

# Homeopathy in Many-Sheeted Space-time

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## Abstract

The claimed mechanisms of homeopathic healing and the method of manufacturing homeopathic potencies are not the only paradoxical aspects of homeopathy. Also the reported frequency imprinting and entrainment, codes based on field patterns, and associative learning of water look mysterious in the framework of standard physics.

### 1. Frequency imprinting and entrainment

Frequency imprinting and entrainment at preferred frequencies are believed to be fundamental for homeopathy and acupuncture. The data suggest that water builds representations for the chemicals it contains as space-time sheets containing water in liquid crystal form. These space-time sheets reproduce relevant part for the spectrum of rotational frequencies of the molecule in rigid rotor approximation. Also the mimicry of vibrational spectrum using sound waves can be considered possible. Besides LC water blobs also magnetic mirrors consisting of magnetic flux tube plus parallel MEs pop up naturally in the original model of frequency imprinting and entrainment.

The basic objection is that if the space-time sheets are in thermal equilibrium, the scenario partially fails in the case of fundamentally important rotational and conformational spectra which are in microwave region. TGD however suggests that also inherently dark atoms identifiable as anyonic counterparts of ordinary atoms are possible and have the same energy spectrum as ordinary atoms, and that the notion of atom and molecule generalizes to what might be called  $N$ -atom/molecule having energy spectrum scaled up by a factor  $1 \leq N \leq \lambda^k$ ,  $\hbar(k) = \lambda^k \hbar_0$ . In this case various vibrational and rotational frequencies would define a hierarchy of dark energies which can be above thermal threshold. In particular, rotational and conformational microwave spectra of bio-molecules have dark counterparts with energies above the thermal threshold. Otherwise only cyclotron energies and plasma oscillation energies can be above thermal threshold at sufficiently high levels of dark matter hierarchy.

### 2. Scaling laws

Homeopathy seems to involve two kinds of scaling laws which seem to be closely related. What I call scaling law of homeopathy states that homeopathic frequencies appear in pairs  $(f_h, f_l)$  of high and low frequencies such that their ratio is given by  $f_h/f_l \simeq 2 \times 10^{11}$ . TGD approach explains this ratio predicts a generalization of the law.  $v = Lf_l$  scaling law tells in TGD framework how the frequencies associated with generalized EEG code for the velocities of physiological waves and their frequencies  $f_h = cf_l/v$ . The general model for motor control by magnetic body predicts this scaling law.

### 3. Model for the homeopathy

The model of homeopathy must explain the effectiveness of homeopathic remedies manufactured by a repeated dilution and succussion. This can be understood if part of chemical involved is transformed to dark matter and is also represented by water clusters or dark super-nuclei formed from protons. This minimal representation involves thermally stable dark cyclotron frequencies. If inherently dark atoms and molecules with essentially same energy spectrum as ordinary ones are possible, also the mimicry of vibrational and rotational spectrum is possible by clusters of dark water molecules.

One must also understand why homeopathic remedies are manufactured from molecules which basically cause the symptoms to be cured. The explanation is that the presence of molecules mimicking the poisonous molecule makes it possible to sweep the poisonous molecules "under the rug" if they enter the organism. In the presence of Bose-Einstein condensates of dark photons generated by the mimicking particles, the poisonous molecules drop to dark space-time sheets where they are harmless: the mechanism is generalization of induced emission.

The model should also explain the associative learning and field codes. The presence of a hierarchy of dark matter levels leads to a model for how magnetic body performs motor control in terms of dark plasmoids and their quantal plasma oscillation patterns and receives sensory input from the biological body and experiences it as a kind of somatosensory representation

along entire magnetic body. It would be the magnetic bodies at higher levels of dark matter hierarchy which learn rather than mere water. Context sensitive field codes emerge naturally as codes involved with all bio-control, in particular that of gene expression.

The charge entanglement by  $W$  MEs is the essentially new element in the model for generalized motor actions by magnetic body. Also the telepathic sharing of mental images could rely on charge entanglement. The reduction of charge entanglement can induce a quantum jump to a state in which local Bose-Einstein condensates become exotically ionized with certain probability depending on the intensity of  $W$  field. These Bose-Einstein condensates define pixels of generalized motor maps. Plasma oscillations in turn induce various physiological responses such as  $\text{Ca}^{++}$  and  $\text{Mg}^{++}$  waves and nerve pulses in turn giving rise to the generalized motor action. Field code is the correspondence between the spatio-temporal pattern of plasma oscillations and generalized motor action.

#### *4. Dark nuclear strings as analogs of as analogs of DNA-, RNA- and amino-acid sequences and baryonic realization of genetic code*

A speculative picture proposing a connection between homeopathy, water memory, and phantom DNA effect is discussed and on basis of this connection a vision about how the tqc hardware represented by the genome is actively developed by subjecting it to evolutionary pressures represented by a virtual world representation of the physical environment. The speculation inspired by this vision is that genetic code as well as DNA-, RNA- and amino-acid sequences should have representation in terms of nuclear strings. The model for dark baryons indeed leads to an identification of these analogs and the basic numbers of genetic code including also the numbers of aminoacids coded by a given number of codons are predicted correctly. Hence it seems that genetic code is universal rather than being an accidental outcome of the biological evolution.

#### *5. Some applications*

The model of the magnetic body and the mechanism of motor control based on plasma oscillations of plasmoids can be tested by finding whether it allows to understand various enigmatic findings. Priore's machine which is a device demonstrated to induce a cure of cancer by somehow stimulating the immune system defines one such application. The findings of Sue Benford about intentionally produced tracks and dots in nuclear emulsions and microwave hearing and closely related taos hum define further applications. There is experimental evidence that electromagnetic stimulation can be used to transfer genetic information imprinted in field patterns between organisms belonging to different species. The idea about genes responsible for genetic self engineering and responding to field patterns representing foreign genes pops up naturally in dark matter inspired vision.

The general model for the magnetic body allows also to sharpen the model of remote mental interactions. In fact, these effects would be only a scaled-up exogenous versions of the effects appearing endogenously in cellular length scales and also in astrophysical length scales in communications between magnetic bodies and corresponding biological bodies.

## **1 Introduction**

The considerations of this chapter are partly inspired by the talk of Cyril Smith in CASYS'2001 conference [27] summarizing various empirical findings about the effects of electromagnetic fields at specific resonance frequencies on water and living matter. A second source of inspiration came from discussions with Lian Sidoroff and her article summarizing what is known about remote viewing and healing [31] as well as from the very process of writing articles to the web journal founded by Lian Sidoroff. A third source of inspiration came from the evolution of ideas about dark matter hierarchy few years later [M3].

## 1.1 Frequency imprinting and entrainment

The claimed mechanisms of homeopathic healing and the method of manufacturing homeopathic potencies are not the only paradoxical aspects of homeopathy. Also the reported frequency imprinting and entrainment, codes based on field patterns, and associative learning of water look mysterious in the framework of standard physics.

Frequency imprinting and entrainment at preferred frequencies serving as a visit card of a given molecule are believed to be fundamental for homeopathy and acupuncture. The results of Smith and Benveniste [39, 40] provide strong constraints on the model of the magnetic homeostasis and on the general structure of the super-conducting part of the circuitry realized by using magnetic flux tubes as current carrying elements.

The data of [27] suggests also that water builds representations for the chemicals it contains as space-time sheets containing water in liquid crystal form. These space-time sheets reproduce relevant part for the spectrum of rotational frequencies of the molecule in rigid rotor approximation. Also the mimicry of vibrational spectrum using sound waves is possible. Liquid crystal property of water blobs makes them ideal also for communications. More exotic, and in fact ideal mimicry would be based on dark super-nuclei of protons formed by closed string like structures of dark protons [J6]. Magnetic mirrors consisting of magnetic flux tube plus parallel MEs pop up naturally in the original model of frequency imprinting and entrainment. Magnetic mirrors and LC water blobs seem to provide the long sought for connection of exotic aspects of many-sheeted physics with bio-chemistry.

The basic objection against this scenario is that if the space-time sheets are in thermal equilibrium it partially fails in the case of fundamentally important rotational and conformational spectra which are in microwave region. Conformal and vibrational degrees of freedom would be thermalized and could not provide metabolic energy nor represent biological information.

A possible resolution of this problem relates to an important open problem concerning the understanding of dark matter hierarchy. The question is whether inherently dark atoms and molecules with thermally stable spectrum are possible or not. The simplest model predicts that atomic energy spectrum scales as  $1/\hbar^2$  so that dark atomic energies would be below thermal threshold and not significant for the functioning of living systems.

TGD however suggests that also inherently dark atoms identifiable as anyonic counterparts of ordinary atoms are possible. They would have essentially the same energy spectrum as ordinary atoms, and the notion of atom and molecule generalizes to what might be called  $N$ -atom/molecule having energy spectrum scaled up by a factor  $1 \leq N \leq \lambda^k$ . In this case various vibrational and rotational frequencies would define a hierarchy of dark energies which can be above thermal threshold. In particular, rotational and conformational microwave spectra of bio-molecules have dark counterparts with energies above thermal threshold. Otherwise only cyclotron energies and plasma oscillation energies can be above thermal threshold at sufficiently high levels of dark matter hierarchy.

## 1.2 Scaling laws

Homeopathy seems to involve two kinds of scaling laws. What I call scaling law of homeopathy states that homeopathic frequencies appear in pairs  $(f_h, f_l)$  of high and low frequencies such that their ratio is given by  $f_h/f_l \simeq 2 \times 10^{11}$ . TGD approach explains this ratio as ratio of zero point kinetic frequencies and cyclotron frequencies and predicts also a generalization of the law involving large number of this kind ratios.

