

Biosystems as conscious holograms

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Abstract

In a nutshell, the notion of conscious hologram follows from the topological field quantization. Classical fields and matter form a Feynman diagram like structure consisting of lines representing matter (say charged particles) and bosons (say photons). In quantum-classical correspondence,

the matter lines are replaced by space-time sheets representing matter (elementary particles, atoms, molecules,...), and virtual bosons are replaced by topological light rays ("mass-less extremals", MEs). Also magnetic flux tubes and electret like space-time sheets dual to them are an important part of the model, and together with MEs they serve as correlates for bound state quantum entanglement.

The internal lines of the Feynman diagram are analogous to wave guides. The classical fields and coherent light propagating along these waveguides interfere at the space-time sheets representing the vertices of the Feynman diagram identifiable as the "points" of the conscious hologram. The formation of the hologram corresponds to the self-organization induced by the leakage of supra currents to smaller (say atomic) space-time sheets. The leakage is induced by the high frequency MEs propagating along low frequency MEs serving as correlates for quantum entanglement. The 3-D stereovision associated with the ordinary hologram generalizes to a stereo consciousness resulting, when the mental images associated with different "points" of the conscious hologram fuse to a single mental image. Central nervous system can be regarded as a conscious hologram of this kind.

Peter Gariaev and his group have discovered a radiowave emission from DNA induced by laser light. This finding allows an explanation in terms of a many-sheeted laser action, and a rather detailed view about how biosystem acts as a many-sheeted laser at a wide wave-length range emerges. The notion of conscious hologram is applied to remote mental interactions and various tests are discussed.

Keywords: Many-sheeted space-time, topological field quantization, Feynman diagram, mass-less extremal, conscious hologram, remote mental interactions.

1 Introduction

The idea that the brain and perhaps all bio-matter, and even the entire Universe, can be regarded as some type of a hologram (see for instance, the articles of Miller and Webb [1] and of Gariaev *et al* [2] in the previous issue of JNLRMI) has a long history but the question about the precise physical sense in which this holds true has remained without a satisfactory answer.

1.1 Maxwellian hologram is not enough

The concrete Maxwellian idea about hologram plate resulting as an outcome of the interference of the reference beam and light scattered from an object can serve only as a guiding metaphor. First of all, coherence occurs only in what are called coherence regions and the problem is that Maxwellian theory does not really provide a first principle definition for the coherence regions. In quantum theory similar problem is encountered. Secondly, in living matter it is not at all clear whether reference beam exists at all. Third, living matter is a dynamic granular structure and far from a homogeneous hologram plate. Fourth, the idea about storing memories, one of the basic motivations of the hologram paradigm, has its own problems although multi-holograms are certainly possible.

1.2 Topological quantization

In TGD framework topological quantization provides a precise first principle description of coherence. Topological quanta are the coherence regions of the

classical field and classical decoherence means the splitting of the space-time surface to topological quanta. This process gives rise to the granular structure of matter and space-time sheets in various length scales are excellent candidates for basic units of holographic structures at the this level of the p-adic length scale hierarchy. At quantum level bound state quantum entanglement having join along boundaries bonds as a space-time correlate is responsible for the macroscopic and macrotemporal quantum coherence. The new view about time means that there is no need for storing large number of holograms in the same physical substrate.

At the level of quantum TGD the notion of quantum gravitational hologram emerges naturally in the sense that 3-surfaces code for data about pieces of 4-surfaces just like 2-dimensional hologram plates codes data about a 3-dimensional image. Classical non-determinism of the basic variational principle however implies that TGD based physics does not reduce to the moment of big bang. Massless extremals which are topological counterparts of light rays in TGD could provide a realization of this idea. Unfortunately, this notion of hologram is yet quite too abstract to be applicable to the concrete modelling of living matter.

Even more, the basic challenge is to generalize the notion of the ordinary hologram to that of a *conscious* hologram, about which bio-holograms would be examples. The notion of quantum gravitational hologram is defined at the level of geometric, purely physical existence whereas conscious holograms exist at the level of subjective existence defined by the sequence of quantum jumps and giving rise to the self hierarchy. Of course, these two notions of hologram must be closely related.

The notion of conscious hologram combines the saint and sinner aspects of consciousness to single concept: macrotemporal quantum coherence due to the generation of bound state entanglement and giving rise to co-operation on one hand, and the dissipative self-organization giving rise to Darwinian selection and competition on the other hand.

1.3 Conscious hologram

In nutshell, the notion of conscious hologram follows from the topological field quantization. Classical fields and matter form a Feynman diagram like structure consisting of lines representing matter (say charged particles) and bosons (say photons). The matter lines are replaced by space-time sheets representing matter (elementary particles, atoms, molecules,...), and virtual bosons are replaced by topological light rays ("mass-less extremals", MEs). Also magnetic flux tubes appear and together with MEs they serve as correlates for bound state quantum entanglement.

The classical fields associated with MEs interfere only at the nodes, where they meet, and one has a hologram like structure with nodes interpreted as the points of a hologram. Thus one avoids the loss of information caused by the interference of all signals everywhere. This aspect is crucial for understanding the role of em fields in living matter and brain. The MEs corresponding to 'real photons' are like laser beams entering the hologram and possibly reflected from it. What is new that the nodes can be connected by 'virtual photon' MEs also analogous to laser beams. Hence also 'self-holograms' with no laser beam from external world are possible (brain without sensory input).

Conscious hologram has a fractal structure: there are space-time sheets at space-time sheets and high frequency MEs propagating effectively as mass-less

particles inside low frequency MEs serving as quantum entangling bridges of even astrophysical length. The particle like high frequency MEs induce 'bridges' between magnetic flux tubes and atomic space-time sheets at the receiving end. This makes possible the leakage of supra currents from magnetic flux tubes to atomic space-time sheets analogous to the exposure of film producing hologram. The leakage induces dissipation, self-organization, and primitive metabolism as a cyclic flow of ionic currents between the two space-time sheets, and thus a Darwinian selection of the self-organization patterns results. Under certain conditions the leakage followed by dropping back to the larger space-time sheet can also give rise to a many-sheeted laser. The low frequency MEs are responsible for the bound state entanglement, macroscopic quantum coherence and co-operation whereas high frequency MEs are responsible for self-organization and competition.

The 3-D vision associated with ordinary holograms generalizes to stereo consciousness resulting in the fusion of mental images associated with the points of conscious hologram.

In the sequel the basic ideas of the many-sheeted quantum control are summarized, the notion of conscious hologram is introduced, a concrete model for how living system acts as a many-sheeted laser emerging from the experimental findings of Peter Gariaev and his group [14] is described, and the application to remote mental interactions and various tests of the concept are discussed at the general level.

The illustrations of many-sheeted spacetime, topological field quantization, and of basic concepts of TGD inspired theory of consciousness might help the reader to assimilate the basic notions. See

"Two-dimensional illustrations related to the many-sheeted space-time concept" at <http://www.emergentmind.com/tgdillu/illua.html>, and

"Illustrations related to the many-sheeted space-time concept and the notions of TGD inspired theory of consciousness" at <http://www.emergentmind.com/tgdillu/illuc.html>.

2 Co-operation and competition as different aspects of quantum consciousness

2.1 Breaking of superconductivity, metabolism and homeostasis

The assumption that magnetic flux tubes of say Earth's magnetic field serve as carriers of supra currents in living manner leads to concrete views about breaking of super-conductivity as a basic mechanism of metabolism and homeostatic control.

2.1.1 Leakage mechanism

The basic mechanism for the breaking of super-conductivity is the generation of 'bridges' between super-conducting magnetic flux tubes and some smaller space-time sheets, which need not be always atomic space-time sheets as assumed in the earlier formulation of the model. The energy of photons inducing the bridges corresponds naturally to the difference for the energies of the ion at atomic space-time sheet and superconducting magnetic flux tube. In the case that the energy at magnetic flux tube is very small as compared to the zero point kinetic energy at smaller space-time sheet, the energy of photon must be the zero point

kinetic energy at least. This option will be discussed in the sequel. The ions at the smaller space-time sheet dissipate their energy and end up to having only zero point kinetic energy plus possible thermal energy.

Quantum-classical correspondence suggests that it should be possible to understand how the absorption of photons corresponds to the process in which 'bridges' are generated by MEs. MEs carry transversal electric and magnetic fields. There is infinity variety of various kinds of MEs but for the simplest MEs electric and magnetic fields have constant linear direction orthogonal to each. Electric field defines a potential difference which is constant in length scales much shorter than the wave length of ME. By generalizing the quantization of magnetic flux to that for electric flux one obtains that the the potential difference satisfies

$$eV = n\omega = nf \times 2\pi .$$

This means that an ion having a charge e accelerating in the radial field gets energy $E = n\omega$. Thus absorption of photon with energy $n\omega$ corresponds classically to an acceleration in the electric field of ME and getting same energy. For ion having opposite charge acceleration would be replaced by deceleration and one must speak of emission of photon with energy $E = n\omega$. The model for ADP-ATP process is indeed based on the assumption that metabolic energy generates an electric potential in which protons are accelerated to get energy of .5 eV (for TGD based model see the chapter "Macroscopic quantum coherences and quantum metabolism as different sides of the same coin" [6]).

2.1.2 New manner to interpret gap energy of bio-super-conductor

The values of the gap energies of super conductors are identifiable as differences of zero point kinetic energies for the space-time sheets, which correspond to the value of p-adic prime nearest to that associated with the magnetic flux tubes in question and present in the topological condensate. For Earth's magnetic field one has $k = 169$ from flux quantization. For proton the zero point kinetic energy at $k = 151$ space-time sheet is about $E_0 = 2^{137-151} \times .5$ eV, which corresponds to a critical temperature of about $T_{cr} \sim E_0 = .3$ K. For $k = 149$ the critical temperature is about 1.2 K. For $k = 139$ the critical temperature would be 1250 K. If this picture is correct, high T_c super conductors result, when the intermediate space-time sheets between those representing superconducting magnetic flux tubes and atomic space-time sheets are eliminated somehow from the material. This goal could be achieved by using strong enough magnetic fields for which the p-adic prime is larger than $k = 151$ so that there are not so many p-adic primes to be eliminated. Also secondary p-adic primes are allowed. For instance, $L_2(71)$ resp. $L_3(37)$ corresponds effectively to $k = 142$ resp. $k = 141$ and critical temperature of 156 K resp. 312 K.

2.1.3 The new view about metabolism

This picture about breaking of bio-superconductivity leads to a new view about metabolism. .5 eV is the value of the quantum of metabolic energy and corresponds to the zero point kinetic energy of proton. The interpretation is that this energy is the minimum energy needed to kick proton from magnetic flux tube of Earth's magnetic field (say) to the atomic space-time sheets and is liberated in the reverse process. Irradiation by coherent IR photons with energy of .5 eV induces both the formation of the bridges making possible the transfer of protons to atomic space-time sheet and dropping them back. The first

process is like pumping of atoms to excited states and the second process is like laser emission of coherent light amplified by the presence of IR photons (also absorption of negative energy photons could be involved as will be discussed below). The process is also accompanied by cyclotron radiation (scaling law of homeopathy). When glucose is metabolized IR photons of energy of .5 eV are liberated and these photons induce both pumping and induced emission. This process involves the $F_0 - F_1$ machine responsible for the metabolic control. Phase conjugates of IR laser waves should reverse the functioning of $F_0 - F_1$ machine if this view is correct.

