is sometimes problematic. For instance, in the state between sleep and awake sensory images often enter into mind. During dreams one can have sensory images and eidetic memory is essentially sensory memory. I have a personal experience about an extended state of consciousness, or rather whole-body consciousness (this experience actually made me consciousness theoretician!). During this state I could see my thoughts as vivid visual images and had also peculiar odour and taste experiences also reported to occur during mystic experiences.

If sensory representations are realized at the magnetic canvas, the difference between imagination and real sensory experience could result from the absence of the sensory representation. It is known that primary sensory areas, which in TGD framework are good candidates for the seats of the sensory projectors, are much less active during imagination than during real sensory experience. The projector MEs responsible for the sensory representation could be activated but be p-adic and thus represent only cognitive images. Similar argument would explain why motor activities are not accompanied by sensory experiences associated with motor pathways. This model would also explain why imagination can sometimes transform to real sensory experiences. The obvious reason for why sensory imagination should not create lively images is that this would lead to a dangerous mixing of the real and virtual.

### 3.7 Tests for the basic notions related to the magnetic sensory canvas

In the following some general tests for the notion of magnetic sensory canvas are proposed.



### 3.7.1 Quantum entanglement and fusion and sharing of mental images

Magnetic flux tubes, MEs and magnetic mirrors induce quantum entanglement between remote systems and this could be tested but this requires highly specialized experimenter. It has been recently found that quantum entanglement between macroscopic quantum systems consisting of about  $10^{12}$  Cs atoms lasts a time of order millisecond at least [21]. This is not what one might have expected on basis of standard quantum theory. The prediction of shared and fused mental images is dramatic prediction and one should try to find a precise test for this prediction. Correlated features in EEG of a large number of subject persons and simultaneous subjective report about similar mental images might be regarded as a support for this.

Brains and organisms could form something analogous to a computer network. Brains would be in shared use and that also we would use several brains via the sharing of mental images and our own brains would be more like personal computer. The EEG bands which do not contribute directly to our consciousness would be involved with the communications to higher levels selves like magnetic Mother Gaia and her mental images. During sleep brains would be used most effectively by these selves.

Sharing of mental images with higher level selves could involve Schumann resonances and other cavity resonances in an essential manner. This might be actually the case quite generally since cavity resonances might make possible the horizontal communications between vertical magnetic flux tubes structure associated with brains. Thus the study of EEG correlations around Schumann frequencies and other resonance frequencies could be especially rewarding.

The liberation of binding energy as a usable energy accompanies the generation of quantum entanglement and could explain why synesthetes whose left brain contains large synchronous regions during synesthesia are able to survive although brain metabolism is 18 per cent lower than normally. Quantum metabolism could also explain why the oxidative metabolism is very low during intense synchronous neuronal firing. The notion of quantum metabolism could also be tested.

Lian Sidoroff [39] mentions the experiment performed by M. Sue Benford et al. (unpublished), where exposing half of a hair sample to a non-ionizing radiation produced radiographic film exposure underneath the other half of the sample, located many miles away. The explanation of this effect must be based on macroscopic entanglement. The basic idea is that the effect is analogous to spin measurement in Einstein-Rosen-Podolski experiment: that is, the measurement of the spin of an electron fixes the spin of the electron entangled with it. If ordinary radiography is basically quantum measurement, then manyphoton states of X ray radiation entangle with the entangled states of the sample and film and radiographic exposure reduces this entanglement. In Benford's experiment there is one further entanglement involved: the manyphoton states of X ray radiation entangle with the first half of the sample entangled with the second half of the sample in turn entangled with the film and quantum measurement in this kind of situation leads to a remote radiographic film exposure. Variants of this experiment could provide a justification for the notion of macroscopic quantum entanglement.

Interestingly, by replacing 'radiographic exposure' with 'control action', one obtains a mechanism of remote control actions. If the sender is able to replace the entanglement between her control system and her physical body with a quantum entanglement between her own and receiver's control systems, the sender can use the receiver's body as it would be her own. There is a mental disease in which patient mimicks with an amazing authenticity the gestures of persons which she does not know beforehand. The quantum explanation would be that the motor areas of the patient quantum entangle with those of the object of mimicry.

### 3.7.2 MEs

Maxwell's electrodynamics predicts that radiation cannot penetrate Faraday's cage. If MEs cannot penetrate Faraday cage, it would seem that the TGD based model for the sensory representations falls down since it would predict that person in an ideal Faraday cage could not have any sensory experiences! One can argue that in many-sheeted spacetime this argument is lost because MEs by definition are em bridges outside the atomic spacetime sheets where the Faraday cage acts.