$v = Lf_l$  scaling law is also discussed by Smith [27] and tells in TGD framework how the frequencies associated with generalized EEG code for the velocities of physiological waves and their frequencies  $f_h = cf_l/v$ . The general model for motor control by magnetic body allows to understand the origin of this scaling law.

A much deeper explanation for the scaling law of homeopathy is based on the quantization of Planck constant. Number theoretical arguments suggest a general formula for the allowed values of  $\lambda$  [C8] as  $\lambda = n$  where  $n$  characterizes the quantum phase  $q = \exp(i\pi/n)$  characterizing Jones inclusion [C6]. The values of  $n$  for which quantum phase is expressible using only iterated square root operation are number theoretically preferred and correspond to integers  $n$  expressible as  $n = 2^k \prod_n F_{s_n}$ , where  $F_s = 2^{2^s} + 1$  is Fermat prime and each of them can appear only once.  $n = 2^{11}$  obviously satisfies this condition. The lowest Fermat primes are  $F_0 = 3, F_1 = 5, F_2 = 17, F_3 = 257, F_4 = 2^{16} + 1$ . The prediction is that also  $n$ -multiples of  $p$ -adic length scales are possible as preferred length scales.

The scaling factor  $2 \times 10^{11}$  corresponds with 1.5 per cent accuracy to the integer  $n_F = 2^{36} \times 3 \simeq 2.03 \times 10^{11}$  defining a Fermat polygon. This suggests an interpretation in terms of a decay of dark photon with a given wave-length to a bundle of  $n_F$  ordinary photons with the same wavelength. The energy of the dark photon would be by a factor  $n_F$  higher. This process could serve as an effective tool of bio-control. Dark photon could also transform to an ordinary photon with wavelength shorter by factor  $1/n_F$ . There is a lot of evidence that the powers of  $n = 2^{11}$  define preferred scalings of  $\hbar$ :  $n_F$  corresponds to  $n_F = 2^{3 \times 11} \times 24$  which suggests that also the scale factors  $n_F = 2^{k \times 11} \times 24$  could be favored. Quite generally, integers  $n_F$  defining Fermat polygons are a reasonable guess for the generalization of the scaling law of homeopathy and the search for these scaling factors could provide an experimental means of identifying the values of Planck constant relevant for living matter.

The time units of everyday life could reflect the properties of the dark matter hierarchy responsible for the control of living matter, in particular those of the sub-hierarchy defined by Fermat polygons. Indeed, one year corresponds to  $n_F = 4 \times 3$  months, one month to  $n_F = 2 \times 3 \times 5$  days, one day to  $n_F = 8 \times 3$  hours, one hour to  $n_F = 60 = 4 \times 3 \times 5$  minutes, and one minute to  $n_F = 60$  seconds.

### 1.3 A model for homeopathy

The model of homeopathy must explain the effectiveness of homeopathic remedies manufactured by a repeated dilution and succussion of a solution containing the molecules causing the symptoms of the disease. This can be understood if part of the chemical involved is transformed to dark phase and is also mimicked by water clusters or dark super-nuclei formed from protons. The minimal representation involves cyclotron frequencies such that corresponding dark cyclotron energy is thermally stable. If inherently dark atoms and molecules with essentially same energy spectrum as ordinary ones are possible, also the mimicry using dark vibrational and rotational spectrum is possible by clusters of dark water molecules.

One must also understand why homeopathic remedies are manufactured from molecules which basically cause the symptoms to be cured. The explanation is that the presence of molecules mimicking the poisonous molecule makes it possible to sweep the poisonous molecules "under the rug" if they enter the organism. In the presence of Bose-Einstein condensates of dark photons generated by the mimicking particles, the poisonous molecules drop to dark space-time sheets where they are harmless: the mechanism is a generalization of induced emission.

Homeopathy does not reduce to mere frequency imprinting and entrainment. There is evidence that the modulation patterns of carrier frequencies are also involved and define what might be called field codes [38, 39, 27]. There is also evidence that water can learn associatively.

The presence of a hierarchy of dark matter levels leads to a model for how magnetic body performs motor control in terms of dark plasmoids and their quantal plasma oscillation patterns and receives sensory input from the biological body and experiences it as a kind of somatosensory representation along the entire magnetic body (actually hierarchy of them). The learning and memory of water can be assigned to the magnetic bodies at various levels of the dark matter

hierarchy rather than water as such. Context sensitive field codes emerge very naturally as codes involved with all bio-control which as a special case activate gene expression.

The charge entanglement by  $W$  MEs is an essentially new element in the model for generalized motor actions by magnetic body. Also the telepathic sharing of mental images could rely on charge entanglement. The notion was originally applied in the model of nerve pulse generation [M2]. Neutral MEs would in turn be related to communications and memory. The reduction of charge entanglement can induce a quantum jump to a state in which local Bose-Einstein condensates become exotically ionized with certain probability depending on the intensity of  $W$  field. Bose-Einstein condensates define pixels of generalized motor maps.

Exotic ionization induces dark Plasma oscillations in turn generating various physiological responses such as  $\text{Ca}^{++}$ ,  $\text{Mg}^{++}$  waves, and nerve pulse patterns giving rise to the motor action as an asymptotic self-organization pattern. Plasma oscillation patterns utilize typically dark microwave photons as metabolic energy. Field code is the correspondence between the spatio-temporal pattern of plasma oscillations and generalized motor action and the number theoretical model for genetic code [L3] generalizes to this context.

## 1.4 Some applications

The model of the magnetic body and the mechanism of motor control based on plasma oscillations of plasmoids can be tested by finding whether it allows to understand various enigmatic findings. Priore's machine which is a device demonstrated to induce a cure of cancer by somehow stimulating the immune system defines one such application [71]. The findings of Sue Benford about intentionally produced tracks and dots in nuclear emulsions [74], and microwave hearing [58] and closely related taos hum [80] define further applications.

The mysteries revolving around genetic code are especially fascinating challenges for the model since the control of gene expression is one of the most important actions of magnetic body. For instance, there is experimental evidence that electromagnetic stimulation can be used to transfer genetic information between organisms belonging to different species [51]. The idea about genes responsible for genetic self engineering and responding to field patterns to which information about foreign genes is imprinted pops up naturally in dark matter inspired vision inspiring also the notions of super gene and hyper gene [M3].

The general model for the magnetic body allows also to sharpen the model of remote mental interactions [31]. These effects would be only a scaled-up exogenous versions of the effects appearing endogenously in cellular length scales and also in astrophysical length scales in communications between magnetic bodies and corresponding biological bodies. In TGD framework the problem is actually not to explain why and how remote mental interactions are possible but why they are so rare and there is a natural explanation. The evolution of consciousness is basically individualization and this requires that fields codes involved with the control of biological body by magnetic body must be personal so that outsiders do not have access to the biological body.

## 2 General view about homeostasis

For the benefit of the reader a general view about homeostasis a la TGD is first described before the construction of a model for homeopathy. First the general picture prior to the ideas about dark matter hierarchy is discussed and then the modifications implied by dark matter hierarchy are considered briefly.

## 2.1 Super-conducting part of the ionic flow circuitry

The observations described in [27] provide important clues about the general structure of the super-conducting part of the ionic flow circuitry assumed to be realized as a fractal structure of magnetic flux tubes. The following scenario is consistent with the basic observations.

### 2.1.1 Magnetic circulation

Magnetic circulation is analogous to blood circulation and emerges during the development of the organism. Magnetic flux tubes form the super-conducting part of a many-sheeted ionic flow circuitry. Supra currents flow along magnetic flux tubes and are transformed to dissipating Ohmic currents when they flow to the atomic space-time sheets.

According to [27], the frequencies associated with the acupuncture meridian lines remain in a good accuracy invariant during the life cycle of the organism [27]. If the ELF frequencies correspond to magnetic transition frequencies, they characterize the thicknesses of the magnetic flux tubes carrying the ions and at least part of the magnetic flux tube circuitry could be closely related with the acupuncture meridian lines. There are very many ions and the magnetic frequency scale varies by a factor of order 100 over the periodic table. Homeopathy demonstrates that also ELF frequencies below those associated with atomic ions are important and this leads to the conclusion that also the magnetic transitions for space-time sheets containing water in liquid crystal form contribute to the ELF spectrum. The work of Mae Wan-Ho suggests a close correlation of flux tube circuitry with collagen circuitry [18]. The DC current circuitry discovered by Becker [47] could correspond to the dissipative part of the circuitry.

According to [27], the endogenous frequencies vary only by  $\pm 2$  per cent. This would mean that endogenous magnetic flux tube thickness varies only by  $\pm 1$  per cent.

### 2.1.2 Frequency entrainment suggests magnetic homeostasis

Super-conducting magnetic flux tubes inside water and inside body body contain large number of ions, molecules, etc.. and there is large variety of magnetic transition frequencies which could be controlled by varying the magnetic flux tube thickness to stay in resonance with the exogenous frequency.

The phenomenon of frequency entrainment supports the notion of magnetic homeostasis. Endogenous frequencies indeed tend to follow the variation of an exogenous stimulating frequency initially sufficiently near to the endogenous frequency up to  $\pm 30$  per cent relative change after which they jump back to their endogenous values. The entrainment of the endogenous frequencies to external frequencies suggest that the thickness of the magnetic flux tubes in water and living matter is subject to a bio-control and that it makes sense to speak about magnetic homeostasis. The above data would mean that the thickness of the magnetic flux tube can change at most  $\pm 15$  per cent. The observed variation of the high-to-low frequency ratios along meridians deviation of  $\pm 15$  per cent. This would mean that the thicknesses of various magnetic flux tubes are with high accuracy scaled by a same factor in the endogenous magnetic homeostasis.