Also other ions, even electrons, can be involved in this kind of metabolic cycles and the process can occur between other pairs of space-time sheets. For instance, $k = 151$ space-time sheets microwave photons could induce similar metabolic cycle for protons or of their Cooper pairs and also other ions. The value of the zero point kinetic energy depends on the details of the local environment and this would make possible very effective control of the process. For a given microwave energy the ions associated with only particular kind of the molecular environment would participate in the cycle. Thus microwaves could make possible very precise quantum control. The inducing microwaves could be emitted by the conformational transitions of proteins and other biomolecules and this would make possible precise and selective biocontrol from protein level since the thermal widths of states would be extremely narrow at $k = 151$ space-time sheet. The phase conjugates of microwaves would induce the time reversal of this process making possible healing by time reversal of the biological programs. This would build down to a very elegant and economical control of the metabolism and homeostasis combining both many-sheeted laser physics and superconductivity. The analysis of the findings of P. Gariaev's group [2] suggests that biological microwave lasers are only example of bio-lasers.

2.1.4 Many-sheeted laser action

There is strong analogy with the functioning of laser. The transfer of ions to smaller space-time sheets is analogous to the pumping of atoms to higher energy state. The presence of coherent photons at this energy implies also the many-sheeted analog of the induced emission: the ions having only thermal energy drop back to the magnetic flux tube by emitting photon at energy corresponding to the zero point kinetic energy. If the energy obtained in the kicking is exactly the zero point kinetic energy and the smaller space-time sheet is very cold no dissipation occurs and the situation is especially favorable for laser action.

The irradiation of system with phase conjugate beam of coherent light at this frequency could help to restore the super-conductivity: this hypothesis might be tested for high T_c superconductors, which might be based on the same mechanism as bio-super-conductors (see the chapter "Biosystems as superconductors" of [5]).

2.1.5 The special role of microwave photons in homeostasis

Microwaves are certainly not the only players in homeostasis but it seems that they have a special role. Plasmoids consisting of closed magnetic flux tube structures carrying supra currents plus atomic space-time sheets associated with them, are good candidates for primitive electromagnetic lifeforms. Ordinary biomatter is assumed to self-organize around these structures and nerve circuit represents a good example of a structure resulting in this manner.

Plasma balls are known to be accompanied by microwaves. This suggests that microwave photons could induce these bridges, break super-conductivity, and induce energy feed and self-organization. A similar breaking of super-conductivity might be also involved with the driving of the super-conducting ions to the atomic space-time sheets in the living matter. It is also possible that the process does not involve much dissipation ($k = 151$ space-time sheet should be very cold and in this case many-sheeted maser would result).

There are several candidates for the source of microwaves in case of plas-moids. What makes these sources so interesting from the point of view of biology is that the frequency spectrum is almost universal.

a) For instance, the ionic currents between $k = 151$ space-time sheets and Earth's magnetic flux tubes makes possible masers. The dropping of electron Cooper pairs from $k = 157$ space-time gives rise to microwave photons with energy about 10^{-3} eV, wavelength of 1.24 mm. More generally, the frequency is $f(A, k) = 2^{157-k} \times .25$ GHz with the assumption that the size of space-time sheet is given by $L(k)$. The dropping of ion of mass number A from space-time sheet k gives rise to photons with frequencies $f(k) = 2^{151-k} \times .15/A$ GHz frequency.

b) The multiple-coiled structure of DNA is expected to give rise to a hi-erarchy of magnetic flux tubes, and cyclotron transitions at these magnetic flux tubes serve as sources of microwaves. Electronic cyclotron frequency, as-suming p-adic scaling of the Earth's magnetic field strength ($k = 169$), is equal to $f_c(k) = 2^{163-k} \times .038$ GHz, whereas ionic cyclotron frequency is $f_c(A, k) = 2^{151-k} \times .8/A$ GHz. As will be found, the transitions between cy-clotron states at different space-time sheets allow to understand the radio-wave emission from DNA induced by laser light.

There are also more conventional sources of microwaves.

a) Coherently occurring protein conformal transitions could generate mi-crowaves and could be also amplified by the many-sheeted masers. Also molec-ular masers are possible (say OH maser).

b) The rotational transitions of clusters of water molecules could emit mi-crowaves and perhaps mimic and amplify the microwaves generated by pro-teins. The clusters of water molecules forming liquid crystals can mimic the conformational and rotational spectrum of various molecules, and that the abil-ity to reproduce the rotational frequency spectrum of the medicine molecule is an essential element of homeopathic healing. The level of self-organization of water would thus be measured by how complex mimicry it is able to perform.

Why rotational microwave energy spectrum is so important for healing, might be understood as follows. The many-sheeted current circuitry, involv-ing atomic space-time sheets and magnetic flux tubes and also other space-time sheets, is extremely complex control structure (see the chapter "Quantum con-trol and coordination in biosystems" of [5]). The continual regeneration of bridges between, say, atomic space-time sheets and magnetic flux tubes by mi-crowaves emitted by proteins is necessary to sustain this circuitry. An important category of diseases is due to the failure to generate the bridges between super-conducting and atomic space-time sheets so that this control circuitry suffers shortcuts. Perhaps the genetic expression of some proteins responsible for the microwaves generating particular bridges fails. The medicine or its homeopathic counterpart would help to generate (or even re-establish the generation of) the microwave spectrum responsible for the generation of the lacking bridges in the circuitry.

2.2 Combining macrotemporal quantum coherence and dissipation

The question is how the saint and sinner aspects combine. The needed piece of the puzzle comes from the scaling law of homeopathy. The law states that high and low frequencies accompany each other, the frequency ratio being $f_{high}/f_{low} \simeq 2 \times 10^{11}$ in the simplest situation when the ions leak to atomic space-time sheet from the magnetic flux tubes of the Earth's magnetic field. The ratio is essentially the ratio of zero point kinetic energy of the ion at the smaller space-time sheet and the cyclotron energy of the ion at magnetic flux tube. Radiation with frequency f_{high} is produced when ions drop to the magnetic flux tube. The ions drop to cyclotron states such that the magnetic quantum number n is usually larger than $n = 0$, which in turn decay and produce cyclotron radiation with frequency f_{low} and its harmonics.

The TGD based interpretation is that ELF MEs are responsible for quantum entanglement in macroscopic, even astrophysical, length scales. Microwave MEs propagating effectively as mass-less particles along ELF MEs in turn induce self-organization by serving effectively as 'food' of the plasmonic life forms at the receiving end. This mechanism is behind both the endo- and exogenous realizations of intentions as actions, that is ordinary motor actions and phenomena like remote healing and psychokinesis. Also sensory representations at the personal magnetic canvas and magnetosphere rely on this mechanism, and in this case lifeforms are mental images getting at least partially their metabolic energy from brain. The law generalizes also to pairs formed by kHz radiowave MEs and MEs corresponding to visible light.

2.3 The role of time reversal

I have proposed in the chapter "Quantum model for paranormal phenomena" of [5] that time reversal is the basic mechanism of healing. The biological programs simply run backwards to the point, where the error occurred, and a new trial is made. De-differentiation is the counterpart of this mechanism at the cellular level. Stem cells are indeed increasingly used for healing purposes, leukemia being one example of this. The following arguments inspire the question whether biological rhythms could quite generally correspond to dissipation-healing (by time reversal) cycles, and whether time reversals in various time scales are a fundamental element of biological self-organization.

2.3.1 Priore's machine

The TGD based model of Priore's machine [7, 8] (see the chapter "Quantum model for paranormal phenomena" of [5]) is based on this idea and involves phase conjugates of microwaves perhaps inducing time reversal mode of molecular machines at DNA level and thus leading to the correction of the genetic error responsible for the cancer. Irradiation by phase conjugate microwaves at critical frequencies might induce the time reversed mode and thus provide a possible general healing mechanism affecting directly the DNA level. Later an alternative interpretation for the functioning of Priore's machines as a mechanism of "stealing" metabolic energy from the cancer cells will be proposed.

2.3.2 Searl machine

The work with various anomalies involved with free energy phenomena has revealed a deep connection between quantum bio-control, remote mental inter-

actions, and free energy phenomena. This connection has become especially clear during the development of a model for so called Searl machine [9, 10]. Searl machine involves stationary ring magnet along which smaller cylindrical magnets spontaneously start to rotate provided the parameters of the system are in suitable range. Several anomalous effects are involved: anti-gravity effect, over unity energy production, effects on radio-active decay rates, strong parity breaking.

The TGD based model of the Searl effect is based on essentially the same mechanisms as applied in the quantum models for homeostasis and remote mental interactions (see the chapters "Homeopathy in many-sheeted space-time" and "Macroscopic quantum coherence and quantum metabolism as different sides of the same coin" of [6]). Strong parity breaking implied by the Z^0 magnetization and the crucial role of neutrinos is the first common aspect. In living matter the key mechanism is the remote quantum entanglement having as a space-time correlate low frequency MEs, and self-organization induced by the high frequency MEs by inducing bridges between, say, magnetic flux tubes and atomic space-time sheets. In Searl machine this mechanism is replaced by its time reversal and leads to the splitting of the join along boundaries contacts feeding gravitational flux to larger space-time sheets so that gravitational and inertial masses of the system are reduced and remain to the larger space-time sheet as 'surface masses': one can say that blackhole remains in the background space-time and system become feather light in the extreme case of a complete topological evaporation.

A further interesting aspect is that the presence of ELF waves at 10 Hz implied by rotation of the Searl machine means that the interaction with the experimenter's brain might interfere with the experiment. The importance of the experimenter's intention would conform with the finding that free energy effects are not fully re-producible. This only adds to the fascination of these effect if one is ready to give up the reductionist and materialistic dogmas and accept the possibility of remote mental interactions. For instance, Searl's machine might provide be ideal for studying mind-machine interaction.

2.3.3 Could molecular machines act as Searl machines?

One can ask whether the time reversal of the mechanism leading to the leakage of supra currents could be central also for the functioning of bio-systems, and whether the living matter might utilize Searl effect routinely. If so, the time-reversed modes of various molecular machines such as $F_0 - F_1$ machine responsible for the metabolism (and its variants suggested by the many-sheeted space-time concept) might be a routine part of the functioning of the living matter. They would induce time reversals of biological programs and thus healing. The generation of negative energy MEs would induce bound state entanglement and the liberated binding energy would compensate the lack of the metabolic energy feed during the time reversed mode. They could also induce anti-gravitational effects, which together with the macroscopic quantum coherence induced by negative energy MEs, could be an essential aspect of the locomotion of the living organism. Molecules, which have temporarily got partially rid of their inertial and gravitational masses and also electromagnetic charge, would be ideal for the catalysis in the many-sheeted space-time. For instance, Coulomb wall could be easily circumvented by leaving the electromagnetic charge temporarily to the larger space-time sheet.

One can thus ask whether some molecular machines are actually Searl machines in their time reversed mode. For instance, the $F_0 - F_1$ machine driving

protons to atomic space-time sheet from (presumably) magnetic flux tubes of Earth, is much like a power plant containing a rotating shaft. In time reversed mode, in which it acts like a motor, the shaft might have reduced inertial and gravitational masses. The parity breaking effect induced by the classical Z^0 force would also favour second direction for rotation, this is obviously essential in order to achieve a synchronous action.

As noticed, Searl machine could be sensitive to remote mental interactions induced by ELF ME induced entanglement. Interestingly, the rotation frequency of $F_0 - F_1$ machine is about 300 Hz, which is the cyclotron frequency of proton in Earth's magnetic field with nominal value .5 Gauss. The rate for translation of DNA is 20/s and also this is ELF frequency. The possibility of remote mental interaction in bodily length scales by ELF ME induced entanglement could be absolutely essential for the possibility to realize intention by using molecular machines.