This is of course just a guess and the conservative minded colleague would say that MEs penetrating Faraday cages should have been observed long ago. Something much more clever could indeed be involved.  $Z^0$  MEs do not care about Faraday cages and biosystem could cheat the builder of Faraday cage by first generating  $Z^0$  ME penetrating the Faraday cage without any difficulties, and then color rotating it to an em ME acting as a sensory projector. If sensory projector MEs indeed result from  $Z^0$  MEs representing control commands by a color rotation, this mechanism is natural.

One can test the presence of MEs by studying whether system can emit radiation penetrating Faraday cage. In particular, if the system generates MEs with a nonvanishing em vacuum current, a system closed in Faraday cage could generate coherent photons outside the cage having correlations with the functioning of the system. One could try to detect Popp's biophotons for living matter inside Faraday cage. The effect of Faraday cage on 40 Hz EEG oscillations, which would naturally be associated with sensory representations, would be also very interesting.

There are claims that alpha waves, in particular at Schumann resonance frequency can penetrate Faraday cage (for instance, the work of Dr. Andre Puharich). If Schumann resonance corresponds to oscillations of magnetic flux tubes, one can understand the penetration as occurring along magnetic flux tube structures.

### 3.7.3 Topological field quantization of magnetic fields and superconductivity

One could in principle test whether Earth's magnetic field in outer space allows tubular and/or shell like topological field quanta which would be ideal magnetospheric sensory canvases. The Russian experiments for overunity energy production in rotating magnetic systems demonstrate the presence of shell like magnetic field structures in these systems [34, 32]. The possible presence of vertical magnetic flux tube structures emanating from brain could be tested as well as the presence of magnetic circulation. For instance, cyclotron radiation from this kind of structures could serve as a signature. Also effects like cold fusion are made possible if atomic nuclei can approach target nucleus along magnetic flux tube and thus avoid Coulomb wall. 'Houdini effect' might be also crucial for the understanding of catalyst action.

The view that magnetic flux tube structures associated with organisms and magnetosphere serve as templates for the self-organization of the ordinary biomatter encourages to consider the possibility that supra currents can flow between healer and healed and that the supracurrent circuitry (magnetic circulation) is not restricted inside single organism but can connect different organisms to each other. Also adjuncts could become part of these circuits. A possible test for the hypothesis of superconductivity in macroscopic length scales is based in the addition of isotopes of selected ions to other half of an organic sample and finding whether the fraction of ion isotopes increases in the second half of the sample located, say, at the second side of the globe.

The treatment of water by magnetic fields is known to stimulate plant growth and to affect IR absorption spectra, surface tension and crystallization patterns. The effects resemble those achieved by the treatment of healer. The emission of biophotons in IR and UV range have been frequently measured in the proximity

of healers. This is easy to understand if MEs and magnetic fields form magnetic mirrors so that presence of either makes the presence of another probable.

### 3.7.4 Sensory canvas and magnetospheric events

That supra currents could flow in magnetospheric length scales is in consistency with the magnetic sensory canvas model. Even more, the model for auroras as an astrophysical quantum phenomenon discussed in the chapter "Biosystems as superconductors" of [30] relies on the assumption that the magnetic flux tubes of both earth's and solar magnetic fields are superconductors (solar wind would thus flow as supra currents). A topological model for the crucial reconnection phenomenon of the magnetic field lines of earth's and solar magnetic fields results. Reconnection is accompanied by the leakage of the supra currents to nonconducting spacetime sheets through join along boundaries bonds: this mechanism is a good candidate for a universal mechanism leading to a breakdown of superconductivity and is presumably involved with a wide class of atmospheric phenomena like lightnings, ball lightnings, tornadoes, etc.. The model allows to identify the mechanism generating the electric fields responsible for the acceleration of ions eventually giving rise to auroras via collisions with the ions of the ionosphere.

The model for the auroras suggests that a given magnetic flux tube contains only single charged ion species. This would mean that magnetic sensory canvas decomposes to subcanvases representing different types of sensory information, perhaps different selves in self hierarchy. This kind of decomposition might be of fundamental importance for conscious information processing and is indeed assumed in the proposed model of sensory qualia and sensory representations (see the chapter "Spectroscopy of Consciousness").