Self-organization by quantum jumps might automatically lead to the selection of preferred values of the magnetic flux tube thickness guaranteing entrainment in healthy organism. The precise mechanism inducing the variation of the magnetic flux tube thickness remains however unidentified at this moment. The return of the entrained frequencies to their endogenous values does not seem to occur with the normal rate for electromagnetically hypersensitive persons [27]: perhaps em hypersensitivity means that the mechanism controlling magnetic flux tube thickness does not function properly.

### 2.1.3 Why magnetic homeostasis?

There are good reasons why for the magnetic homeostasis.

1. Magnetic homeostasis with parallel MEs makes it possible for the system to entrain to the frequencies of various chemical transitions occurring in living matter. This would make possible endogenous spectroscopies allowing the organism to consciously (not necessarily at level of entire organism) detect various chemical concentrations by magnetic quantum phase transitions induced at these frequencies. Also the entrainment of neurons to external frequencies could rely on this mechanism.
2. Magnetic transitions could participate bio-control. 'Stimulation of chakras' would translate to resonant generation of magnetic phase transitions at super-conducting magnetic flux tubes. If magnetic transitions affect the structure and properties of the bio-molecules, this in turn can induce strong control effects at the atomic space-time sheets. For instance, if super-conducting enzyme molecule suffers a magnetic transition at super-conducting space-time sheet, its enzymatic properties could change dramatically. Magnetic transitions at resonance frequencies at super-conducting space-time sheets could induce protein conformations somehow. They do not directly affect net supra currents essential for ionic flow equilibrium. Spin flip could however induce change of the direction of the electric dipole moment and induce chirality changes, etc.. Conformations of enzymes could change and their catalytic properties could be affected dramatically.
3. Also non-magnetic transitions induced by MEs parallel to the magnetic flux tubes could occur coherently for BE condensates of atoms and even molecules at super-conducting space-time sheets and optimize the effectiveness of the bio-chemical control. A possible explanation for the necessity of the immune system is that quantum coherence of protein Bose-Einstein condensates is reduced if organism contains alien proteins with same function so that the rates for transformations of the protein (say enzyme) conformations at super-conducting space-time sheets are reduced.
4. Magnetic transitions for the space-time sheets containing water in liquid-crystal form and having size smaller than the transversal thickness of the magnetic flux tube have spectrum extending to  $1/f = 1000$  years. This means that all biological rhythms relevant for life at the level of single organism could be coded to these structures. In particular, the representation of long term memories (not at the geometric now but at the moment of the actual event) might involve this kind of structures.

### 2.1.4 Are wormhole magnetic fields involved?

'Wormhole magnetic fields' are pairs of magnetic flux tube space-time sheets with vanishing net energy (in TGD framework space-time sheets with negative energy are possible because space-time is 4-surface rather than an abstract Riemann space) and carrying opposite magnetic fields. Wormhole contacts, whose throats carry opposite classical em charges, connect the two space-time sheets, and if they rotate, they generate opposite currents at the two space-time sheets involved in turn giving rise to magnetic fields of same magnitude but opposite sign. No elementary particles are required to generate these magnetic fields. Vacuum polarization effect is in question in a well defined sense.

At least the positive energy space-time sheet could contain supra phases of ions and an open question is whether super-conducting magnetic flux tube circuit consists of ordinary magnetic flux tubes only or whether it contains also parts which are wormhole magnetic fields. Wormhole magnetic fields could be regarded as a simulation of ordinary magnetic structures and homeopathy might involve also the generation of wormhole magnetic fields mimicking the magnetic structures

associated with the homeopathic remedy. Wormhole magnetic fields might replicate and diffuse from homeopathic potency to body without any external energy feed and could be regarded as a life form of their own.

There is an obvious analogy between wormhole magnetic field and DNA double strand: similar analogy holds true for double-sheeted MEs which could also be present. Both double-sheeted MEs and wormhole magnetic fields would be structures carrying pure information.

## 2.2 How water represents?

The general model for how water can represent in its own dynamical structure the chemicals is inspired by various experimental findings (especially by the findings challenging the notions of ionic channels and pumps) is roughly the following.

1. The magnetic flux tube structure is fractal and thus contains flux tubes inside flux tubes and gives rise to what might be called magnetic circulation analogous to blood circulation. The magnetic field of Earth is important but not necessarily the only part of the structure. The thickness of the flux tube, and thus also magnetic transition frequency scale, is under bio-control. Also the length of flux tube is variable and under control.
2. MEs parallel to the magnetic flux tubes are also involved. The ends of magnetic flux tube could act effectively as laser mirrors and MEs would thus define zigzag path in space-time between the ends of the magnetic flux tube. Similar structures are involved with the model of long term memory and the structures in question could quite generally give rise to conscious memory in the time scale determined by the frequency involved. The characteristic frequencies associated with MEs are given by  $f = c/L$ , where  $L$  is the length of ME. There are thus *two branches* in the spectrum of important characteristic frequencies: magnetic transition frequencies in ELF range and the high frequency branch of the frequencies associated with MEs with lengths not above than the size of organism. For length scale of .1 meters the frequency scale of ME frequencies is of order GHz.
3. Positive/negative energy MEs could be even classical correlates for photon emission/absorption. Quite generally, MEs with typical length  $L = c/f$  are presumably necessary for a complete TGD based description of atomic and molecular transitions at given transition frequency  $f$ . One can even consider the possibility that p-adic ME in presence of charged particle could transform to real ME and charged particle such that energy momentum conservation is satisfied. In this manner intention would be transformed to action at elementary particle level. One could also think that MEs at these frequencies could perform bio-control and also detect radiation emitted by various molecules.
4. Frequency imprinting and entrainment are generic phenomena. Both endogenous and exogenous frequencies can be entrained by varying the thickness and length of the magnetic flux tubes. This suggest that bio-system is performing kind of endogenous spectroscopy by detecting important bio-chemicals at magnetic flux tubes and even elsewhere. In ELF part of spectrum NMR or its generalizations to other than spin flip transitions would be involved. Also the sensing of important em frequencies as such could be performed routinely by bio-system in this manner. An interesting possibility is that also p-adic variants of MEs are involved so that this process could be seen as mimicry by singing in the same tune.
5. Weak magnetic fields affect the super currents running in the circuitry and this in turn affects dramatically the ionic concentrations at the atomic space-time sheets so that chemical control becomes possible. Magnetic transitions at super-conducting space-time sheets can affect the catalytic properties of enzymes and thus make possible more refined quantum level chemical

control. Also *other* than magnetic transitions could occur coherently (rate proportional to number of ions squared) at super-conducting space-time sheets and even atomic space-time sheets and be induced by MEs at the high frequency portion of the spectrum. Perhaps the rates for the transitions inducing protein conformations affecting the catalytic properties of the protein could be optimized in this manner. The performance of this kind of bio-control at super-conducting space-time sheets would be like performing surgery inside a specialized hospital instead of doing it on the street.

The above considerations do not answer the question about the role of the atomic space-time sheets in the representations of frequencies provided by MEs and magnetic flux tubes. What this role might be is suggested by the fact that the matter at the atomic space-time sheets should have the role of an amplifier of em fields associated with MEs.

1. The generation of space-time sheets containing water in liquid crystal form with a rotational frequency spectrum mimicking that of the homeopathic potency is a further aspect of this mimicry and could amplify the otherwise weak signal provided by chemical by amplifying the em fields associated with MEs. The water domain could be also seen as a mental image (sub-self) about the chemical at atomic space-time sheet. In principle all the rigid body aspects of the molecule can be mimicked in this manner. Mimicking water domains can also control the transitions of the bio-molecules or vice versa.
2. Not only rotational spectrum but also vibrational spectrum (such as conformal vibrations of molecules) can be mimicked since any system near equilibrium reduces to a collection of harmonic oscillators: now sound waves propagating in LC water blobs would provide the representation. It is known that the water in cell interior and near to the cell membrane transforms routinely between sol and gel (LC) states in response to various stimuli: this transformation would have interpretation as a formation of a conscious representation for something, perhaps some event or object outside the cell.
3. Note that by scaling law  $f_h/f_l = 2 \times 10^{11}$ , the characteristic neuronal frequency  $f_l = 1$  kHz corresponds to  $f_h = 2 \times 10^5$  GHz and to a ME with a length of 1.5 micro-meters, which roughly corresponds to the thickness of the magnetic flux tube. Thus kHz frequency is maximal if ME is required to extend outside the magnetic flux tube. Perhaps this ME could be involved with the sensory representations at the cell level. Note that an alternating voltage at kHz frequency is used also to generate Kirlian effect. For human vision the wave lengths of photons are in the range of  $10^{-6} - 10^{-7}$  meters and corresponding ELF length scale is  $10^4 - 10^5$  meters if scaling law is assumed.
4. The requirement that LC water blob has size not larger than about one micro-n implies that that the lowest ELF frequency corresponds to a time period of about  $T = 1000$  years so that all time scales relevant for human consciousness are covered and MEs with frequencies relevant to human long term memories can be amplified by intracellular LC water space-time sheets. If the scaling law  $f_h/f_{EEG} = 2 \times 10^{11}$  is taken literally, one obtains  $f_h = 20$  Hz at the upper bound: this corresponds to the lowest audible frequency which suggests that also sound waves serve representative purposes.
5. Fractality suggests that LC water space-time sheets form in turn liquid crystals in larger length scale give rise to secondary representations and that there exists entire hierarchy of these representations.

## 2.3 The role of micro-waves in homeostasis

Plasmoids (or 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 life-forms, in particular plasmoids identified as UFOs. It has been found that plasmoids indeed satisfy the basic definitions of a life form [33]. Ordinary bio-matter is assumed to self-organize around these structures and nerve circuit represents a good example of a structure resulting in this manner.