2.3.4 Could biological rhythms correspond to dissipation-healing cycles?

The following argument leads to suggestion that biological rhythms quite generally correspond to dissipation-healing cycles involving time reversal in the healing period.

Time reversal means that the second law of thermodynamics is broken. Since p-adic topology does not allow ordering of events, it is natural to expect that time reversals can occur only below the time scale defined by n-ary p-adic time scale $T_n(k)$, $p \simeq 2^k$, k prime or power of prime. An especially important p-adic time scale is the secondary time scale $T_2(127) \simeq .1$ seconds associated with electron. There is already evidence for the breaking of the second law below this time scale [11].

The time reversal for the leakage of supra currents is predicted to involve anomalous radiation. Rotating magnetic systems (Searl machine in particular) generate visible light, which must be due to the transitions of excited N_2 and N_2^+ molecules to their ground state (see [10] and the chapter "Anomalies explainable by many-sheeted space-time concept of [4]). This strange radiation has no standard physics explanation. The radiation could result in a geometric time reversal of the process in which electron drops from an atomic space-time sheet by emitting its zero point kinetic energy of about 1 keV as an X ray; X ray in turn ionizes atoms of air and creates electrons, which in turn induce electronic transitions of N_2 and N_2^+ molecules to excited states. For the time reversal excitation of nitrogen molecules occurs first by emission of negative energy photons, which in turn induce geometric time reversal for the ionization process, and finally there is a single negative energy X ray inducing the dropping of electron from atomic space-time sheet to the magnetic flux tube. The system absorbs energy from the environment in this manner, breaks second law, and is able to transform thermal energy to usable energy with efficiency larger than one.

Rotating magnetic system is also found to be surrounded by a series of magnetic walls and a lowering of the temperature is observed at the magnetic "walls": a signature for the pumping of energy from environment. Anomalous radiation usually generated by ionization of air by electrons and magnetic walls with lowered temperature might be signatures of also remote healing by time reversal.

Also metabolic cycle involves the dropping of protons to some larger space-time sheet, presumably a super-conducting magnetic flux tube of Earth, and

a liberation of about .5 eV zero point kinetic energy as a usable energy (the universal "energy currency"). Buy-now pay later principle and temporary time reversal could be involved also now and provide enormous flexibility (think only how easy it is to travel abroad if you have a credit card!). The molecular system utilizing the metabolic energy quantum would emit negative energy photon being thus excited to a higher energy state, and a proton at the atomic space-time would absorb the negative energy photon and "drop" to the magnetic flux tube to be driven back by $F_0 - F_1$ machine. Thus metabolism would repeat a cycle involving dissipation and healing. Fractality suggests that other biorhythms correspond to similar dissipation-healing cycle.

Even sensory perception and motor action could be seen as time reversals of each other in a relevant time scale. Motor action would be like carving a four-dimensional statue by starting from a rough sketch and adding the details gradually. The dissipation in both ordinary and reversed direction of the geometric time would Darwinially select a final state with only a rough dependence on the details of the sketch. No detailed planning would be required. Dissipation would act as an ally instead of an enemy. Motor actions could be imagined by initiating the time reversed process, not from the muscle cells as in case of actual motor action, but from some higher level of the central nervous system and proceeding to the level of cortex. Sensory imagination would also be a process starting from some level above sensory receptors and propagate up to the cortical level: this would mean that sensory qualia would be absent. During dreaming and hallucinations sensory qualia would be assigned to the imagined experience by feedback to the primary sensory organs involving entanglement and sharing of mental images.

2.3.5 Magnetosphere and Searl's machine

Earth's magnetic field rotates and this suggests that it is also kind Searl's machine. The frequency of rotation is one cycle per 24 hours (10 cycles per second for the Searl's machine of [10]). If Searl's machine indeed involves a time reversal, one might expect that similar time reversal occurs in the case of the Earth's magnetic field. Therefore one expects a bio-rhythm with a period of 24 hours decomposing to dissipative self-organization period and a healing period.

Wake-sleep cycle is an obvious candidate for this bio-rhythm. During sleep brains and perhaps entire organism entangles with the magnetosphere to give rise to self-organizing collective magnetospheric consciousness, which is something else than a mere passive sensory representation and draws actively energy from the biosphere by buy now -let others pay mechanism by emitting negative energy MEs received by sleeping organisms.

The outer magnetosphere, in particular plasma sheet corresponds to theta and delta bands for protons from the requirement that the length L of ME defines an appropriate magnetic transition frequency f_m ($f = c/L = f_m$) at a given point. Theta and delta bands indeed dominate during sleep. Alpha band is at the boundary between the inner and outer magnetosphere and dominates during hypnagogic states during which conscious experience involves transpersonal components.

The prediction would that EEG corresponds to negative energy photons and time reversed MEs during sleep. During daytime the inner magnetosphere is activated and in a role of passive computer monitor. Thus brain would generate during the wake-up period positive energy MEs inducing self-organization at magnetosphere and personal magnetic canvas responsible for the sensory representations. Night-day dichotomy would correspond to negative-positive energy

dichotomy for MEs, and this dichotomy might be detectable from EEG (during night time coherent EEG laser beams should transform to their phase conjugates). How nightside magnetosphere corresponds structurally and functionally to the motor areas and frontal lobes, and dayside magnetosphere to the sensory areas, is discussed in detail in the chapter "Magnetospheric sensory representations" of [6]. Although this picture is bound to an over-simplification, it might be a good starting point.

The anomalous radiation associated with the Searl's machine should correspond to a self-organization of the magnetospheric plasma by remote metabolism using the metabolic resources of the sleeping brain and body. From the point of view of biosphere this process would be a healing process since time reversals of dissipative processes occur. Magnetic transitions of superconducting charged particles (protons and electrons) are good candidates for generating anomalous ELF radiation. Negative energy EEG MEs carry high (negative) frequency MEs resulting when ions jump from magnetic flux tubes to smaller spacetime sheets. In the self-organizing plasma regions an entire hierarchy of space-time sheets is expected to be present, and could give rise to wide range of negative energy photons, microwave photons in particular. This vision provides a tentative model for how the highly self-organization plasma sheet at the night side of the magnetosphere uses the metabolic energy from sleeping brain to self-organize and to construct sensory representation about biosphere [Frank *et al*] and at the same time induce healing at brain level.

3 Conscious hologram

The notion of conscious hologram gives hopes about a unified description of living matter and remote mental interactions.

3.1 What are the basic properties of conscious hologram?

To proceed it is good to ask what are the basic features of ordinary holograms possessed also by conscious holograms.

3.1.1 Distributed information storage

The most fundamental and biologically attractive property of hologram is the distributed character of the information storage in the sense that a small piece of hologram represents satisfactorily the same image as entire hologram. This makes information storage very robust. This condition is very general and is satisfied by the neurons of cortex which receive information from a large number of neurons, and it would seem that neurons are good candidates for points of a 3-D conscious hologram. The fractality of the TGD universe allows an entire hierarchy of hologram structures corresponding to the hierarchies of space-time sheets and of selves.

3.1.2 Continuity

The neighbouring points of the hologram store almost the same information. Also in the case of a primitive organisms like salamanders each neuron of brain seems to represent almost the same information (even when salamander's brain is shuffled like a pack of cards, salamander recovers and preserves its memories [12]). This would suggest that single neuron forms a holographic image about

a considerable part of brain. This could apply at the level of any cell and body parts to which it belongs.

The assumption that cells are like points of hologram plate would explain why cell replication is the basic architectonic principle in the living matter. Quite generally, the structures which appear as almost identical copies, say proteins, DNA triplets, cell nuclei, cells, and the millimeter sized information processing units in cortex, are good candidates for 'points' of a conscious hologram. The TGD based view about higher levels of the self hierarchy suggests that even individual organisms of a given species correspond to the points of conscious holograms representing higher multi-brained conscious entities. Also various body organs, brains, substructures of brain,....., and even the DNAs of a given species could form similar collective conscious entities.

3.2 Stereo consciousness and the notion of conscious hologram

Ordinary holograms are 3-dimensional. This is made possible by the preservation of the phase information achieved by the interference between reference beam and the beam scattered from the object. On the other hand, ordinary stereo vision results somehow from two slightly different views about the same visual field provided by the retinas. In TGD inspired theory of consciousness stereo-consciousness results, when different sub-selves bound-state entangle to single sub-self: each sub-self gives rise to a view about (possibly) the same object of perceptive field. The entanglement of right and left visual fields so that separate visual fields fuse to single 3-D visual field is a special case of this. When the sensory fields are too different, stereo consciousness is not sensical. In this kind of situation sensory rivalry results so that either left or right hemisphere determines the conscious-to-us percept. This is analogous to the 'alike likes alike' rule of Sheldrake [13] characterizing morphic resonance. In particular, during sleep a large number of sufficiently similar brains could quantum entangle to give a stereo view about 'human condition'.

The question is whether the hologram mechanism understood in a sufficiently abstract sense could be consistent with the generation of stereo consciousness by bound-state entanglement. This seems to be the case. The entangling systems would correspond to the points of a conscious hologram, neurons, cells or some other structures. The survival value provided by stereo consciousness would explain why populations of almost similar living systems have resulted in evolution. The geometric correlate for the bound state entanglement is the formation of join along boundaries bonds, say magnetic flux tubes and MEs. These join along boundaries bonds imply classical coherence necessary for the hologram property in the ordinary sense, as well as macroscopic and macrotemporal quantum coherence in the time scale defined by the lifetime of the bound state.

MEs are TGD counterparts of topological light rays and the classical fields propagating along them are natural candidates for generating self-hologram as a system which defines its own holographic image. This requires that a given basic unit is connected by join along boundaries bonds to a large number of other units and receives classical information from and quantum entangles with them in the holographic state. When bound state quantum entanglement is not present, system is in a 'reductionistic mode' and decomposes into separate sub-selves. Classically this corresponds to the decoherence of the classical fields associated with the units and absence join along boundaries bonds connecting

the units of the conscious hologram.

The experimental findings of Russian researchers about bio-holograms [15] support the notion of conscious hologram. Kirlian images taken from say fingertips are studied. What is found is that the simultaneous electrical stimulation of some body part, say inner ear, affects the spectrum of visible light in the Kirlian image of the finger tip. Even more, it is possible to abstract the image of the stimulated body part from the pattern of the visible light in Kirlian image.

3.3 Questions

At least the proposed basic aspects seem to be worth of taking into account in an attempt to generalize the notion of hologram to that of self-hologram or conscious hologram. Several questions however remain to be answered.

3.3.1 How is it possible to abstract any conscious information at all from the self-hologram?

Ordinary hologram is completely diffuse and does not contain visual information as such and reference beam is needed to generate the 3-dimensional picture. In case of a self-hologram this mechanism need not work, since even the notion of reference beam is questionable. In the case of an ideal self-hologram every part of the hologram receives fields from all the other parts and there are actually large number of fields interfering at a given point of the hologram. There are two ways to circumvent the problem: hologram is not ideal and there is a symmetry breaking input from external world.

1. *Self-holograms are somewhere between ordinary photo and ideal hologram*

Self-hologram is not ideal one: not every unit is connected with every other unit and self-hologram is expected to be somewhere between the ordinary photo and ideal hologram. A given block of units receives information about some other blocks of units and forms a hologram about the field patterns sent by those blocks. For instance, these blocks could correspond to cortical features associated with a given sensory modality and firing synchronously. Topologically this means that these blocks of units are connected by a large number join along boundaries bonds whereas the number of join along boundaries bonds to the other units is relatively small. Thalamo-cortical and cortico-thalamic connections provide a basic example of this. Topographical connections from sensory organs to thalamus and from thalamus to the primary sensory areas correspond to the geometric optics limit in which interference effects are minimized. Diffuse connections from brain stem responsible for controlling general alertness correspond to the second extreme.