#### 1. *Sounds from auroras as ESPs?*

The sounds claimed to be heard during auroras but not measured by microphones might represent genuine extrasensory percepts resulting from the perturbations of the magnetic auditory canvas caused by the auroras. The breakdown of the super conductivity might even correlate with the loss of consciousness reported to sometimes occur during perceiving auroras. This picture encourages to think that weather phenomena, in particular thunder storms, might relate to our consciousness also in extrasensory manner. There are also reports that seeing auroras can cause a loss of consciousness. This effect might not be only due to the depth of the aesthetic experience. The effects of magnetic storms on patients of mental hospitals are also well documented. If the transpersonal sensory representations responsible for third person aspect of consciousness are indeed realized at magnetic flux tubes structures associated with Earth's magnetic field, one is led to ask whether the dissipative processes associated with auroras destroying ionic supra currents might indeed affect directly our consciousness, inducing even a loss of consciousness. The effects of auroras as well as magnetic storms and substorms are indeed strong in the outer magnetosphere (in particular in plasma sheet), where the highest level representations should reside (see the chapter "Magnetospheric sensory representations" of [31]).

#### 2. *Meteor sounds and 40 Hz thalamocortical resonance frequency band*

There is also some other evidence for the sensory canvas hypothesis. Since 16th century it is known that also meteors produce audible sounds. What is mysterious that there is no time lag due to the propagation through the atmosphere. The explanation is that it is very low frequency em waves which propagate to Earth and generate sounds by interacting with the objects at the surface of Earth.

Joined by the International Leonid Watch - Croatia (ILWC) project, a group of scientists presented the first instrumental detection of elusive electrophonic meteor sounds. In November 1998, the researchers from the Croatian Physical Society and the University of Kentucky organized an expedition to Mongolia

to observe the anticipated Leonid meteor shower and shed some light on the phenomenon [42]. The complete data analysis revealed two electrophonic (electronically detected) sounds that provided several important clues about the nature of this longstanding astronomical mystery. It became clear that sounds were created when the meteors were crossing night-time ionosphere. The existing theories cannot however completely explain the phenomenon. The energy of meteor does not seem to be high enough to invoke the electric fields needed to explain the electronically recorded sounds, and strangely enough, the frequencies are much lower than expected, in the region 20-40 Hz.

Magnetic mirrors as carriers of the electromagnetic perturbations might allow a better understanding of the phenomenon. Perhaps the audible sounds, in contrast to the electronically recorded ones which seem to be of much lower frequency, are in fact generated by the direct perturbations of magnetic or  $Z^0$  magnetic auditory canvas: this would explain why there is no lag due to the propagation through atmosphere. Electronically recorded sounds could be induced by the em perturbations propagating along magnetic mirrors and the mirrors might act as resonant wave guides amplifying the em fields (electrophonic sounds had frequency spectrum in the region of lowest Schumann frequencies). Notice that magnetic mirrors of length shorter than Earth's circumference would give rise to higher resonance frequencies than Schumann frequencies. Also cavity resonances and TGD counterparts of Alfvén waves might be involved.

### *3. Day-night and geographic variation of the sensory magnetic canvas and EEG*

Magnetosphere should be responsible for the sensory (and other) representations related to memory and third person aspects of consciousness, whereas personal magnetic sensory canvas is responsible for the first person aspects. This implies definite predictions. For instance, space traveller (in particular moon traveller) consciousness should differ from the ordinary consciousness. Also night-day variation in consciousness are expected. This might correlate with the fact that we usually prefer to sleep during night time. Magnetic storms should have (and indeed are known to have) effects on consciousness, in particular so at delta and theta bands.

Also the possible dependence of EEG on the location of a given subject person could be studied. Personal sensory magnetic canvas presumably moves together with the subject whereas resonance condition for the length of ME ( $f = c/L = f_m$ ) fixes the length of ME and also to high degree the point of magnetosphere where ME projects. The most natural option is the point at which ME projects changes so that magnetic transition frequency is not changed. This would predict minimal changes in EEG.

One could also test the third person aspects of consciousness in subjects in artificial satellites. What is known that an electric field oscillating at 10 Hz frequency is needed to keep the biological clocks of astronauts ticking: this might relate to the change of the endogenous cyclotron frequencies of Iron and Cobalt.