Also the magnetic life forms need energy feed to self-organize and stay awake. The basic metabolic mechanism would be the same as in the case of living matter [K6]. Energetic super-conducting ions must be somehow driven from the magnetic flux tubes to the atomic space-time sheets, where they collide with atoms, ionize them, and generate visible light in the atomic transitions giving thus rise to the observed luminous phenomena interpreted as UFOs. The ions would eventually 'drop' back to super-conducting space-time sheet and liberate the zero point kinetic energy as a quantum of metabolic energy defining what is often referred to as a universal energy currency. Essentially identical energetic cycle of Karma would be realized also in living matter but involve a complex molecular organization and many-sheeted current circuitry responsible for the control of homeostasis. For the proton the quantum is predicted to be of order .5 eV liberated also when a single molecule of ATP is used.

The realization of this primitive metabolic cycle requires the breaking of super-conductivity: some mechanism must generate join along boundaries bonds serving as bridges connecting magnetic flux tubes with atomic space-time sheets along their boundaries so that supra current leakage becomes possible. The gap energy of super-conductors, typically measured in  $10^{-4}$  eV as a unit (corresponding to temperature of order Kelvin), would naturally correspond to the energy needed to build up this bond (note that the temperature at the magnetic flux tubes would be much lower). Interestingly enough, a gap energy would  $10^{-5}$  eV corresponds to the frequency  $\sim 3$  GHz. This suggests that micro-wave 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. Proteins could generate the needed micro-wave photons by coherently occurring conformational transitions. Also rotational transitions of clusters of water molecules could emit micro-waves and perhaps mimic and amplify the micro-waves generated by proteins.

The clusters of water molecules forming liquid crystals can mimic the conformational and rotational spectrum of various molecules, and that the ability 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 micro-wave energy spectrum is so important for healing, could be understood as follows. The many-sheeted current circuitry, involving atomic space-time sheets and magnetic flux tubes and also other space-time sheets, is extremely complex control structure [I4, I5]. The continual regeneration of bridges between, say, atomic space-time sheets and magnetic flux tubes by micro-waves 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 micro-waves generating particular bridges fails.

The medicine or its homeopathic counterpart would help to generate (or even re-establish the generation of) the micro-wave spectrum responsible for the generation of the lacking bridges in the circuitry. A further piece to 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 (the ratio can actually vary). The TGD based interpretation is that ELF MEs are responsible for quantum entanglement in macroscopic, even astrophysical, length scales. Micro-wave MEs propagating effectively as mass-less particles along ELF MEs in turn induce

self-organization by serving effectively as 'food' of the plasmoidic 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 life-forms are mental images getting at least partially their metabolic energy from brain.

## 2.4 How the vision about dark matter hierarchy affects the picture?

The picture discussed in previous subsections is essentially that before the ideas about dark matter hierarchy emerged. The basic implication of the dark matter hierarchy is that there is no need to assume that temperatures at different space-time sheets are widely different since the scaling of  $\hbar$  can scale up the energies above thermal threshold. The simplest model of dark hydrogen atom however predicts that the energies of the hydrogen atom are scaled down by  $1/\lambda^2$ ,  $\lambda \simeq 2^{11}$ , which means that inherently dark atoms and molecules would not be thermally stable at room temperatures.

In topological condensation of ordinary atoms and molecules at dark space-time sheets cyclotron energies and plasma oscillation energies are scaled up and can be above thermal threshold. This leads to a very restrictive model. For instance, the conformal and rotational spectra of bio-molecules correspond to microwave frequencies and would be below thermal threshold and thus of no importance. This would also reduce the importance of liquid crystals known to be of crucial importance for the functioning of living matter. There is also a feeling that the role of fermionic bio-ions such as  $\text{Na}^+$ ,  $\text{K}^+$ , and  $\text{Cl}^-$  should be more important than this picture allows.

One can however consider a modification of the notion of dark atom in which the dark energy spectra are essentially same as the ordinary ones. This would mean that the original vision about water blobs as being able to mimic molecules using their rotational and vibrational spectra is modified only by replacing these structures with their dark variants. Of course, at this stage only experiment can decide whether atoms and molecules can be inherently dark. In the following the two models of dark atom are discussed to give an overall view about what is involved.

### 2.4.1 An alternative model for inherently dark atoms

The attempts to understand dark matter hierarchy led to an alternative model of dark atoms in which the energy spectra of dark atoms and molecules are nearly the same as their ordinary counterparts.

1. The original model for dark atoms relies on the scaling of  $\hbar$  by  $\lambda^k$  at the  $k^{\text{th}}$  level of the dark matter hierarchy. Here  $\lambda$  is integer and  $\lambda \simeq 2^{11}$  seems to define a preferred value of  $\lambda$ . Also the harmonics and integer valued sub-harmonics of  $\lambda$  are possible.
2. In the case of hydrogen atom the model predicts that the energies of hydrogen atom proportional to  $1/\hbar^2$  are scaled down by  $1/\lambda^2$  so that dark atoms would not be thermally stable at room temperature. In practice this would exclude dark atoms and molecules as biologically interesting inherently dark systems. The topological condensation of ordinary atoms and molecules at  $\lambda^k$ -sheeted (now in the sense of "Riemann surfaces" over  $M^4$ ) dark magnetic flux quanta is however possible and means scaling up of the cyclotron energy by  $\lambda^k$  making possible cyclotron Bose-Einstein condensates at high temperatures identifiable as dark quantum plasmas. The same scaling occurs to the energy of dark plasma oscillations so that their energies can be above thermal threshold. Dark plasmoids and plasma oscillations are indeed fundamental in the TGD based model of quantum control in living matter.

3. One must be however very cautious in drawing conclusions since the model for the dark matter is not precise enough to exclude the possibility that the notion of dark atom and molecules makes also sense. For instance, dark atoms having ordinary size and ordinary energy spectrum could be possible if the principal quantum number  $n$  is fractionized to  $n \rightarrow n/\lambda$ . The fractionization could make sense if the atomic space-time sheet is  $\lambda$ -folded and atoms become radial anyons. The corresponding Bohr orbits would close in the radial direction only after  $\lambda$  turns. The formation of dark atoms could be interpreted as a transition to chaos by period  $\lambda$ -folding in radial and angular degrees of freedom. This option would differ from the first one in that radial scaling in  $M^4$  by a factor  $\lambda^{2k}$  is replaced by a radial  $\lambda^k$ -folding so that the  $M^4$  projection of dark atom has the same size as in the case of ordinary atom.

This picture is favored by the requirement that four-momenta and angular momenta remain invariant in the transition to the dark matter phase but does not conform with the first model of dark atoms which assumes that  $n$  is integer. This model was formulated before the realization of the  $\lambda^k$ -fold Riemann surface like structure of dark space-time sheets following from the conservation of angular momentum.

4. Since dark atom would define a  $\lambda^k$ -fold covering of  $M^4$ , one expects a degeneracy of states corresponding to the phase factors  $exp(ikn2\pi/\lambda^k)$ ,  $k = 0, \dots, \lambda^k - 1$ , where  $n$  labels the sheets of the  $\lambda^k$ -fold covering of  $M^4$ . The nuclei and electrons of  $N \leq \lambda^k$  dark atom could form many-particle states separately and fermionic statistics becomes effectively para-statistics for the resulting  $N$ -atoms. Note that the  $N$  electrons and nuclei would be in identical states in ordinary sense of the word since Bohr orbits must be identical: kind of fermionic Bose-Einstein condensates become thus possible.
5. The quantum transitions of  $N$ -atoms for  $N = \lambda^k$  would give rise to dark counterparts of the photons emitted in the ordinary atomic transitions. For  $N \leq \lambda^k$  the energies of dark photons would be  $N$  times higher than the energies liberated in the ordinary transitions. The claims of Mills [72] about the scaling up of the binding energy of the hydrogen ground state by a square  $k^2$  of an integer in plasma state might be understood as being due to the formation of dark  $N = k^2$ -atoms emitting dark photons with  $k^2$ -fold energies de-cohering to ordinary photons. The plasma phase would contain a fraction which is in dark plasma state. The chemistry of bio-molecules identified as  $N$ -molecules would definitely differ from the ordinary chemistry.

The fractionization  $n \rightarrow n/\lambda$  of integer  $n$  labelling vibrational modes and cyclotron states would be unavoidable. Single particle cyclotron states having  $E = \hbar(k)\omega$  of the earlier picture would in this framework correspond to single particle states having  $n = \lambda^k$  or to  $N = \lambda^k$ -ion states. Fermionic  $N = \lambda^k$ -states are expected to have a special role since these configurations are analogous noble gas atoms with full shells of electrons and to magic nuclei with full cells of nucleons. Most biologically important ions are fermions and  $N = \lambda^k$  states would give rise to what might be regarded as fermionic analogs of Bose-Einstein condensates. For bosonic ions there is no restriction to the occupation numbers of  $\lambda^k$  single particle states involved.

6. The phase  $q = exp(i2\pi/\lambda^k)$  brings unavoidably in mind the phases defining quantum groups and playing also a key role in the model of topological quantum computation [E9]. Quantum groups indeed emerge from the spinor structure in the "world of classical worlds" realized as the space of 3-surfaces in  $M^4 \times CP_2$  and being closely related to von Neumann algebras known as hyper-finite factors of type  $II_1$  [C6]. Unfortunately, the integer  $n$  characterizing the phase cannot be identified as  $\lambda$ . Could it be that quantum groups emerge in two different manners in TGD framework?