2. *Breaking of symmetry by inputs from external world*

Self-hologram receives input from the external world via what might be called primary sensory organs (in generalized sense). This information is shared holographically by join along boundaries bonds connecting the primary sensory organs to other units. This breaks the symmetry between units even in the case that ideal self-hologram is in question. When some unit receives strong stimulation and self-organizes vigorously, it also sends much stronger stimuli to the other units. Hence the contribution of this unit to the experiences of other units can dominate and other units tend to experience the same experience as the strongly stimulated unit.

For instance, in the case of bio-holography [15] by Kirlian imaging the electrical stimulation of the inner ear implies that the input from the inner ear to the finger tip starts to dominate over the input from the other body parts. This picture conforms with the general facts about conscious experience. When the sensory input breaking the symmetry is absent as in case of a deep meditative state, a holistic state of one-ness in which mind is 'empty' results. On the other hand, when a highly emotional mental image is present, this mental image dominates over the other mental images. The emotional content of the mental image obviously measures how strongly it contributes to the self-hologram. The fact that information molecules responsible for emotions are scattered around the entire body, encourages to think that it is indeed the entire body which experiences emotions, and that limbic brain is more like a primary emotional organ. Emotional expression would result from the quantum communication of emotions from the limbic brain to the body which now takes the same role as brain in case of sensory input.

3. In what sense mental functions are localized?

This picture is consistent with the finding that the localization of mental functions to various parts of brain seems to make sense. As already noticed, one can divide the units of the self-hologram into two classes: those which receive primary stimulus, and those which receive only secondary stimuli. This division can be made at several levels. Primary sensory organs viz. other parts of CNS, thalamus viz. cortex, primary sensory areas viz. higher sensory areas are examples of divisions of this kind. The possibility of this kind of division means that the assumption about the localization of consciousness to brain and various mental functions to various parts of brain, although basically wrong, defines a reasonable 'as-if' theory. The units which receive the primary stimuli replace functional units in the holographic view about brain. Artificial stimulation of, say, cortical neurons can artificially make them the primary sensory organs and the fact that this kind of stimulation can induce memories and complex hallucinations, suggests that these neurons indeed have complex conscious experiences differing from our experiences only in that the stereo consciousness aspect is not present.

3.3.2 What physical process corresponds to the formation of a conscious hologram?

Ordinary hologram plate results, when the reference beam and the beam scattered from an object interfere and induce a local change in the transparency of the film. This change is proportional to the local intensity of the incoming light. In the case of a self-hologram the reference beam and the light scattered from the object are replaced by the interference of the classical radiation fields propagating along MEs and converging to a given unit like light rays to retina. Hologram results locally if one assumes that the classical radiation resulting in the interference induces some physical change proportional to the net intensity of the classical radiation field, and provided that the units are connected by join along boundaries bonds to form a macroscopic quantum bound state.

Conscious experience involves a formation of self-organizing mental images. A very general mechanism inducing self-organization is the leakage of ions from the super-conducting magnetic flux tubes to the atomic space-time sheets, where the ions dissipate their energy, and end back to the magnetic flux tubes sooner or later. In case of protons this process corresponds to the fundamental step in the metabolic ADP-ATP cycle. Very probably the process occurs for other

ions and perhaps even for molecules, and in this generates EEG waves by the mechanism proposed in the chapter "Macroscopic quantum coherence and quantum metabolism as different sides of the same coin". This process occurs only if 'bridges' between atomic space-time sheets and magnetic flux tubes are somehow created. If the number of bridges formed is proportional to the total intensity of the classical radiation entering into the unit along various topological light rays converging to it, a hologram like structure results.

A concrete interpretation for this mechanism is suggested by various findings related to the role of microwaves in living matter. Microwaves with energies of quanta not too much above the gap energy of bio-super-conductor, generate 'bridges' between magnetic flux tubes and atomic space-time sheets inducing the breaking of super-conductivity and local self-organization. This mechanism gives rise to the many-sheeted ionic flow equilibrium defining dynamical control circuitry taking care of quantum homeostasis. The scaling law of homeopathy leads to the view that ELF MEs serve as quantum entanglers, em bridges connecting units of a conscious hologram, and that microwave MEs propagate along them like mass-less particles along ELF MEs, and induce self-organization at the receiving end. The interference of the classical fields associated with microwave MEs in the region with size considerably smaller than wavelength to guarantee effective pointlikeness would give rise to single point of the hologram.

Both the fractality of TGD Universe and the findings of bio-holography [15] suggest that the mechanism is much more general. Also MEs with lengths in wavelength range of visible light and radio frequency (RF) MEs in kHz range define low-high frequency pairs of MEs. The electric voltage associated with say finger tip and oscillating at about kHz frequency defines the RF ME to which RF MEs from various body parts converge and fuse with. Along RF MEs propagate the visible MEs with lengths coming as multiples of the wave lengths of visible light. The interference occurs in a region of size smaller than wavelength of visible light. When some body part is stimulated electrically, it emits a large number of visible MEs ending down to the fingertip and contributing to the Kirlian image.

As noticed, the sizes of the basic holographic units corresponding to a given wavelength must be smaller than the wavelength to guarantee effective pointlikeness. The experiments of Gariaev [2] demonstrate that the illumination of DNA with a visible laser light generates radiowaves with frequencies up to MHz with frequencies in kHz range having especially strong intensities, which suggest that the wavelength range associated with the visible light corresponds to subcellular structures, DNA being the most natural candidate in this respect. Also the findings about bio-holograms [15], and the fact that kHz frequency corresponds to the duration of nerve pulse and to the frequency of neuronal synchrony support this identification. The units associated with microwave MEs must have sizes in the length scale range 1 mm-300 mm and millimeter sized structures in cortex (cortex has thickness of order millimeter).

Also larger structures of cortex are candidates for holographic units at the level of multi-brained collective consciousness. Magnetospheric sensory representations would naturally correspond to this kind of multi-brained conscious holograms and various parts of brain and also body parts could give rise to what might be regarded as a species consisting of individuals and possessing collective consciousness. Scaling law makes this hypothesis quantitative and assigns to a structure with a given size an ELF frequency responsible for the entanglement with magnetosphere.

3.3.3 What about the notions of reference beam and static hologram?

The view about holograms as generated by a simple reference beam and the beam representing information is too simplistic to be applied as such to conscious hologram. For instance, the number of interfering beams is large since each ME converging to given unit of self-hologram corresponds to a particular beam. However, in a situation in which single ME gives a dominating contribution, the remaining MEs collectively interfere to what might be regarded as a counterpart for a slowly varying reference beam.

Under certain conditions it is also possible to talk about quasi-static conscious hologram. There are two time scales involved: the lifetime τ_B of the macroscopic bound state defined by the hologram, and the lifetime τ_s of the 'bridges' connecting atomic space-time sheets and larger space-time sheets. If these time scales are longer than the duration of the stimulation from the active units of hologram, quasi-static hologram results. At the level of conscious experience the reference beam could be interpreted as the background whereas the dominating contribution to conscious experience would correspond to the figure.

p-Adic length scale hierarchy suggests the presence of a hierarchy of time scales corresponding to the lifetimes of these bridges, and synaptic strengths might be seen as quasi-static conscious holograms resulting in this manner. If this is the case, the breaking of super conductivity and dissipation should be a crucial element of synaptic activity. The fact that the dendrites are responsible for most ohmic losses in the neural circuitry [16] conforms with the idea that the breaking of super-conductivity occurs dominantly in the dendrites. The age hierarchy for quasi-static holograms would correspond to a hierarchy of supra current leakages occurring from various space-time sheets labeled by p-adic primes. The effect of various neural transmitters and information molecules might be understood as a generation of bridges between space-time sheets characterized by the duration of the effect. The more lasting the effect is, the larger the corresponding space-time sheet would be. This conforms with the fact that information molecules with long lasting effect are responsible for emotions and moods, which are indeed whole-body effects.

4 Bio-photons, radio waves and genetic regulation

Biosystems could generate holograms in much more concrete sense than the hot, wet and noisy character of this environment would suggest: even mechanisms generating laser beams could be there. The findings of Peter Gariaev and collaborators described in the article "The spectroscopy of biophotons in non-local genetic regulation" [2] provide a new support for the notion of many-sheeted DNA. The findings also lead to a concrete model for how biophotons affect many-sheeted DNA, and in this manner induce a generation of coherent radio waves and ELF waves. Moreover, a concrete model for how biosystems act as many-sheeted lasers at various wavelengths emerges.

In polarizing laser-radio wave spectroscopy (PLR-spectroscopy) laser light scatters from the target substance. In the experiments of Gariaev *et al* red light ($\lambda = 632.8$ nm, 1.9595 eV) generated by He-Ne laser is used. There are two orthogonal polarizations correlated in intensity in such a manner that the total intensity remains constant. After the interaction of one mode with the target

substance, the reflected light is returned to the optical resonator, where the re-distribution of the intensity of these modes occurs. One of the laser modes, at a certain mode of generation, is able during the interaction with the target substance to induce modulated radio waves of a wide spectrum correlated with the modulations of the optical modes of the laser radiation. The modulation depends on rotational fluctuations of micro-structural components (say, domains of crystals) and of their optical activity. The PLR-spectrum is present also for in-organic materials. For biological targets there is spectral memory effect present, which means that the radio wave radiation continues even when the laser beam is not present anymore.

4.1 Frequency spectrum of radio waves

The frequency interval of the radio emission settles down at the 1 MHz. The PLR-spectrum is depicted in figures 1 and 2 of [2] (<http://www.emergentmind.org/gariaevI3.htm>) for apofillit crystal. The frequency spectrum for the radio waves has a modulated fractal structure suggesting that spectrum is superposition of spectra which consist of harmonics $n_1 f_h - n_2 f_l$ of higher frequency f_h modulated by harmonics of scaled down frequency $f_l = x f_h$. Almost identical copies of a piece of length about

$$\Delta f \sim 100 \text{ Hz}$$

appear in a sequence as the pictures 1 and 2 of [2] for the spectrum of apofillit crystal in 1560-1860 Hz range demonstrate. This suggests the presence of harmonics of basic frequencies perhaps shifted by a constant amount. Cyclotron and spin flip transitions in magnetic field suggest itself.

There is also gross structure consisting of peaks in scale of kHz suggesting harmonics of frequency of order kHz. For wheat seed (picture 3 of [2]) the strongly expressed frequency ranges are identified as 800-900 Hz (to my personal opinion the band is 300-900 Hz), 1700-1900 Hz, 2400-2600 Hz, 3600-3800 Hz (to my personal opinion a wider frequency range 1700-2200 Hz is strongly expressed). There is also strongly expressed frequency band below at 300 Hz. Also the spectrum of high polymerization DNA sample from calf thymus (picture 4 of [2]) shows a clear peak at 2400-2600 Hz and less pronounced peaks at lower frequencies.

The radio wave radiation from DNA samples has specific effects on biosystems such as ab-normally fast germination and re-vitalization of seeds. Thus it seems that the radio wave radiation is able to restore the genetic control apparatus and the vitality of the seeds.

4.2 Basic questions

The model proposed by Gariaev *et al* [2] for the PLR effect is based on the phenomenological notion of photon localization dating back to the experimental findings made 1985 [17] suggesting that photon beam can be concentrated in a narrow tube under some circumstances. This is strongly reminiscent of ME (massless extremal), which is essentially 'topological light ray' along which photons propagate. MEs are the basic element in TGD based quantum model of living matter.