### *4. Plasmons as fundamental magnetic life forms and experiences about encounters of ETs*

The explanation of Persinger for the experiences about encounters with ET:s generalizes: the magnetic perturbations of Earth caused by tectonic activity at tectonic lines generates spray of magnetic flux tubes from the site of the tectonic activity and these flux tubes can reconnect with the magnetic flux tubes of personal sensory canvas and this induces a leakage of supra currents and changes the structure of the personal sensory canvas. This can also lead to generation of plasmons, which are good candidates for the fundamental lifeforms. The entanglement of plasmonic mental images with ours might explain the experiences about encounters with angles, ETs,.. Even genuine UFOs might be plasmons and contain as a crew sensory representations of habitants of a planet of distance

star!

The challenge is to develop precise experimental tests for this general picture. Artificial generation of conscious experiences would be one such test. For instance, if one could decouple brain regions giving the dominating sensory and motor input (for instance, by transcranial magnetic stimulation), the possible transpersonal contribution to the sensory canvas could begin to dominate and give rise to a plethora of altered states of consciousness: OBEs, encounters of deceased, life review,... Also miraculous cognitive feats such as those performed by certain autists could become possible. One could also test whether the presence of artificially generated plasmons induce altered states of consciousness.

## 4 A general model for remote mental interactions

TGD provides a general model for the phenomena like remote mental interactions defying standard science explanations (see the article of Lian Sidorov [39]). Remote healing and viewing are special case of remote mental interactions. One healing method goes under name Qigong (see the article [13]). Qigong is a general term for a large variety of traditional Chinese energy exercises and therapies. Qigong is generally considered as a self-training method or process through Qi (vital energy) and Yi (consciousness or intention) cultivation to achieve the optimal state of both body and mind. The traditional Chinese medicine postulates the existence of Qi, which could be regarded as a kind of subtle energy circulating around the physical body.

In TGD framework the energy associated with MEs and supra currents flowing along magnetic circuitry would be a natural counterpart of Qi. Also the energy liberated when quantum entangled bound state between healer and healed is generated is a good candidate for Qi. Yi would in turn would translate to p-adic cognitive representations representing also intentions, perhaps p-adic variants of MEs. Internal Qigong refers to self healing whereas external Qigong means directing Qi energy or intention to help others by opening Qi blockages or inducing the sick Qi to get out of body, or helping to achieve Qi balance. The physiological, chemical and electromagnetic effects of both internal and external Qigong have been studied ([39] contains large number of related references). Also the effects of Qigong healing on cancer has been studied [13].

### 4.1 Definition of the model

The general model for remote mental interactions is formulated using terms sender and receiver: to get a more concrete picture reader can replace them with healer and healed. It is not obvious basic what one means with healer and healed now: their physical bodies or their magnetic bodies. At this stage one cannot resolve this question: it might well be that both bodies are involved and which dominates depends on the situation. For instance, in remote healing magnetic signals might be transferred between magnetic bodies and in healing by touch between physical bodies.

a) Magnetic mirrors connecting the sender and receiver make possible a universal mechanism for the transfer of intent (Yi) and action (Qi). p-Adic MEs represent the transfer of a mere intent and real MEs represent a transfer of action. p-Adic ME can be transformed to real ME either by receiver or some higher level magnetic self. Magnetic mirrors need not connect sender and receiver directly and magnetospheric selves could act as relay stations. In fact, it might be better to identify the healer as the part of healer at the magnetic sensory canvas.

ME-magnetic flux tube pairs characterized by their fundamental frequencies make possible bridges between sender and receiver and allow a resonant interaction in which sender can initiate various control commands or 4-dimensional

templates represented as holograms. Also smaller MEs can be send along these MEs serving as bridges (this is like throwing balls with light velocity!).

b) It is quite possible, and perhaps even necessary, that also multi-brained and -bodied higher level magnetospheric selves actively participate in the process. Essential aspect is the fusion and sharing of mental images of selves which can be also at different levels. For instance, healer shares the mental image of the healed, or healer and healed share a mental image of higher level self. The model for magnetospheric sensory representations allows rather concrete view about how conscious magnetosphere could participate with the remote mental interaction.

c) What is of special interest is that the resonance condition  $f = c/L = f_m$  determining the length of the projector ME determines the distance between the healer and healed if ME connects them directly. For instance, for electron's cyclotron frequency (distance would be 500 meters now, for proton distance would be  $2.5 \times 10^6$  meters). If the healing involves signal from the healer to the magnetosphere and from magnetosphere to healed, resonance condition can be satisfied easily for both steps under much more general conditions.

d) The binding energy liberated when bound state entanglement is generated between the sender and receiver could be used for generating the desired effect. In case of healing, the energy could go directly to healing or to control purposes. The sharing of the mental images made possible by entanglement makes possible telepathy like aspects of the remote mental interaction. These aspects need not be directly conscious to healer or healed since mental images of sub...subelves can be in question.