If so, living matter could perhaps be understood in terms of quantum deformations of the ordinary matter, which would be characterized by the quantum phases  $q = \exp(i2\pi/\lambda^k)$ . Hence quantum groups, which have for long time suspected to have significance in elementary particle physics, might explain the mystery of living matter and predict an entire hierarchy of new forms of matter.

#### 2.4.2 Are both options for dark matter realized?

For  $N = \lambda^k$  molecules which dark photons emitted in the rotational and conformational transitions would be above thermal threshold. It is of course quite possible that both options are realized. The fact that also fermionic ions (such as  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Cl}^-$ ) are important for living system suggests that this is the case. This would also provide a justification for the hypothesis that microtubular conformations represent bits and allow conformational dynamics to serve as metabolic controller by providing microwave dark photons with energies above thermal threshold.

As demonstrated in [L2], the notion of  $N$ -particle leads to an amazingly elegant model for the lock and key mechanism of bio-catalysis as well as the understanding of the DNA replication based on the spontaneous decay and completion of fermionic  $N < \lambda^k$ -particles to  $\lambda^k$ -particles. Optimal candidates for the  $N$ -particles are  $N$ -hydrogen atoms associated with bio-molecules appearing as letters in the "pieces of text" labelling the molecules. Lock and key would correspond to conjugate names in the sense that  $N_1$  and  $N_2$  for the letters in the name and its conjugate satisfy  $N_1 + N_2 = \lambda^k$ : as the molecules combine, a full fermion shell represented by  $\lambda^k$ - fermion is formed.

### 3 Scaling laws

What I have christened scaling laws have gradually become more and more important for the understanding of many-sheeted physics. Scaling laws form also the cornerstone of the general model of the sensory canvas and motor control based on the hierarchy of generalized EEGs [M3]. Two kinds of scaling laws emerge.

1. The scaling law of homeopathy, about which I learned from the work of Cyril Smith [27], states that high and low frequency em radiation accompany each other such that the frequency ratio satisfies  $f_h/f_l \simeq 2 \times 10^{11}$ . This regularity can be understood in terms of dropping of charged particles from atomic space-time sheets to magnetic flux tubes of the Earth's magnetic field, and the ratio is essentially that of zero point kinetic energy to cyclotron energy. The law generalizes considerably and it is possible to identify mechanisms for  $f_h \rightarrow f_l$  and  $f_l \rightarrow f_h$  transformations.
2.  $v = Lf$  scaling law, where  $L$  is length of some linear structure,  $v$  is the velocity of some excitation, and  $f$  frequency of em radiation generating the excitation, is assignable to nerve pulse conduction, EEG waves, and  $\text{Ca}^{++}$  waves and possibly more general waves assignable to bosonic ions such as  $\text{Mg}^{++}$ . This law can be deduced from a simple model for the quantum control interaction of MEs representing dark photons and the linear structure in question.  $v$  can be identified as the phase velocity assignable to the periodic dependence of the transversal electric and magnetic fields on a coordinate  $x$  varying along a linear structure: in resonance  $v$  is adjusted to the velocity of conduction of the excitation in question so that preferred frequencies induce the excitation. Also in this case is is easy to imagine  $f_l \rightarrow f_h$  transformations since the structure of length  $L$  can serve as antenna generating em waves with frequency  $f = c/L$  implying  $f_h/f_l = c/v$ . Both laws apply to the entire dark matter hierarchy.
3. De-coherence mechanism for the dark photons transforming them to dark photons at lower level of hierarchy predicts a variety of scaling laws for which one has  $f_h/f_l = \lambda^k$ , where one

has  $\hbar(k) = \lambda^k \hbar_0$ .  $\lambda$  is integer and  $\lambda \simeq 2^{11}$  seems to be the preferred value in living matter. For a given  $\lambda$  also its harmonics and integer valued sub-harmonics can be considered [79, J6].

### 3.1 Scaling law of homeopathy in its basic form

The basic finding about frequency imprinting of water (to be discussed in more detail later) is that the members of the imprinted high-low frequency pairs ( $f_h, f_l$ ) implicate each others' physical presence and that the ratio of the frequencies of a given pair is given by  $f_h/f_l = 2 \times 10^{11}$ . According to [27] this ratio seems to be a constant of Nature unlike the ratio  $f_h/f_l = c/v$  in case of EEG waves,  $Ca^{++}$  waves etc.. appearing in  $v = Lf$  scaling law. This statement must however be taken critically.

TGD explains the effect, predicts the ratio correctly, and also predicts generalizations of the homeopathic scaling law. The proper interpretation seems to be that the scaling law holds accurately only for  $f_h \rightarrow f_l$  transformations (generation of sensory representations) whereas for the  $f_l \rightarrow f_h$  transformations (generation of motor actions) entire band of frequencies  $f_l$  is transformed to the same  $f_h$ .

#### 3.1.1 Dropping of charged ions to magnetic flux tubes as explanation of $f_h/f_l = \text{constant}$ scaling law

A mechanism predicting correctly the homeopathic frequency ratio and explaining its universality for  $f_h \rightarrow f_l$  transformations can be indeed identified (the identification was a purely accidental discovery).

The crucial observation is that the ratio of the zero point kinetic energy  $E_0 = 3\pi^2/4mL^2$  (137) of a ionic Cooper pair at atomic space-time sheet having  $k = 137$  to its cyclotron energy  $E_c = eB_E/2m$  in Earth's magnetic field with a nominal value  $B_E = .5$  Gauss satisfies the condition  $E_0/E_c \simeq 2 \times 10^{11}$  ( $E_0 = .5$  eV is proton's zero point kinetic energy). The ratio is same for doubly charged bosonic ions such as  $Ca^{++}$  and  $Mg^{++}$ .

At first, the universality (or more generally quantization) of  $f_h/f_l$  ratio of the homeopathic scaling law seems to be independent of the assumption that there is some propagation velocity involved unless the velocity for some reason is constant to a high degree. Later it will be found that there is a natural connection between the scaling laws.

#### 3.1.2 Mechanisms explaining why frequencies $f_h$ and $f_l$ accompany each other

The co-presence of frequency pairs ( $f_l, f_h$ ) [27] means that  $f_h$  generates  $f_l$  and vice versa. One can imagine several mechanisms explaining why frequencies  $f_l$  and  $f_h$  accompany each other. It is in principle also possible that  $f_l$  and  $f_h$  correspond to different levels of dark matter hierarchy assuming that  $f_h$  corresponds to an energy larger than that associated with  $f_l$ . Interestingly, the basic form  $f_h/f_l = 2 \times 10^{11}$  results in good approximation if one assumes that  $f_h$  and  $f_l$  corresponds to same energy for  $k_{em} = 3$  and  $\lambda \simeq 5 \times 2^{11}$ .

##### 1. Simultaneous generation of radiation $f_h$ and $f_l$

A photon with threshold frequency  $f_h$  is generated when an ion at rest drops to a superconducting magnetic flux tube of Earth's magnetic field. ELF or VLF radiation with frequency  $f_l$  or its multiple is generated when an ion at rest drops to high  $n$  cyclotron state which decays by emitting radiation with frequencies which come as multiples of  $f_l$ . If the dropping ion has a momentum parallel to the magnetic flux tube, photon's energy is above the threshold value  $f_h$ . In this case the cyclotron state has also longitudinal momentum and the spectrum becomes continuous with the multiples  $f_l$  serving as effective thresholds. For both cases scaling law at threshold generalizes so that also sub-harmonics of  $f_h/f_l$  are possible:  $f_h/f_l = n_l \times 2 \times 10^{11}$ .

### 2. $f_h \rightarrow f_l$ transformation

$f_h \rightarrow f_l = n_l f_c$  transitions occur when atomic (say) space-time sheet and magnetic flux quantum are connected by join along boundaries bond and Cooper pair or bosonic ion at magnetic flux quantum absorbing a photon with frequency  $f_h$  is transferred to atomic space-time sheet. Momentum conservation gives a non-trivial constraint to  $f_h \rightarrow f_l$  process since protonic (ionic) momentum is much larger than the photonic momentum  $p(p)/p(ph) = \sqrt{m/E(ph)}$ .

Momentum conservation is satisfied if the kicked particle exchanges virtual photon with another particle of Bose-Einstein condensate. This particle can emit photon with frequency  $f_l = n_l f_c$  as brehmstrahlung like cyclotron radiation. VLF or ELF radiation with frequency  $f_l$  is generated also when the kicked charge drops back to magnetic flux quantum. Of course, also other mechanisms can shake atomic space-time sheets and lead to the dropping of ions to magnetic flux tubes and thus generation of radiation at cyclotron frequencies.

### 3. $f_l \rightarrow f_h$ transformation

$f_l = n f_c \rightarrow f_h$  transitions can occur in the following manner. Suppose that the particle at magnetic flux quantum absorbs photon with a frequency  $f_l$ . Momentum conservation requires the emission of a virtual photon. If it is absorbed by a similar particle at atomic (say) space-time sheet and if the absorption kicks it to the magnetic flux tube, a photon with frequency  $f_h$  (in good approximation) is emitted.

Also the radiation pressure of coherent  $f_l$  radiation (recall that  $\hbar$  is now large) could kick ions from atomic space-time sheet to magnetic flux tubes and in this manner generate radiation at threshold frequency  $f_h$ . The dropping of an object from table to the floor is a concrete analogy for what happens.

Also frequencies  $f \neq f_l$  can induce the dropping. For  $f < f_l$  the dropping of the particle from atomic space-time sheet absorbing virtual photon with negative energy is forced by the conservation of energy and the frequency of emitted photon equals to  $f_h$  in the approximation  $f_l/f_h = 0$ . For  $f = f_l$  semiclassical considerations suggest that a resonant coupling occurs.