Concerning the modelling of the PLR effect, the basic questions to be answered are following.

a) How could one understand the modulated fractal like spectrum of the radio waves radiation? What is the origin of the frequency scales present in the spectrum and what gives rise to modulatory structure?

b) How does the scattering of coherent light on DNA induce the radio wave emission and how one can understand the correlation between polarizations?

c) How does the spectral memory effect result and what is the mechanism causing the biological effects or radiowaves?

In the following TGD based answers to some of these questions are discussed.

4.3 How to understand the spectrum?

The finding that the width of the basic unit of the spectrum is about $\Delta f = 100$ Hz would suggest that the mechanism involves magnetic transitions in Earth's magnetic field, whose nominal value can taken to be $B_E = .5$ Gauss for definiteness. The corresponding space-time sheet would be $k = 169$ and correspond to p-adic length scale $L(169) \simeq 5$ micrometers.

1. Miracle length scales and the coiling hierarchy of DNA

Above this p-adic length scale are four miracle length scales $k = 151$ (cell membrane thickness of about 10 nm), $k = 157, 163$, and $k = 167$ related by scaling $L(k) = 2^{(k-169)/2} \times L(169)$ to $L(169)$. These p-adic primes correspond to the so called Gaussian Mersennes $|G_k| \simeq 2^k$, which are complex counterparts of ordinary Mersenne primes. Since ordinary and Gaussian Mersennes are fundamental for TGD based elementary particle physics, one expects that the same is true in biological length scales. The coils inside coils inside... structure of the chromosomes could correspond to a quantum control hierarchy of these four space-time sheets, and the transitions of ions between cyclotron (magnetic) states at these space-time sheets would generalize ordinary cyclotron (magnetic) transitions.

If these space-time sheets are also magnetic flux tubes carrying magnetic field satisfying flux quantization condition the corresponding field strengths are obtained by scaling $B(k) = 2^{169-k} B_E$. Cyclotron frequency scales are scaled up in the same manner: $f_c(k) = 2^{169-k} f_c(169)$.

a) For $k = 167$ the cyclotron frequencies are scaled up by a factor 4. What is interesting is that for Carbon cyclotron frequency is $f(169) = 25$ Hz so that for $k = 167$ the cyclotron frequency would be 100 Hz. Hence the 100 Hz approximate fractal periodicity might relate to the cyclotron harmonics of Carbon ions. Carbon ions could be present in large amounts. There are also other cyclotron frequencies present and different frequency scales imply super-position of the scaled up harmonics spectra.

b) For $k = 163$ the factor is 64 and frequency range 10 – 100 Hz for ionic cyclotron frequencies is scaled up to 640 – 6400 Hz. These transitions could explain the large scale features of the spectrum with characteristic scale of kHz.

c) For $k = 157$ the factor is $2^{12} \simeq 4000$, which means that the frequencies for ions are in MHz range, which corresponds to the upper bound for the frequency range of radio waves. One must notice that there are also spin flip transitions: for instance, for electron $\Delta n = 1$ cyclotron transition compined with spin-flip has frequency about 900 Hz at $k = 169$ space-time sheet (the frequency vanishes at the limit of the vanishing anomalous magnetic moment of electron).

d) For $k = 151$ the factor is $2^{18} \simeq 10^6/2$ and the cyclotron frequency for proton is about .15 GHz and in microwave range. Microwaves are in a fundamental role in TGD based view about bio-control.

2. *Is the radio-wave spectrum a superposition of many-sheeted magnetic transition spectra?*

The simplest hypothesis is that the radio-wave spectrum is a superposition of relatively simple magnetic spectra for several ions and having the same general shape.

a) The spectrum of a given ion results, when the ion drops from a cyclotron state n_1 at $k > 169$ magnetic flux tubes to cyclotron states n_2 at $k = 169$ magnetic flux tube such that the longitudinal momentum along tube is conserved or is very small. If the magnetic flux tube is of finite length L , the longitudinal energies are given by $E_n = n^2\pi^2/2mL^2$, L the length of the magnetic flux tube. If the length of the magnetic flux tube is considerably longer than the magnetic length, magnetic energy gives only a small contribution to the energy and can be neglected unless Δn is very large.

b) The frequencies of the photons resulting in this manner are given by

$$f(k) = n_1 f_c(k) - n_2 f_c(169) = [2^{169-k} \times n_1 - n_2] \times f_c(169) .$$

Here $f_c(169)$ varies in the region 1-100 Hz for ions other than proton and for proton one has $f_c(169) = 300$ Hz. Quite generally one has $f_c = 300Z/A$ Hz, where A is the mass number of ion and Z its charge. Effectively the harmonics of the ionic cyclotron frequencies at Earth's magnetic field modulate the scaled frequencies at $k < 169$ magnetic flux tubes. Also magnetic spin flip is possible and induces a doubling of the lines in spin-flip frequency scale defined by the nuclear magnetic moment and magnetic field at $k = 169$ space-time sheet, typically the frequency scale is 100-300 Hz. The doubling occurs only for ions which have vanishing electronic spin (for instance, Na_+ , K_+ and Cl_-). The change of the longitudinal momentum in the dropping proces implies additional features to the spectrum but for small longitudinal momenta lines get only wider.

c) A more general model allows the variation of the magnetic field strengths from their nominal values, so that one has the formula

$$f(k) = [a(k)2^{169-k} \times n_1 - a(169)n_2] \times f_c(169) .$$

Here $a(k)$ characterizes the scaling relating the actual value of the magnetic field value to its nominal value.

Under these assumptions it should be possible to understand the basic fractal like characteristics of the spectrum. There is a killer test for the model: one should be able to identify individual lines of the PLR-spectrum as differences $S(k_1, A) - S(k_2, A)$ of the magnetic spectra $S(k_i, A)$ for various ions (A denotes the atomic number). PLR in principle means a possibility to do many-sheeted spectroscopy and might provide the Golden Road to many-sheeted physics.

4.4 Many-sheeted radio-wave laser excited by ordinary laser light

The general idea of many-sheeted laser suggests that the visible laser light beam could pump the ions from the magnetic flux tubes to cyclotron states at $k < 169$ space-time sheets wherefrom they drop to $k = 169$ space-time sheet and generate coherent photons at radio wave frequencies. Alternatively, laser light might stimulate directly the dropping of pre-existing ions from space-time sheet $k < 169$ to $k = 169$. The emitted light can indeed give rise to stimulated emission just like in the case of the ordinary laser. Entire many-sheeted cascades

$k_1 \rightarrow k_2 \rightarrow \dots \rightarrow k = 169$ of emissions analogous to cascades of emissions from the decay of excited atomic states are possible.

The arguments leading to the model are following.

4.4.1 He-Ne laser produces miracle wave length

The wavelength of laser photons corresponds to about 632.48 nm, which is quite near to the p-adic length scale $L(163) = 640$ nm in the approximation $L(151) = 10$ nm. This is one of the p-adic miracle frequencies. This observation suggests that the laser light interacts resonantly with $k = 163$ space-time sheet and somehow generates radio waves in this process. Therefore the general rule of thumb for how to make many-sheetedness manifest would be simple. A radiation with wavelength of order p-adic length scale induces resonantly a flow of ions to space-time sheets for which the zero point kinetic energy is of the order of magnitude of the photon energy. This hypothesis is in principle testable by looking whether the laser beams with wavelengths given by p-adic length scales are in a special position.

4.4.2 The energy of photons from He-Ne laser corresponds to the zero point kinetic energy of electron at $k_2 = 73$ space-time sheet

The space-time sheet corresponding to the secondary p-adic length scale $L_2(k = 73) = "L(146) \simeq 10/32 \simeq 3.12$ Angstroms, is rather near to the length of single DNA base (10 DNA triplets correspond to the length of 10 nm). In this case electron's zero point kinetic energy is $\simeq 2$ eV and is the same as the energy of photons in the laser beam used in the experiments. This suggests that the kicking of electrons from $k = 163$ space-time sheet to $k = 73$ secondary space-time sheet is the first step of the process. After this step electron drops back to $k = 163$ space-time sheet and emits essentially the original wavelength so that laser action results. The probability for the occurrence of this step is amplified by the presence of coherent laser light (stimulated emission mechanism). Electron could also drop to $k = 169$ space-time sheet. If the spin of the electron is such that the energy is not minimal possible, electron emits $\Delta n = 1$ spin flip radiation of frequency about 900 Hz.

4.4.3 The polarizations of radio-waves and laser photons correlate

The polarizations of the radio waves correlate with the polarization of the laser light. This is the case if the radio waves result in a process, which kicks electron from $k = 163$ space-time sheet to $k = 73_2$ space-time sheet. The simplest possibility is that the kicking process involves a coherent interaction with the other ions at $k = 163$ magnetic flux tube inducing the dropping of these ions to $k = 169$ magnetic flux tube accompanied by the radiation at frequency corresponding to the difference of the magnetic energies. One can imagine also a second possibility. Since the electron is kicked to a super-conducting space-time sheet associated with the DNA base, the information about polarization is not lost into a thermal noise, and the electron dropping back to $k \leq 169$ space-time sheet still carries it. Therefore the dropped electron could induce the dropping of ion to $k = 169$ space-time sheet generating still polarized radiowaves.

4.4.4 Quantum coherence produces intense radiowave and ELF laser beams

Because of the presence of a large number of Cooper pairs/bosonic ions in the same state at $k \leq 169$ space-time sheet, the process occurs coherently and the rate is proportional to the square N^2 of the number N of the bosonic ions/Cooper pairs in the system.

The radio waves and ELF radiation produced in ordinary magnetic transitions at $k = 169$ space-time sheet is quantum coherent in the length scale defined by wavelength at least and propagates inside the tubes defined by ELF or VLF MEs. This radiation is obviously ideal for biological communication and control purposes. This suggests that bio-photons propagating inside low frequency MEs with frequencies in kHz range act just like a laser beam and induce emission of radiowaves in the proposed manner.

Also $k > 169$ space-time sheets can be involved and produce radiation ULF wave lengths. For instance, maser beam could resonantly interact with structures in the size range of roughly 1 mm-1 m (microwave wavelengths) and kick electrons to $k = 157$ magnetic flux tubes (say) where cyclotron energy scale is of correct order of magnitude. Thus a very complex many-sheeted spectroscopy analogous to atomic and molecular spectroscopies is predicted.

4.4.5 More general mechanisms

One can consider also more general mechanisms but these mechanisms do not explain the correlation between the polarizations of the radio and laser waves. They could be of course present.

a) In the first step any ion kicked by the visible photon from some space-time sheet to atomic $k = 137$ space-time sheet so that it has zero point kinetic energy of about .5 eV plus additional energy given by the photon. The ion can be kicked also to non-atomic, that is $k > 137$, space-time sheet if it ends up to a localized state. In case of an ionized molecule part of photon energy could go to a vibrational excitation of the molecule for which unit is typically fraction of eV.

b) After this step ion dissipates most of its kinetic energy, at least if it is at an atomic space-time sheet. Then it drops to $k < 169$ or possible $k = 169$ space-time sheet, and emits at least its zero point kinetic energy in the process. The emitted energy corresponds to the non-elastically scattered laser light. This process is nothing but pumping of the ions to cyclotron (or more generally, magnetic) $k_0 < 169$ space-time sheets.

c) The ions from $k < 169$ space-time sheet drop to $k = 169$ space-time sheet (or possibly $k_0 < k_1 < 169$ space-time sheet first. In this process the difference of the magnetic energies is emitted. If the kinetic energy in the direction of magnetic flux tube is small is small or separately conserved, one has a laser producing coherent VLF or even ELF radiation.