One can imagine also a more detailed model.

a) The transformation of intention to action could correspond to the transformation of p-adic  $Z^0$  ME to its real counterpart. This ME color rotated to em ME would in turn represent sensory feedback.

b) The action could be realized in exactly the same manner as motor action the only difference being that the command would come from the sensorimotor canvas of the healer. The  $Z^0$  ME associated a magnetic mirror connecting sender and receiver could act as a reference wave which can initiate an arbitrarily complex hologram representing biological program. Memetic code provides more complex realization of control commands and might be favoured by safety reasons. Sender has the ability to generate and amplify the frequencies which induce holograms representing the control commands. In particular, sender can initiate complex biological programs without knowing anything about their functioning.

c) It is also possible that healer interacts directly with the sensorimotor canvas of healed by entanglement of mental images and uses the generalized motor system of healed.

The proposed mechanism works in all length scales and for all kinds of remote mental interactions. Even more, these remote mental interactions would not be some rare anomalies but a necessary prerequisite for the development of social structures. Fusion and sharing of mental images would be at work at molecular level and explain molecular recognition and processes like DNA translation and replication: the notions of molecular and cell society would make sense in quite literal sense.

## 4.2 Comparison with data

The model of remote healing and vision proposed above seems to conform with the findings described in [39] (the URL references of this article provide a comprehensive source of background data).

### 4.2.1 Coordinate healing and healing using adjunct

The basic observation [39, 5] is that there are two classes of transfer of intent (including remote healing and vision as special cases).

a) The target is found by the remote healer or viewer being given a name, location, birthdate, etc. What is strange is that this information need not have any conscious meaning for healer. This can be understood if multibrained magnetic selves are involved with the process so that it is enough that the information has meaning for some brain involved. The well-documented effects of prayer groups (see [5] which gives various aspects of spiritual healing) could be understood if the higher level selves receiving information from all prayers are actively engaged in the process. Also a coherent amplification of the effect (the so called Maharishi effect in transcendental meditation proportional to the square of the number of participants) could be involved. As noticed, resonance condition for the length of ME strongly suggests that the magnetospheric selves are indeed involved with the remote mental interaction.

b) An adjunct (an object previously treated by the healer, such as water, cloth, a crystal, etc) is used by the healee with or without the healers's knowledge. Adjunct could act as a relay station being connected to the healer and healee by MEs containing same frequencies. Besides serving as relay station, the adjunct can also act as an antenna amplifying the healing frequencies. This would explain why water (LC water blobs), linear structures like lock of hair of healee containing DNA, and crystals are effective adjuncts. This also explains why remote viewer can have vision about the viewed by touching some object belonging to the viewed.

#### **4.2.2 The role of imagery**

The role of imagery is known to be important. The abilities of the sender to transmit the intent seem to be better the more vivid is his/her ability to imagine the intent. This conforms with the hypothesis that the transfer of intent involves at basic level the generation of a p-adic spacetime sheet transformed to real form at some stage and that the transformation to a real action occurs in the easiest manner if the p-adic pseudo constants involved are genuine constants as for real solutions of the field equations.

#### **4.2.3 Two kinds of healing mechanisms seem to be involved**

TGD view conforms with the fact that two kinds of healing mechanisms seem to be involved. Healer either uses his own energy to influence the healee or uses 'universal energy'. In the first case healer herself would transform the p-adic intent into a real action. In the second case this transformation is carried out by the healee or some third agent, possibly higher level self.