### 3.1.3 A hierarchy of scaling laws is predicted

Ions, molecules or water molecule clusters can drop also from other than atomic space-time sheets and also to other space-time sheets than magnetic flux tubes. This means a hierarchy of scaling laws with the scaling factor given by

$$\frac{f_h}{f_l} = (2^{137-k_1} - 2^{137-k_2}) \times 2 \times 10^{11}$$

in the idealization that space-time sheets are cubes. Here  $k_1$  is labels the space-time sheet, where the ion drops from and  $k_2$  refers to the space-time sheet, where ion drops to. Note that for  $k = 131$   $f_h$  can belong to the range of visible and UV frequencies.

For  $k_2 \gg k_1$  scaling laws reduced to  $f_h/f_l = 2^{137-k} \times 2 \times 10^{11}$ . An important special case is  $k = 151$  for which the ratio is predicted to be  $f_h/f_l = 5 \times 10^7$  corresponding to the velocity of about 6 m/s which is quite near to the propagation velocity of alpha waves at the surface of skull.

### 3.1.4 Tests for the scaling laws of homeopathy

There are several tests for the homeopathic scaling law:

1. The homeopathic scaling law is expected to hold true when  $f_h$  corresponds to a cyclotron frequency  $f_l = f_c = eB/2\pi m$  of some ion in Earth's magnetic field.

*Test.* Irradiate living matter slightly above the threshold frequency  $f_h$  and look for the response at multiples of the frequency  $f_l$ . If ions can drop only from  $k \geq 137$  space-time

sheets,  $f_h$  should satisfy  $f_h \leq .49$  eV so that visible frequencies are excluded from the spectrum of *threshold* frequencies.

*Test:* Look whether the irradiation of bio-matter with  $f_c$  induces radiation with the threshold frequency  $f_h = 2 \times 10^{11} f_c$ .

*Test:* Vary the local intensity of Earth's magnetic field. This should leave  $f_h$  unchanged but vary  $f_l = f_c$  so that the proportionality constant in the scaling law should vary. The effect should disappear when Earth's magnetic field is eliminated. This suggests that living organisms regulate the endogenous magnetic fields (magnetic circulation) by homeostasis.

2. One could also test also the variants of the scaling law. For instance, the dropping of proton from  $k = 131$  space-time sheet would give  $f_h \leq 32$  eV and the dropping of massive ions with mass number  $A \gtrsim 15$  gives rise to visible light: the ratio of scaling law is however changed to  $128 \times 10^{11}$ .

### 3.2 Does $v = Lf$ scaling law map the hierarchy of generalized EEGs to physiological excitations?

$v = Lf$  scaling law is discussed in [27] and believed to relate closely to the scaling law of homeopathy. In TGD framework  $v = Lf$  law was originally proposed during the development of the model of nerve pulse and EEG [M2]. The ideas related to dark matter hierarchy suggest that the scaling law has much deeper meaning than thought originally and is analogous to genetic code in some respects. It would basically tell how quantum control occurs by coding the hierarchy of generalized EEGs to a hierarchy of physiological excitations.

#### 3.2.1 $v = Lf$ scaling law

I have considered several variants for the interpretation of the  $v = Lf$  scaling law. Perhaps the most elegant interpretation for the  $v = Lf$  law found hitherto is based on the developments related to the model of nerve pulse and EEG [M3].

The assumption is that charge entanglement induced by  $W$  ME transversal to axon induces generation of nerve pulse. Nerve pulse is generated when state function reduction leads to a situation in which Bose-Einstein condensate of bosonic ions gains exotic nuclear charge due to the charging of color bonds having quark and antiquark at their ends. The loss of charge equilibrium induces ionic currents between cell interior and exterior and nerve pulse is generated.

This model generalizes and one can replace nerve pulse with  $\text{Ca}^{++}$  waves (probably accompanying also nerve pulse conduction) or more general waves associated with bosonic ions. The conduction of nerve pulse along axon, or more generally of  $\text{Ca}^{++}$  waves along some linear structure, could be understood if  $W$  ME is so wide in the transversal degrees of freedom that it covers the entire length of the linear structure. The phase velocity assignable to the transversal degrees of ME parallel to the linear structure would correspond to the conduction velocity of some physiological excitation be it  $\text{Ca}^{++}$  or something else.

1. For simplest MEs  $CP_2$  coordinates depend on arbitrary manner of variables  $u_1 = k \cdot m$  and  $x = \epsilon \cdot m$ , where  $m$  is standard  $M^4$  4-coordinate.  $k \equiv (\omega, \omega, 0, 0)$ , where  $k$  is light-like 4-D wave-vector orthogonal to the axon, and  $\epsilon$  is a polarization unit vector parallel to axon obviously satisfying  $\epsilon \cdot k = 0$ . Note that  $x$  reduces to the longitudinal coordinate along axon.
2. Simplify further the situation and suppose that  $CP_2$  coordinates for ME are expressible as superpositions of harmonics  $\exp(i(u_2 + Kx)) = \exp(i(\omega t + Kx + \text{const}))$  along axon. Periodic boundary conditions or their analog requires  $K = n_n 2\pi/L$ . The phase velocity  $v = \omega/K$  satisfies

$$v = \frac{L f_l}{n_h} ,$$

so that a generalization of the scaling law allowing also sub-harmonics of the basic velocity follows as an outcome.

3. It would not be surprising if the phase velocity  $v$  associated with the transversal degrees of freedom of ELF ME would correlate strongly with the velocity of physiological excitations moving along the linear structure. If this velocity is restricted to some range by various physiological constraints also the frequencies  $f_l$  inducing physiological effects are restricted to corresponding ranges.

It could be also that physiology adapts to the constraints posed by the scaling law involving only the ration of zero point kinetic energy and cyclotron energy of ion in Earth's magnetic field. For instance, the scaling law of homeopathy in its basic form follows if the velocity  $v$  for propagation correspond to the velocity of blood flow in capillaries, which would suggest that the velocity of blood flow represents adaptation to the constraint posed by universality of the metabolism. For  $v \sim 1.5$  mm/s corresponding to the order of magnitude for the velocity of the blood flow in capillaries, one has  $c/v \simeq 2 \times 10^{11}$ , which is very near to the ratio of frequencies  $f_h$  and  $f_{ELF}$  in homeopathic imprinting in which these two frequencies imply each other.

The importance of  $v = L f_l$  can be exaggerated. Essentially the coding of of EEG to physiology by mapping the frequencies of the fractal hierarchy of generalized EEGs to the velocities of physiological excitations would be in question.  $v = L f$  mechanism could be involved with a large variety of physiological waves: EEG waves [M3, M2],  $\text{Ca}^{++}$  waves [K6], the generation of radio waves as DNA is irradiated with visible laser light [29, K4], and with Kirlian effect [30].

There are reasons to suspect that  $f_h \rightarrow f_l$  transformation is involved with the generation of the sensory representations communicating sensory data to the magnetic body and  $f_l \rightarrow f_h$  transformation with the motor control of living matter by magnetic body.

In standard quantum physics context one does not expect that frequencies  $f_l$  in ELF range (say EEG range) can have appreciable physiological effects. If MEs correspond serve as correlates for dark photons for sufficiently high level of dark matter hierarchy, the situation changes. For instance, for EEG frequencies  $k_{em} = 4$  level implies that the energies of EEG photons are above thermal threshold at room temperature.

### 3.2.2 Do $v = L f$ scaling law and the scaling laws of homeopathy relate?

Also  $v = L f$  scaling law can relate two different frequencies  $f_h$  and  $f_l$ .  $v = L f$  excitation can induce em wave with wave length  $L/n$  and frequency  $f_h = n_h c/L$ , that is ME with length  $L$  and frequency  $f = n_h c/L$ . The ratio  $f_h/f_l$  would be  $f_h/f_l = n_h c/v$  in this case. Low frequency MEs orthogonal to the linear structure would induce high frequency ME parallel to it.

Dark MEs would in general be in question and high frequency ME would naturally correspond to a lower level of dark matter hierarchy. This could define a mechanism for how for instance the mechanism of intentional action proceeds from higher to lower levels of the dark matter hierarchy. If the lower level corresponds to a same photon energy, the additional constraint  $f_h/f_l = \lambda^k$  would be satisfied.

A further constraint comes from the requirement that  $n_h f_h$  corresponds to a zero point kinetic energy liberated as some ion drops from space-time sheet labelled by  $p \simeq 2^k$  to a magnetic flux quantum. The justification for this constraint would be a resonant coupling to the zero point kinetic energies fundamental defining metabolic energy quanta. This would imply quantization for the allowed lengths  $L$  of the linear structures and velocities of physiological excitations

$$\begin{aligned}
L = L(k, A) &= \frac{4}{\pi} \times n_h A m_p L^2(k) \ , \\
v(k) &= n_c \times \frac{E_c}{E_0(k)} \ .
\end{aligned}
\tag{1}$$

where  $A$  is the mass number of ion or ionic Cooper pair (formula generalizes in an obvious manner for electronic Cooper pairs) and  $n_c$  corresponds to the harmonic of the cyclotron frequency. In this framework  $f_l \rightarrow f_h$  and  $f_h \rightarrow f_l$  transitions would define a closed control loop. Note that homeostatic variation of magnetic field strength around  $B_E$  allows to vary also  $f_h/f_l$ . The velocity spectrum of  $\text{Ca}^{++}$  waves consisting of relatively narrow bands of allowed velocities defines a testing bed of the model. For instance, one can ask whether velocity bands could allow sub-band structure corresponding to various values of the mass number  $A$  and harmonics  $n_c$  of cyclotron frequency.