4.4.6 Phantom DNA effect

A further mysterious looking effect involved with the experiments is phantom DNA effect. There is also an elastic scattering of the coherent from irradiated DNA and the simplest mechanism is the kicking of electrons to the $k_2 = 73$ space-time sheet and dropping back so that they regenerate laser photons with essentially the original wave length. When one removes the DNA from the chamber containing it, and irradiates it by laser light, a weak pattern of scattered light is still produced: as if there were kind of phantom DNA there.

A possible explanation for the effect is that the removal of DNA is not complete but leaves some non-atomic space-time sheets associated with the DNA to the chamber. If $k_2 = 73$, $k = 163$ and $k = 167$ space-time sheets are left besides the $k = 169$ space-time sheets associated with the magnetic field of Earth, the proposed model indeed predicts scattering. Sooner or later however the ionic densities from these space-time sheet should leak from the volume of the chamber and the scattering is not observed anymore. An killer test for the model is whether the removal of the Earth's magnetic field artificially destroys the effect (and also PLR effect).

4.5 Is the radiowave band structure for wheat seed scaled-up version of the band structure of EEG?

In TGD based model of EEG the band structure of EEG reflects directly the structure of the periodic table (see the chapter "Spectroscopy of Consciousness" of [6]). If all ions contribute to the spectrum this should be the case for the radio wave spectrum also. Therefore it is interesting to look at the band structures of the radio-wave spectrum for wheat seed represented in the figure 3 of [2] (<http://www.emergentmind.org/gariaevI3.htm>).

a) By scaling the frequency bands of figure 3 of [2] one finds that the lowest band below 250 Hz can be identified as the counterpart of delta band in EEG ($f < 3.9$ Hz).

b) The region 300 – 900 Hz corresponds to the range 4.7 – 14 Hz covering theta and alpha bands. Actually the band extends to about 1300 Hz so that it contains also beta frequencies up to 20 Hz. In the figure 4 of [2] (<http://www.emergentmind.org/gariaevI3.htm>) representing the spectral memory there is minimum of intensity at about 700 Hz which corresponds to about 11 Hz so that alpha and beta bands separate from each other.

c) The band 1700 – 2100 Hz corresponds to the range 26-32 Hz and also to beta frequencies. 2400 – 2600 Hz band corresponds to 40 Hz thalamo-cortical resonance band 37.5 – 40.6 Hz.

d) 3600 – 3800 Hz band corresponds to the range 56.3 – 59.5 Hz. The DNA spectrum of figure 4 of [2] (<http://www.emergentmind.org/gariaevI3.htm>) contains also a band around 4800 Hz: this frequency corresponds to 75 Hz and to the cyclotron frequency of ${}^4\text{He}_+$ ion. There are no further peaks visible in the figures of [2] (<http://www.emergentmind.org/gariaevI3.htm>). Protonic cyclotron peak should be visible at frequency of 19.2 kHz not represented in the figures of [2].

As already noticed, the 100 Hz periodicity visible in the spectrum of apofillit crystal (figure 2b) of [2]) could be due to the harmonics of the Carbon cyclotron frequency $f_c(167) = 100$ Hz at $k = 167$ space-time sheet. There is also 50 Hz periodicity and a weaker 25 Hz periodicity and these periodicities could correspond to even and odd cyclotron harmonics of Carbon at $k = 169$ space-time sheet. Even harmonics for ordinary cyclotron transitions are suppressed by parity conservation.

5 Conscious hologram and remote mental interactions

The notion of conscious hologram, which is based on the generalization of the notion of Feynman diagram, provides a general view about remote mental in-

teractions.

5.1 Big vision

The basic building bricks of the vision are following.

a) Brain can be seen as a part of a gigantic dynamical and fractal brain consisting actually of the entire universe. The same mechanisms that work at the brain level work also at larger length and time scales. Brains/bodies serve as 'neurons' for the magnetospheric selves receiving information from several brains/bodies. In particular the fusion of the mental images defined by similar structures can give rise to stereo-consciousness, and the notion of species consciousness and even multi-organ consciousness associated with various kinds of organs makes sense. This picture conforms nicely with and generalizes Shel-drake's species memory and 'alike likes alike' rule.

b) Association mechanism works also for remote mental interactions and is even in the case of brain based on MEs and magnetic flux tubes with neuronal firing and metabolic activities being side products of the this mechanism. Remote mental interaction might involve feedback and gradual learning how to induce desired effects.

c) One of the strange findings about remote mental interactions is that remote viewer can receive information about an object for which she knows only coordinates, which as such are meaningless numbers to her. It is also commonly reported that erraneous readings or interpretations of the target tend to propagate to other viewers. These findings suggest that magnetospheric dynamical multi-brained selves act as kind of relay stations mediating the remote contact between remote viewer and object. If some brain knows the meaning of the coordinates of the target, this is enough to connect remote viewer to the correct target.

Empirical support for the notion of multi-brained collective levels of consciousness comes from the experiments of Mark Germine [34]. An operator and a subject person were involved. The stimulation of the subject person consisted of a sequence of identical sounds containing now and then an odd-ball stimulus (now silence). The odd-ball stimulus generated an event related potential (ERP) visible in EEG and reflecting the conscious reaction. The operator was in a second room and by simple toss of coin decided whether to observe the stimuli in the computer monitor or not. The stimuli appeared in the computer monitor one second before they were heard by the subject person.

What was found that when the operator saw the odd ball stimulus from the computer monitor, the ERP was weaker on the average. An 11 Hz periodicity was the major component in the difference profiles. The simplest explanation is that the brains of both the operator and of the subject person belong to a larger multi-brained self and that the evoked response represented partially the reaction of this self. When this multi-brained self had already seen the stimulus through the operator's eyes, it was not so surprised to hear this stimulus again through the ears of the subject person, and ERP was weaker. The appearance of the 11 Hz periodicity suggests that this frequency is an important correlate for the entanglement of the subject person's mental images with those of the multi-brained magnetospheric self.

5.2 Sketch for what happens in typical remote vision experiment

Consider a situation in which a system consists of remote viewer A, person B having target XYZ coordinate. B gives the coordinates XYZ for person C in turn giving them to the remote viewer A. The following simplified sketch assumes that communication channels are permanent and that the intentions involved with the process are realized as p-adic space-time sheets in the brain of A, and might involve only p-adic variants of cognitive neutrinos (it is still unclear whether p-adic MEs are involved with intentionality).

a) Remote viewer A, person B knowing having target-XYZ association as two mental images in his brain, and target T have permanent bridges to a magnetospheric multi-brained self M. Therefore M knows the target-XYZ association via the brain of B.

b) Remote viewer A is a client of the multi-brained self M using the remote sensory services provided by M. A-M contact is more or less permanent: this is what it means to have the ability to remote view. This is possible if the ELF MEs connecting A to M are in passive and active modes: Z^0 MEs in the passive mode, and transformed to em MEs by a color rotation in the transition to the active mode. The transition to the active mode requires the intention of A and its transformation to a process inducing the color rotation. An alternative option is that only the magnetic flux tube connection is permanent and the intention of A generates p-adic ME parallel to the magnetic flux tube and connects A to M and is then transformed to real ME.

c) In principle A-M communications could be based on sharing of mental images. That is, the intention of A (p-adic space-time sheet in brain of A perhaps) to remote view and the questions of A about the target would be shared by M. T-M communications could involve classical communication with light velocity generating magnetospheric sensory representation about the target by self-organization. This might explain the 13-17 second delay of remote mental interactions [18]. Target could be also "non-living": it is quite possible that magnetospheric selves form sensory representations also about "non-living" matter. The finding that meteor sounds have frequency spectrum in the 40 Hz band of thalamocortical resonance frequencies, rather than in the predicted 20-20.000 Hz band, supports the view that magnetospheric sensory representations at 40 Hz resonance band are associated also with the non-living matter (see the chapter "Magnetic sensory canvas hypothesis" of [6] and [19]).

d) Remote viewing by the sharing of mental images means that there are no sensory receptors associated with the remote viewing: no such receptors have been identified [20]. Various physiological correlates (say EEG patterns) of remote viewing should be reactions to the shared mental image rather than direct correlates of it. If primary sensory qualia are at the level of sensory organs, remote viewing differs from hallucinations in that there is no feedback to the retinas from cortex responsible for "qualiafication": this could provide be a clear-cut test. At least in the case of living targets the laws that govern the ordinary sensory perception should hold true for the remote viewing. For instance, the known correlation of the AC performance with the spatial and temporal entropy gradients of the target should hold true for living targets. Even in the case of a non-living target similar correlation holds true if the sensory perception of magnetospheric selves obeys same laws as that of ours: there is some evidence for the correlation of the entropy of non-living target with the AC performance [20].

5.3 Why it is so difficult to take remote mental interactions seriously?

By the fractality of consciousness the anatomy of quantum jump represents the general structure of the life cycle of any self. First totally entangled multiverse is generated, then state function reduction and preparation by self measurements occur and the end result is a maximally un-entangled state. This is what analysis following the birth of an intuitive idea is. By the fractality of consciousness same process occurs also in longer time scales since the sequences of quantum jumps effectively integrate to single quantum jump and the sequences of these effective quantum jumps have similar structure.

This somewhat pessimistic vision is based on the standard Shannonian notion of entropy. For algebraic entanglement, which is the only possible entanglement between different number fields, number-theoretic entropies can be non-negative and Negentropy Maximization Principle does not force de-entanglement in this case. Thus it might be possible to avoid the unavoidable looking decay, and living systems might apply it routinely.

Depending on whether one believes in Shannonian world order or takes seriously the notion of number theoretic entropy, one ends up with two almost diametrically opposite visions: evolution as an emergence of selfish *resp.* unselfish selves. Both views explain in their own manner why it is so difficult for a modern man to take remote mental interactions seriously.

5.3.1 Evolution as a gradual de-entanglement?

From the Shannonian view point, the evolution of self at any level is also a decay process leading to alienation and loneliness at the level of conscious experience of sub-selves. What is consoling is that selves can lose consciousness and wake-up into new childhood. One can say that a healing sleep after a hard day is possible at all levels of self hierarchy.

Also ancient myths inspire to think that this vision applies to the evolution of modern subjective consciousness from more collective consciousness. Jaynes has proposed a vision about how bicameral consciousness [21], in which the voices of Gods talking to people were talking to everyone, gradually transformed to the modern subjective consciousness. TGD based articulation of Jaynes's views based on the notion of semi-trance is discussed in the last chapters of this book written much before these lines were written.

The basic theme of this evolution would be the gradual de-entanglement. The ancient world has survived in fairy tales. In this world remote mental interactions like telepathy, remote healing, and witchcraft were every-day life. Incredible-to-us physical feats like building of pyramids might have been made possible by the liberation of energy and coherent momentum in the formation of collective bound state entanglement. The rhythmic work songs helping to generate body synchrony are a remnant from this period, but are not sung in modern IT companies. Also the strange intra-terrestrial creatures and spirits of magnetosphere; fairies, trolls, eagle-headed humans, dreadful snakes,..., populated this world. Shamans talk completely seriously to the anthropologists about these creatures without any doubt about their reality. The human sacrifices for Gods, which look extremely cruel to us, were not experienced as such since these people were not individuals with ambitious plans for a lifelong career.

This development has a parallel at the level of personal life. Fairy tales are told to children, who themselves are living the period of oneness. Then these children grow, become more and more rational and analytic. They lose their

ability to make choices and there is not much to choose anymore, and become often also lonely and separated. Gradual physical decay adds its own flavor to this process.