#### **4.2.4 Distance does not seem to matter**

The model explains also how healing effects can be achieved over distances of thousands of miles. The basic characteristic of MEs is that they allow a directed propagation of classical energy without attenuation (Maxwell's equations do not allow this kind of solutions). Thus, if magnetic mirrors serve as bridges between the sender and receiver of intent, the high precision communication of intent does not look mysterious. The observation that Faraday cage does not seem to prevent remote mental interactions, has been used as a justification for the claim that there must be some new form of energy involved with parapsychic phenomena. Perhaps the most elegant solution of the problem is that Faraday cage is penetrated by  $Z^0$  ME representing the action of the healer and then color rotated to em ME representing the feedback. As noticed, there are somewhat anecdotal claims that EEG waves in alpha band can penetrate Faraday cage (experiments of Dr. Puharich)

#### **4.2.5 The effects of healers to the em frequency spectrum of water**

There is evidence that healers can affect the em frequency spectrum of water. In [39] examples of these effects are listed: the Raman spectra of water can be

influenced from a distance up to 1900 km; the polarization angle of He-Ne laser can be affected by so called waiqi method; the IR spectrum (hydrogen bonds) of sterile water changes in the proximity of therapeutic touch practitioners. Experiments do not support the hypothesis that the time of exposure correlates with the intensity of the effect. On the other hand, the treatment time of adjuncts is known to be an important factor in the distant healing. Also the UV spectrum of the water treated by healers differs from that for control samples.

It is not difficult to understand these effects in terms of magnetic mirrors. The effects at UV frequencies can be understood if MEs with lengths shorter than  $10^{-7}$  meters are involved. Microtubules in UV length scale range are natural candidates for being accompanied by UV MEs (for instance, the receptors in retina contain microtubules in UV wavelength range). The cell membrane could contain an array of MEs of length  $L(151) = 10$  nm parallel to lipids whereas genes should involve also MEs with lengths corresponding to the wavelengths of visible light [23].

Especially interesting wavelengths for biophotons in IR-UV range are the p-adic length scales  $L(151) = 10$  nm,  $L(157) = 80$  nm,  $L(163) = 640$  nm, and  $L(167) = 2.52 \mu\text{m}$  which all correspond to Gaussian Mersenne primes (Mersenne primes are in a preferred role in elementary particle physics: all charged leptons, nuclei, hadrons and intermediate gauge bosons correspond to ordinary or Gaussian Mersennes). That these primes span all p-adic length scales between cell membrane thickness and cell length scale could be the number theoretic correlate for the miracle of life. Needless to emphasize, the finding that these frequencies are biologically special frequencies would give an enormous boost for TGD approach. The transfer of intent could involve sending of MEs with short lengths, say in UV or IR range. These MEs would move inside larger MEs forming the bridge between sender and receiver and would not obviously satisfy resonance condition.

$L(163) = .640 \mu\text{m}$ , which is in the lower end of the visible portion of photon spectrum ( $.4 - .7 \mu\text{m}$ ) and thus corresponds to red light, equals with .6 per cent precision with the wavelength  $\lambda = 644 \mu\text{m}$  associated with photosynthesis by chlorophyll b) and with 6 per cent precision to the wavelength  $\lambda = 680 \mu\text{m}$  associated with the photosynthesis by chlorophyll a). Could it be that magnetic mirrors with these wavelengths amplify photosynthesis by first amplifying the incoming visible light in a resonant manner?

### 4.3 The EEG correlates for the transfer of intent

In one class of experiments described in [39] the sender and receiver are located separately in sensorily-shielded rooms and extrasensory transfer of information is attempted while both sender and receiver are connected to electroencephalographs. The sender transmits his intent during randomly selected intervals and receiver attempts to guess the moments of transmission. Experiments demonstrate no conscious ability to guess the moment of transmission. However, a statistically significant correlation between the actual sending time and the alpha wave amplitude was found in the receiver.

Alpha wave synchronization was detected between pairs of qigong masters and their receivers even when they were separated by a distance of 4 km. A possible interpretation is that the low frequency part of EEG, in particular alpha band (perhaps Schumann frequency) are used by the higher level multibrained magnetic selves which act as relay stations receiving the intent of the sender and communicating it to the receiver. This hypothesis is natural since Schumann frequencies are associated with the perturbations of Earth's spacetime sheet.

The model for the magnetospheric sensory representations fixes the alpha band in case of protonic cyclotron frequency to the transition region between inner and outer magnetosphere. The time lapse between the sending and onset of the unconscious physiological response in the receiver was found in these experiments to vary in the range 10-17 seconds. This corresponds to p-adic



length scale of order 3 – 5 Gmeters. Perhaps magnetic mirrors with length in the time interval of 5-8.5 light seconds are involved. The cyclotron time scale of proton in plasma sheet, which should correspond to the highest level of magnetospheric consciousness, varies in the range 8.4 – 16.7 seconds (see the chapter "Magnetospheric sensory representations" of [31]).

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