The velocities of  $\text{Ca}^{++}$  waves can be much lower than the velocity  $v = 10^{-11}c/2 = 1.5$  mm/s. Ultraslow  $\text{Ca}^{++}$  waves move with velocity  $v$  in the range 1 – 30 nm/s [26] corresponding to  $v/c = x \times 10^{-17}c$ ,  $x \in [3, 90]$ . The lower bound for this velocity range corresponds to  $B = 1.5 \times 10^{-6}B_E = .75 \times 10^{-10}$  Tesla. The cyclotron time scale corresponding to .1 second time scale for  $B_E$  (alpha band in EEG) would be 18.5 hours.

### 3.3 Miracle wave lengths and corresponding VLF wave lengths

p-Adic length scale hypothesis predicts a hierarchy of preferred length scales given by  $L_p \propto \sqrt{p}$ ,  $p \simeq 2^k$ ,  $k$  prime or power of prime. This in turn predicts hierarchy of preferred wave lengths  $\lambda = L(k)$  and frequencies  $f = 2\pi c/L(k)$ . The biologically most relevant length scale interval 10 – 2560 nm represents a number theoretical miracle: all p-adic length scales  $L(k)$ ,  $k = 151, 157, 163, 167$  correspond to the so called Gaussian Mersennes, which besides ordinary Mersennes have very special role in elementary particle length scales. There are excellent motivations to test whether the miracle of life correlates with the number theoretical miracle.

1. The miracle wave lengths  $\lambda_h(k) = L(k) = 2^{(k-151)/2} \times 10$  nm,  $k = 151, 157, 163, 167$ . The photon energies are (126, 15.68, 1.96, .49) eV and correspond to the wave lengths (10, 80, 640, 2560) nm. The last two photon energies correspond to the energies of photon absorbed in photosynthesis and the energy liberated when single ATP is used respectively.
2. The VHF counterparts of the miracle wave lengths are  $\lambda_l = 2 \times 10^{11} \lambda_h(k) \simeq 2^{(k-151)/2+1} \times 10^3$  meters. In this case there is however no obvious mechanism guaranteeing the scaling law since  $f_h$  does not correspond to a photon generated when ion drops from atomic space-time sheet.  $f_h(167) = .49$  eV happens to correspond to the value of proton's zero point kinetic energy at atomic space-time sheet: one has  $f_l(167) = .593$  kHz.
3. The vacuum zero point energies  $E_0(p, k) = \pi^2/2mL^2(k) \simeq 2^{137-k} \times .49$  eV of proton for miracle wave lengths correspond to the radio wave lengths  $\lambda_h(k) = 2^{k-151} \times 4.1$  cm and are given by (.04, 1.31, 41.9, 171.1) meters and correspond to radio frequencies (7.5 GHz, .1 GHz, 1.8 MHz, .1 MHz). PCs, travel phones and other electronics produces intense radiation at these wave lengths and might thus have highly undesirable effects on bio-control. Heavier ions give rise to the sub-harmonics of these frequencies. For protonic Cooper pairs the frequencies are halved.

## 4 TGD based model for homeopathy

Homeopathy is regarded by skeptics as a fringe science, kind of promised land of crackpots. My own views about homeopathy changed after I heard the excellent lecture of Cyril Smith in Liege

about frequency imprinting and entrainment as mechanisms of homeopathy [27]. After that I learned about the work of Benveniste [38, 39] and encountered once again the pattern which I had encountered so many times before. When empirical discovery does not fit the dogmas of the reductionistic science, it is simply forgotten and the unlucky experimentalist is labeled as a swindler or crackpot.

#### 4.1 Basic claims about homeopathy

The basic assumption of homeopathy is that the homeopathic remedy manufactured from the substance causing the illness also heals the illness. The preparation of the homeopathic remedy occurs by a repeated dilution so that for instance 1 part of homeopathic remedy already obtained is diluted in 99 parts of water. The dilution can be continued arbitrarily many times, say 30 times so that the ratio of substance to water is  $10^{-60}$ : obviously no molecules of the original substance can be present anymore in the probabilistic sense if one accepts the standard view about space-time.

The notion of water memory [38] crucial for the explanations of acupuncture and homeopathy has received a considerable empirical support quite recently [40]. It seems that basic mechanisms of both homeopathy and acupuncture are frequency imprinting and entrainment. Somehow water learns the some fundamental frequencies characterizing the molecules of the homeopathic remedy during the manufacturing process and when it has learned these frequencies it acts as the desired healing effect. Even more: just this frequency imprinting of water without any need for the remedy could be enough to achieve the healing effect.

#### 4.2 Frequency signatures for the homeopathic remedies and endogenous frequencies in acupuncture

The homeopathic remedies seem to be characterized by frequencies varying in the range containing at least the range  $10^{-3} - 10^9$  Hz suggesting that electromagnetic fields at specific frequencies characterize the homeopathic remedy. These frequencies can be imprinted into water and also erased. The imprinting of frequencies is induced by the presence of the homeopathic potency or by irradiating pure water by using either the ELF or far infrared frequencies associated with the potency. Very importantly, the removal of Earth's magnetic field erases the imprinted frequencies [27].

The frequencies appear as pairs  $(f_h, f_l)$  of high and low frequencies in the sense that the imprinting of  $f_h$  implies the imprinting of  $f_l$  and vice versa [27]. The first branch is at GHz range: in particular the frequencies 2.664 GHz, 1.42 GHz (21 cm line of hydrogen) and 384 MHz have unexpected properties. The second branch of frequencies is in the ELF range, in particular Schumann frequency 7.8 Hz accompanies 384 MHz. The ratio of high and low frequencies is in good approximation constant and equal to  $f_h/f_l = 2 \times 10^{11}$ : this result gives strong constraint on possible models.

The studies of acupuncture support the existence of certain highly coherent endogenous frequencies [27] associated with the acupuncture meridians at which em radiation has strong effects. Also these frequencies appear as pairs and the ratio  $f_h/f_l \simeq 2 \times 10^{11}$  is constant over all acupuncture meridians with a deviation of  $\pm 15$  per cent. The fact that these frequencies can entrain to exogenous frequencies suggests a mechanism of homeopathy based on entrainment and mimicry. It would be the characteristic frequencies associated with the homeopathic potency molecule, which would help to achieve the healing effect rather than the chemical structure of the potency molecule.

Quite generally, frequency imprinting and entrainment could be a basic representational mechanism in living matter. The important chemicals present in living matter would be represented by their frequencies and water would construct representations. These representations can explain why bio-system can recognize also chemicals usually not present in organism (such as poisonous

molecules).

### 4.3 What could be the mechanism behind the homeopathic healing

Both the claimed healing using the agent causing the disease and the manufacturing process seemingly removing every trace of the remedy are paradoxical enough to induce strongly emotional reactions in the average skeptic. The notions of many-sheeted space-time and dark matter hierarchy however suggest a rational explanation for these claims. Several mechanisms can be imagined and I have indeed done this before finding the most convincing option.

#### 4.3.1 Bose-Einstein condensation of molecules of homeopathic remedy to magnetic flux tubes as a basic mechanism

The manufacturing of the homeopathic remedy could induce dropping of some fraction of the homeopathic remedy to magnetic flux tubes of the Earth's magnetic field. This assumption conforms with the crucial role of the Earth's magnetic field in the erasure of the imprinted frequencies. Also the importance of 7.8 Hz Schumann frequency [27] can be understood.

If the molecules in question are bosons or if they combine with some other particles to form bosons in water environment, they can form Bose-Einstein condensates in cyclotron states. At  $k_{em} = 4$  level of dark matter hierarchy they cyclotron energy scale would be above the thermal threshold for cyclotron frequencies above 1 Hz: the charge/mass ratio corresponds to that for DNA. For  $k_{em} = 5$  the charge to mass ratio is reduced by a factor  $\lambda \simeq 2^{11}$ .

#### 4.3.2 Could protonic super nuclei perform mimicry of ions?

One of the first discoveries in the process leading to the understanding of dark matter was the direct evidence for the fact that one fourth of protons of water is in dark phase [76] in time scale of attosecond (these protons are not visible using neutron diffraction or electron scattering). This phase could correspond to  $k_{em} = 1$  level of dark matter hierarchy but also higher levels could be present.

The simplest model for the dark phase [F10] is as "super nuclei" formed by closed protonic strings (for the analogous model of nuclei see [F8]) with nearby protons connected by color bonds with exotic dark quark and anti-quark at ends of the bond. These protonic strings can develop also exotic em charge when the quark and anti-quark at the ends of the bond are replaced by  $u$  and  $\bar{d}$  or  $d$  and  $\bar{u}$ . Thus a protonic super-nucleus containing  $A$  protons with a proper exotic charge can mimic ion with mass number  $A$  and charge  $Z$ .

Dark protonic super-nuclei could perform mimicry of those characteristics of molecules which are crucial for the macroscopic quantum coherence. Frequency imprinting and entrainment would be based on the formation of protonic super-nuclei plus magnetic homeostasis allowing to vary the value of the magnetic field around the nominal value  $B_E = .5$  Gauss in such a manner that entrainment is achieved for almost any ELF frequency.

Conservation of the magnetic flux implies that the variation of field strength corresponds to the variation of the thickness of the magnetic flux tube. Magnetic homeostasis could therefore be regarded also as a motor action of the magnetic body containing dark matter and to some extent behaving like an intelligent conscious system. The magnetic flux quanta assignable to the homeopathic potency would carry the information about the molecules of the homeopathic remedy. Also p-adic scaling of flux tube dimensions by scaling factor which is power of  $\sqrt{2}$  can be considered.