The entire evolution could be seen as wake-ups or re-births, bursts of potentialities from which only few are selected during gradual de-entanglement accompanying self-organization, with dissipation serving as the Darwinian selector. Huxley's view about brain as a filter makes sense: our brains minimize the sharing of mental images, which does not aid controlled behavior and survival, and thus make us modern individuals. For instance, the mysterious ability of birds and fishes to migrate back to their birth places might actually involve quantum entanglement.

Inhibition by various neurotransmitters could be seen as a measure for the degree of de-entanglement. Inhibition acts as the filter, which de-entangles the brain from other brains and the body from the bodies of other life forms. During hallucinatory experiences, generated by say drugs, inhibition "fails". The degree of inhibition indeed increases, as one climbs along evolutionary tree and in human brain most of the neural activity is inhibition, a rather strange finding difficult to understand in the framework of the ordinary neuroscience.

In accordance with ontogeny recapitulates phylogeny principle, this evolution is seen as an increasing dominance of inhibition during the development of individual leading from spontaneous children to well-behaved and highly controlled adults. Only in some periods of life inhibition fails: during puberty, in physical death and in great turning points of life. Indeed, puberty and physical death are sometimes accompanied by poltergeist phenomena. Physical death may also be accompanied by telepathic phenomena.

5.3.2 Evolution as an emergence of un-selfish selves?

If the notion of the number-theoretic entropy makes sense, the view about the growing role of inhibition as an indication of continual de-entanglement need not be correct. Rather, the increasing dominance of inhibition would indicate the increasing role of an entanglement during which neuron receives negative energy MEs, and thus provides energy for some another system by buy now and let others pay mechanism. This would mean a gradual emergence of un-selfish neurons making possible increasing flexibility and co-operativity. This of course applies also at higher levels like family and society. The Jaynesian view about the evolution of subjective consciousness could be seen as a gradual development from a child like selfish self sending negative energy to an adult unselfish self able to receive negative energies and co-operate.

In this picture the loneliness of the so called modern man can be seen as a degeneration, a return to a selfish child like behaviour. In entanglement either party is the one who gives energy, and the refusal of the average market economy self to entangle by receiving negative energy or sending positive energy makes it hard to entangle at all. A society of lonely skeptics is the outcome. In this view, the failure of inhibition is a degeneration phenomenon, a return to childhood, and involves strong fluxes of negative energy to the environment generating irreversible phenomena like poltergeist and inducing telepathic experiences. Needless to say, this option is more optimistic than Shannonian alternative.

5.4 About the physiological correlates of anomalous cognition

In the article "Physiological correlates of Psi cognition" of Charles Tart [22] some apparently contradictory findings about physiological correlates of anomalous cognition are described besides the experimental findings of Tart. Changes in EEG, galvanic skin response, finger pulse, and basal skin resistance are examples of possible candidates for the physiological correlates of remote mental interactions.

The findings are following.

a) The first class of experiments involves two persons: subject and agent. The agent is subjected to various kinds of stimuli inducing emotional response: sudden sounds, painful stimuli as in the experiments of Tart, etc.. Subject person is typically in a sound proof room and tries to remotely cognize when subject person experiences these stimuli. Various candidates for the physiological correlates are measured. The physiological correlates typically express a heightened arousal. For instance, in the experiments of Tart [22] galvanic skin response occurred more frequently, and EEG became more complex with more beta waves and fewer alpha, theta, and delta waves.

b) In the second kind of experimental arrangement remote viewing or telepathy is involved but the second person, if present at all, is not subject to any stimuli inducing emotional reaction. Now the physiological correlates tend to be characteristic for a relaxed state of mind. The increase of the basal skin resistance is one such correlate.

These findings might seem to be contradictory. This is however not the case if one accepts the following model.

a) Remote mental interactions involve two distinct aspects: sensory and motor. The sensory, pure remote viewing aspect is made possible by a mere entanglement having low frequency (EEG range typically) MEs as correlates. In principle there is *no* direct physiological correlate for the content of the remote viewed percept. The motor aspect corresponds to the self-organization induced by the high frequency MEs (say microwave MEs) travelling along low frequency MEs to the target. Also endogenous remote mental interactions between cells and other structures are present and corresponding high frequency MEs induce partially the emotional reaction to a remote percept. For remote viewing the endogenous high frequency MEs can be regarded as perturbations, which are minimized in a relaxed mental state.

b) In experiments of type a) the measured response reflects a reaction to a telepathically received information about a stimulus able to induce an emotional reaction. In experiments of type b) the physiological correlates are genuine correlates for the prerequisites of the remote mental interaction and are not masked by the emotional reaction to its content.

c) The remotely perceived (possibly sub-conscious) stimulus or remote anticipation of the stimulus induces in the subject person an emotional reaction having as a correlate the reduction of skin resistance. In the experiments of Tart [22] both the real electrical stimulus experienced by the agent and the electrical stimulus guide by the operator to an electrical resistance instead of the agent, generates the arousal in the subject. This requires that both the operator, agent, and subject belong to the same multi-brained self so that the reaction of the subject can be interpreted as a kind of conditioned reaction of the multi-brained self expressed via the body of the subject.

This model does not assume anything about the mechanism causing the change of the skin resistance. The skin resistance is believed to reduce during

emotional arousal since sweat conducts are filled during the emotional reaction. This mechanism predicts also a plateau effect. This explanation might quite well be the correct one but also new physics could contribute to the effect. The join along boundaries bonds induced by high frequency MEs (say microwave MEs) between atomic space-time sheets and larger space-time sheets could also participate in the control of the skin resistance. The larger the number of endogenous high frequency MEs is, the lower the skin resistance is since Ohmic current can run part of time as a supra current. This corresponds to a state of arousal. When the number of endogenous MEs is small, the leakage probability for the ohmic current is reduced and the current flows as ohmic current most of the time which means an increased skin resistance. This corresponds to a relaxed state. Since competing endogenous high frequency MEs are not present, the system becomes sensitive to remote mental interaction signals.

5.5 Local sidereal time, geomagnetic fluctuations, and remote mental interactions

The article of J. Spottiswoode [23] discusses two strange findings about remote mental interactions.

a) There is a statistical tendency of the anomalous cognition (AC) performance to concentrate in a 2 hour period around 13.30 of the local sidereal time (ST), which is the time measured using as a reference distant stars and thus running at a slightly different rate than the solar time: the lag is $\Delta T = 24/365$ hours ~ 3.7 minutes during 24 hours.

b) The anticorrelation between the level of geomagnetic fluctuations and AC performance has also a maximum during 2-hour period around ~ 13.30 ST.

According to the following argument these findings provide a support for magnetospheric consciousness and could add further details to the model of remote mental interactions. Higher level selves could be involved, even selves above the magnetospheric ones, as is also suggested by the general argument based on $L = cT$ relationship relating the time scale T of mental activity to the length of MEs involved.

5.5.1 Support for the role of magnetospheric consciousness

The so called ap index measures the intensity of the fluctuations of the Earth's magnetic field. If the magnetosphere is a conscious entity, ap index can be interpreted as a measure for the level of arousal of the magnetospheric mind. The negative correlation between ap and AC performance tells that AC is most probable, when the magnetosphere is in a "calm state of mind". This is natural since only in this kind of situation the noise does not mask the signals.

The local magnetic noise produced by the modern high tech environment is much stronger than the geomagnetic noise but this does not matter. Also this conforms with the view that the entire magnetospheric consciousness is involved with the anomalous cognition.

5.5.2 Is there an ELF signal from the special direction masked usually by the geo-magnetic noise?

The obvious question is why the anticorrelation between anomalous cognition effect size and ap index is highest at 13.30 ST? What this finding means that a particular portion of the sky defined by a definite longitude is above the head of

a successful anomalous cognizer independently of the time of year. Thus there should be something special in a direction at this longitude.

The simplest possibility is that there is an ELF radiation source at the direction 13.30 ST such that its frequency corresponds to a typical time scale of the anomalous cognition. Since remote psychokinesis and anomalous cognition should rely on the same mechanism, the first guess for this time scale is as the time lag of 13 to 17 seconds involved with the remote realization of intentions by Qigong masters [18]. This would mean the importance of the frequencies in the range .06 to .08 Hz for anomalous cognition. This gives a definite hint concerning the origin of the anticorrelation. The following scenario allows to understand the time scale of remote PK, the anticorrelation of the AC performance with the ap index, and is also testable.

a) If protonic cyclotron transitions generate the low frequency MEs in the range $f_1 = .06$ Hz to $f_2 = .1$ Hz, the strength of magnetic field must be in the range 10 to 17 nT (nanotesla). The magnetic flux tubes of an interstellar magnetic field in a direction with a longitude defined by 13.30 ST should be in question. The magnetic flux tubes of the interstellar magnetic field would define kind of a cosmic umbilic cord and might be a correlate for the tunnel experience associated with NDEs.

b) The ends of the flux tubes attached to structures within the inner magnetosphere co-rotate with Earth. The resulting twisting presumably tends to induce additional noise to the interstellar magnetic field or Earth's magnetic field or both. The twisting would be below critical amount within the 2 hour time interval around 13.30 ST. If the noise produced by the twisting can be regarded as fluctuations of the Earth's magnetic field (this is not obvious), the local noise level should depend on the sidereal time and have a minimum around 13.30 ST.

c) The strengths of the typical disturbances of Earth's magnetic field are in the range 50-200 nT [23]. The average strength for a given frequency component for the fluctuating part of the Earth's magnetic field increases at low frequencies. At the alpha band the strength is about pT at alpha frequencies. Interestingly, the magnetic perturbation produced by brain at alpha band has a peak, which is slightly above the fluctuations of Earth's magnetic field. This is perhaps not an accident in light of the expected role of alpha band in remote mental interactions. The strength for the Fourier component of fluctuations [26] is roughly .1 nT at $f_2 = .01$ Hz and about 10 nT at frequency $f_1 = .06$ Hz. What puts bells ringing is that the noise level is just the strength for the required interstellar magnetic field at the lower limit corresponding to the 17 second period.

These findings suggests that magnetic fluctuations tend to mask the positive effect of the interstellar magnetic field on AC. Only when the strength of the fluctuations of the Earth's magnetic field at the cyclotron frequency of the interstellar magnetic field reduces sufficiently below the strength of the interstellar magnetic field, the masking effect is small enough.

d) There are some open questions relating to coherence. Does the possibly existing interstellar magnetic field superpose to the Earth's magnetic field coherently as Maxwell's theory would predict, or is the superposition incoherent so that the flux tubes of Earth's magnetic field reside inside the much thicker flux tubes of the interstellar magnetic field? Are the fluctuations of also Earth's magnetic field incoherent so that they would correspond to separate larger flux tubes at which the constant part of Earth's magnetic field resides? The proposed model suggests incoherent superposition in both cases.

5.5.3 What is the origin of the interstellar magnetic field?

The idea about the magnetic umbilic cord connecting distance astrophysical objects to a single quantum coherent whole is sensible in the many-sheeted space-time. The TGD based model for the galaxy formation assumes that the ordinary matter results from the decay of cosmic strings, which are objects carrying extremely strong magnetic fields (magnetic flux tubes and these objects belong to the same solution family of field equations). These cosmic strings form a complex network. For instance, this model explains gamma ray bursters (see the chapter "TGD and cosmology" of [3]). The huge energy production of gamma ray bursters is consistent with their huge distance only if one assumes that the energy is liberated in jets. In TGD framework the gamma ray burts can be identified as jets resulting in the decay of split cosmic strings giving rise to the ordinary matter. The burts are indeed known to originate in the regions, where new stars are born. This picture supports the idea about the existence of a fractal magnetic flux tube network connecting different astrophysical objects, and left as a remnant from cosmic strings, when their magnetic energy transformed to the ordinary matter and gave rise to the birth of stars. This network could give rise to galactic nervous systems in turn combining to the central nervous system of the Universe.

Surprisingly, this picture might be consistent with the constraints on the direction and magnitude of the interstellar magnetic field.

a) According to the online lecture of S. Oliver [24], the measured values of the interstellar magnetic fields depend somewhat on the method with which they are measured (this might be a signal of the many-sheetedness). The interstellar magnetic fields vary in the range milliGauss- .1 microGauss [25], which means that both electronic and protonic cyclotron time scales for all interstellar magnetic fields correspond to time scales relevant for human consciousness.

b) The synchrotron radiation associated with the diffuse emission from the whole sky but concentrated towards galactic plane corresponds to a field strength $\sim .6$ nT. Zeeman splitting for hydrogen 21 cm line from condensing clouds gives fields in 1-2 nT range. In the plane of the galaxy the field is roughly parallel to spiral arms and its strength is .1-1 nT and too weak to correspond to the proposed magnetic umbilic cord. Also the direction of the spiral arm is different from the direction of the required magnetic umbilic cord.

c) The second guess is that the magnetic umbilic cord is orthogonal to the galactic plane. The direction of the galactic North Pole has the right ascension (identifiable as the sidereal time at the meridian of the rotating observer) $RA=12.49$ $\delta = 27.4$ degrees: RA is not too far from 13.30 so that this guess might make sense. Taking into account that the rotation axis of is tilted by 23.5 degrees towards Sun this would mean that the direction of the magnetic umbilic cord is with accuracy of 3 degrees in the plane defined by the orbit of Earth around Sun. Interestingly, the magnetic field associated with the solar wind varies in the range .2 – 80 nT and average value is 6 nT. According to [25], galactic center carries a dipole like field with a strength of order 100 nT, not too far from 10-30 nT. Also this field has filament like structures (flux tubes), which might extend to long distances [25]. The flux tubes of this field should intersect the galactic plane orthogonally. If the strength of the magnetic field inside the flux tubes stays constant rather than varying like dipole field strength, these flux tubes could give rise to the magnetic umbilic cords connecting us directly to the center of the galaxy. Galactic center, perhaps the immense black-hole region there, could be an monstrous brain having galaxy sized central nervous system! That the model for magnetospheric consciousness would generalize to

the scale of entire galaxy would conform with the fractality of consciousness.

d) According to [25], supernova remnants are accompanied by radial filament like structures carrying magnetic field in 1-10 nT and it seems that supernova wind might carry this field around galaxy: very natural if flux tubes carry the field. According to [24], for individual sources such as supernova remnants like Cas A Minor, the field strength is 10-30 nT. This corresponds to the interval 5.6 to 17 seconds. That the field strength is of the same order of magnitude as the dipole field at the galactic center conforms with the idea about magnetic nervous system of galaxy connecting the center of the galaxy to the stars. This magnetic field would be easy to observe in case of supernovae because supernova explosion has packed magnetic flux tubes to a very dense bundle.

5.5.4 Connections with other effects?

There might be fascinating connections with other strange findings.

a) In Comorosan effect [27] (see the chapter "Wormhole magnetic field" of [5]) the irradiation of a bio-matter with a laser irradiation lasting for a multiple of 5 seconds has anomalous effect on a catalyst action. 5 seconds corresponds to $n = 3$ cyclotron transition for proton in a magnetic field of 10 nT. Comorosan effect occurs also in a non-living matter and suggests that the magnetic umbilic cord serves as a kind of cosmic clock.

b) The strength of the Earth's magnetic field in far-away in the plasma sheet is about 10 nT. Could this cosmic magnetic umbilic cord be connected with the plasma sheet and be in a synchrony with what happens there? Plasma sheet is known to be highly self-organizing structure containing in the velocity distributions of charged particles features like "wings" and "eyes" [Frank *et al.*]. In the chapter "Magnetospheric sensory representations" of [6] I have proposed that plasma sheet defines the "self model" of magnetospheric brain and is thus in a role analogous to the insula in the human brain. It would rather natural for the cosmic umbilic cord to couple with that part of the magnetospheric brain which corresponds to the highest level in the self hierarchy associated with the magnetic Mother Gaia.

c) Lungs contain magnetic particles giving rise to magnetic field of about 10 nT. The theory of magnetospheric sensory representations inspires the speculation that the moment of physical death is decided by magnetospheric self sending to lungs stopping signal at proton's cyclotron frequency associated with 10 nT magnetic field.

6 How to test the basic vision?

In the following some proposals for testing the basic vision are discussed. Possible tests distinguishing between remote viewing and hallucinatory experiences have been already discussed.

6.1 Leakage of supra currents

One of the basic elements of the proposed vision about PK is remotely induced leakage of supra currents from magnetic flux tubes to atomic space-time sheets. This same mechanism works for both endogenous biological self-organization (playing a key role in metabolic cycle) and remote mental interactions which would form a routine part of our sensory representations. The most economic experimental strategy would be a direct verification of this basic mechanism.

An especially dramatic effect would be the appearance of ions from magnetic flux tubes to the target of remote mental interaction not present in the target initially. Sue Benford has found evidence for the appearance of S, Mg, and Al in X ray films which were exposed to the radiation coming from so called torsion generator [28]. Intentional effort was involved with the experiment. What happened was that dots and tracks with typical size scale of one millimeter appeared in the X ray film. The dots and tracks did not allow identification as tracks of charged particles, and the exposed regions contained S, Mg and Al not present elsewhere. The leakage of energetic super-conducting ions to atomic space-time sheets dissipating their energy by emitting electromagnetic radiation and ionizing the atoms is the natural explanation for the effect [28, 29].

6.2 Time reversal for the leakage of supra currents

The time reversal of the mechanism generating the leakage of supra currents could be especially important for healing. This mechanism is consistent with the presence of remote bound state entanglement and anomalous production of metabolic energy when binding energy is liberated.

The mechanism would be accompanied by a mysterious disappearance of marker ions in the tissue, and manifest as time reversed function of various molecular machines certainly detectable. Phase conjugates of (that is time reversed) microwaves at critical frequencies could induce the healing process. For instance, de-differentiation of cells might be induced in this manner.

As explained earlier, geometric time reversal could typically involve generation of anomalous radiation by excitation of atoms or molecules by emission of negative energy photons. Rotating magnetic systems (Searl machine) would be especially interesting for proving that time reversal indeed occurs. One could try to demonstrate that biological rhythms correspond to dissipation-healing cycles (wake-up sleep period and metabolic cycles being basic examples).

6.3 Controlling metabolism by IR laser beams and DNA functioning by maser beams?

One could also test the 'dropping' of ions to larger space-time sheets. If the dropping ions have dissipated their energy this means that system acts like a maser at wavelength defined by the reduction of the zero point kinetic energy liberated in the dropping of the ion. The pumping process would correspond to the leakage of the supra currents to atomic or some other space-time sheet, and induced emission to the dropping induced by the photons already present.

a) The effectiveness of metabolic energy production in which proton drops and absorbs a negative energy photon of energy about .5 eV could be amplified by a beam of coherent IR light "kicking" protons back to the atomic space-time sheets. The irradiation by phase conjugate beam would "steal" energy from living system by inducing the dropping without locally usable energy. Whether living systems can "steal" energy from other lifeforms in this manner could be tested. The "stealing" of the metabolic energy (there is probably a fractal hierarchy of "energy currencies") from cancer cells by phase conjugate laser light might be the first principle explanation for why Priore's machine works.

b) The dropping of ions from say $k = 151$ space-time sheet to larger space-time sheets creates microwaves with frequencies corresponding to zero point kinetic energies about $2^{-15}/A$ eV, A atomic number. For electron the energy is about 1/16 eV. These processes could define exotic forms of metabolism,

perhaps at the level of DNA. This process could be amplified by an external microwave beam or its phase conjugate and phase conjugate beam could induce the correction of genetic errors.

c) The scaling law of homeopathy [30] states that high and low frequencies accompany each other and are in a constant ratio for which TGD predicts several values determined as ratios of zero point kinetic energies and cyclotron energies at magnetic flux tubes. The scaling law can be understood as follows: dropping of ions to cyclotron states generates with the zero point kinetic energy and cyclotron photons. Low frequency photons can interact resonantly with the system for which the internal excitations have same low frequency. This generates internal excitation with wavelength which is of the order of system size and this excitation couples resonantly to photons with wavelength equal to system size: thus high frequency photons result.

Thus one might achieve the above proposed effects using also low frequency irradiation. For instance, irradiation by kHz waves in order to achieve generation of biophotons and irradiation by ELF waves in order to achieve generation of microwave photons. In fact, I started to develop the vision about living system as a macroscopic quantum system from the finding of Blackman [31] and other pioneers of bio-electromagnetism that ELF radiation has delicate effects in the functioning of living matter. It seems that the basic mechanism might be the dropping of ions between space-time sheets or its time reversal. This mechanism could be tested also for remote objects.

6.4 How to choose senders and receivers?

An important aspect of testing is optimal choice of targets and the persons acting as sender.

Quite generally, the optimal target system for demonstrating these effects would be a critical system very sensitive to small perturbations. Any critical system would work, and one might even consider that the critical systems used to detect elementary particles might be used. Overcooled vapour or liquid or overheated liquid is one possibility. One could take register what happens in the system using same methods as in particle physics. Organic compounds might be by definition be this kind of systems.

One could also try to identify optimal 'senders'. Persons with strong will power or with firm belief on the effect, or persons with lower level of inhibition (children, actors, artists,...) could be considered as optimal 'senders'. One could find whether some drugs which remove inhibition, could enhance telepathic and psycho-kinetic abilities. The "blessed are the meek since they quantum entangle" prediction could be also tested. Indeed, one of the most dramatic experiments supporting psychokinesis was done using chicken which imprinted to a robot [32]. The robot, whose behavior was programmed earlier by random number generator, tended to stay near the chicken, as if chicken had induced a quantum jumps changing the geometric past in macro-temporal time scales.

6.5 How to test the notion of conscious hologram?

The notion of conscious hologram means that practically any part of body can represent any other part of body or even external world. Concerning the notion of conscious hologram at the length scale of body, Kirlian imaging with simultaneous electrical stimulation of other body parts, in particular ear, is very promising manner to test the hypothesis [15]. It is also known that ear forms kind of fractal miniature of body with respect to acupuncture points so that

stimulation of particular part of ear electrically creates sensation that particular part of body is stimulated [33].

PLR spectroscopy [2] provides a precise and accurate manner to prove the viability of the notion of conscious hologram empirically. What is needed is the analysis of the frequency spectrum: does it really contain the predicted differences of cyclotron harmonics. If this approach and its variants really work it becomes possible to determine experimentally the densities of superconducting ions and Cooper pairs at parallel space-time sheets.

At the level of remote mental interactions the stimulation of brain electrically could induce in other brain nerve pulse pattern or even experience correlating with the nerve pulse pattern or even experience in the stimulated brain.

Even water near criticality could provide this kind of representations. In Imaging laboratory at Hilversum, Holland the following experiment (unpublished) has been performed with success. The experiment involves water droplet near freezing point. A person with abilities of a healer asks for Universe to express something in the structure of the droplet. What results are beautiful fractal patterns representing say plant leaves, even a picture about the laboratory's architecture has been generated in this manner.

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