#### 4.3.3 Could also clusters of water molecules perform mimicry?

Dark protons are not the only option. The original proposal was that clusters of water molecules are ideal for mimicking cyclotron, rotational, and vibrational spectra of molecules. The recent view

about dark matter suggests that the internal properties of particles are unaffected in the dropping to  $\lambda^k$ -fold magnetic flux tubes so that only cyclotron energy spectrum is scaled by  $\lambda^k$  and can be thermally stable. Here  $\lambda = 2^{11}$  corresponds to preferred value of Planck constant postulated in the original picture about living matter. Also other powers of 2 are however expected to be present although  $\lambda = 1^{11}$  is special in that it represents fundamental constant in TGD Universe [C8, D7]. Hence water molecule clusters could also mimic molecules. Without magnetic homeostasis the accuracy of the mimicry would not be very impressive since mass number would be a multiple of 18. For heavy molecules the relative accuracy would be  $\Delta f_c/f_c = 18/A$  and could be compensated by the control of magnetic field strength.

#### 4.3.4 Homeopathic healing mechanism as sweeping of harmful molecules to magnetic flux quanta?

Also the homeopathic healing mechanism could be understood. Usually the immune system prevents the access of the harmful molecule or organism to the system by chemical means. Also in the homeopathic healing similar elimination mechanism would work but now magnetic body would perform the elimination. One can imagine several mechanisms. The harmful molecules could be simply dropped to the magnetic flux quanta. The dropping of these molecules would liberate zero point kinetic energy (which brings in mind the old saying "the disease that does not kill you, strengthens you!"), and if the process involves emission of photons with frequencies  $f_h$  and  $f_l$ , the rate of the process would be enhanced by the presence of the Bose-Einstein condensates of dark photons of frequency  $f_l$  emitted in cyclotron transitions by the standard mechanism of induced emission. It would not matter whether the Bose-Einstein condensate of ELF photons causing the induced dropping is generated by the molecules of homeopathic remedy or by the protonic super-nuclei mimicking them.

#### 4.3.5 Stealing of the magnetic bodies of molecules

If magnetic bodies of harmful molecules are responsible for the harmful effects, then it would be enough to steal magnetic bodies of the harmful molecules and provide clusters of water molecules with them. The shaking of the water in the manufacturing of the homeopathic remedy would facilitate this process. This option allows to understand the fact that the presence of biomolecules can be mimicked by using suitable patterns of low frequencies identifiable as cyclotron frequencies. The domains of water with size scale of 10 nm proposed by Smith could be the thieves of the magnetic coats defining the biological role of the molecule. This option is definitely the most elegant and minimal one and seems to explain what is known about homeopathic action and water memory.

### 4.4 TGD counterparts for the propagation and diffusion of coherence

Cyril Smith [27] assigns the endogenous frequency pairs  $(f_h, f_l)$  with the coherent domains of water with size of 75 nm interacting with external em fields as coherent units. The origin of the scaling law  $f_h/f_l = 2 \times 10^{11}$  claimed by Smith has been discussed in previous section. These coherent domains are predicted by the theory of Giudice and Preparata [48]. On basis of empirical data Smith associates two kinds of dynamical phenomena to the coherence regions: diffusion of coherence with low velocity and propagation of coherence with light velocity.

On dimensional grounds one expects that for a coherent domain of size  $L$  dispersion relation for the low velocity excitations (not only diffusion of coherence) could be given by the scaling law  $v \sim Lf$ . According to Smith the observed diffusion velocities are of order few m/s  $\sim m/s$  and of the same order of magnitude as nerve pulse conduction velocity and phase velocities for EEG waves. From this the size of coherent domains for the high frequency branch would be of the same

order as that predicted for the coherence domains of water. For the low energy branch the size of the coherence domains would be of order .1 m.

The  $v = K$  relationship proposed by Smith is of the same form as the scaling law discussed in the previous section and representing the coding of generalized EEGs to the velocities of physiological waves. In TGD framework the counterparts of these domains would be various linear structures, say space-time sheets formed by water in liquid crystal form. The propagation of coherence with light velocity would correspond to the propagation of the classical signal inside ME whereas the diffusion of coherence would basically correspond to the phase velocity assignable to ME in direction along the linear structure and fixed by the boundary condition so that it obeys the generalization of the scaling law from its original form  $v = Lf_l$  to  $v = Lf_l/n_h$ .  $f_h$  would be given by  $f_h = (c/v) \times f_l$ .

## 4.5 Frequency imprinting and de-imprinting

In the following a more detailed comparison of TGD based model with the data discussed in [27] is carried out. The effect of several methods allowing frequency imprinting and erasure could be understood if imprinting involves the variation of thickness of magnetic flux tubes carrying super-conducting ions.

### 4.5.1 Some facts about imprinting

I learned the basic facts about frequency imprinting from Cyril Smith's excellent lecture in Liege.

1. Cyril Smith represents detailed empirical data about n-alkane imprinting. In this case ELF frequencies were in Hz range and the ratio of the high and low frequencies was roughly  $2 \times 10^{11}$  as also in other experiments. This is consistent with the assumption that cyclotron frequencies serve as a representation of of the molecule.
2. Smith has studied also frequency memory of bulk water (no potency present) in ELF frequency range .001 – .01 Hz. Bulk water showed resonances between 200 MGz and 2GHz with a mean frequency ratio of about  $2 \times 10^{11}$  as also in case of n-alkanes. If very low ELF frequencies correspond to magnetic transition frequencies in Earth's magnetic field, then the atomic numbers of the space-time sheets involved must be quite high:  $10^{-3}$  Hz corresponds to  $A = 3 \times 10^5$  and thermal stability of cyclotron energies requires  $k_{em} = 5$  level of the dark matter hierarchy.
3. ELF frequency imprinting by frequency  $f_l$  was also found to induce splitting  $f \rightarrow f \pm f_l$  of other inherent ELF frequencies associated with water. A similar splitting was observed in high energy branch. The explanation is that the resulting MEs interact with the MEs associated with these frequencies and induce amplitude modulation. Interaction could be due to MEs inside MEs mechanism.
4. There might be a connection with the work of Gariaev's group [28] demonstrating that the irradiation of DNA with a coherent light generates radiation at radio frequencies discussed in [K6]. The method inducing these radio frequencies is based on the use of two orthogonally polarized laser beams interacting with DNA in liquid crystal state and can be also used to detect imprinted frequencies [27].

### 4.5.2 Frequency imprinting of 'clean' water

Typical example of imprinting involves the transfer of imprinted frequencies through the glass of a vial containing 'clean' (no chemical impurities nor imprinted frequencies) water immersed to the imprinted water serving as the frequency source. Higher ELF frequencies are transferred quickly

whereas the transfer of the low frequencies can take hours or even days [27]. The vial could be also in the proximity of the frequency source (homeopathic potency, imprinted water, or oscillator). The succussion of the vial or a brief application of the field of a strong permanent magnet allows the transfer of frequencies. The transfer of frequencies of body to a vial of 'clean' water is possible by a direct contact, say by holding the vial in hand. Succussion also helps the transfer.

Several questions relate to the dynamics of the magnetic flux sheet structures.

1. Do the flux structures exist already before imprinting or are they dynamical? Can one even speak about the growth of these structures from source to the imprinted system? The general model for quantum control and communications between magnetic and biological body predicts that magnetic body is dynamical and grows during the development of individual. Thus flux quanta could penetrate/diffuse/grow from the imprinted water to the interior of the glass seal. This means also the transfer of the magnetic transition frequencies.
2. High frequencies are reported to penetrate quicker than slow frequencies [27]. If magnetic flux quanta penetrate to the imprinted system and homeostatic variations of the flux tube area keeping the flux constant are possible, the question transforms to a new form. Why thin magnetic flux tubes carrying strong magnetic fields and high frequencies penetrate quicker than the thick magnetic flux tubes carrying weak magnetic fields? Naive geometric intuition suggests an answer here. There are several possibilities: simple dimensional analytic argument  $T \propto 1/f$  or equivalently  $T \propto 1/f_c$ . If the time of transfer is proportional to the p-adic time scale one would have  $T \propto T(k) \propto 1/\sqrt{f_c}$  (this would mean a variation by factor of  $10^6$  in the range  $10^{-3} - 10^9$  Hz).

There is also a list of question about the imprinting using arbitrary frequency source and frequency.

1. Does the magnetic body of the source represent the frequency of the source somehow? Is this magnetic body connected to the Earth's magnetic body? Is the presence of water really necessary? Are dark proton super-nuclei present also now and do they originate from the magnetic body of Earth? Is it really possible to imprint arbitrary frequencies?
2. The frequencies should be assignable to dark photons at  $k_{em} = 4$  (or  $k_{em} = 5$  level of dark matter hierarchy. Hence the question arises whether the emission of ordinary photons is accompanied by emission of dark photons represented by  $\lambda^k$ -folded MEs. Are ordinary photons transformed with some rate to dark photons by the reversal of coherence phase transition. Is this phase transition de-coherence phase transition for phase conjugates of dark photons?
3. Do the magnetic flux quanta perhaps form closed flux tube structures connecting the source and imprinted water? This is actually suggested by the reported Aharonov-Bohm effect [27], which would be due to the modification of vector potential along a closed magnetic flux circuit.

#### 4.5.3 Erasing the frequency imprinting

According to [27], the removal of Earth's magnetic field by surrounding the imprinted water by a metallic container removes the imprinting provides very strong support for the fundamental role of Earth's magnetic field. This however forces to consider critically the idea about  $\lambda^k$ -folded dark magnetic flux quanta since the removal of also the  $\lambda^k$ -fold dark variants of its flux quanta. This is frustrating but one must humbly accept the fact that the model for dark matter at space-time level is far from being final, and it is rather easy to end up to the garden of endlessly branching paths.

Also heating is reported lead to both appearance and disappearance of imprinted frequencies [27]. The thermal instability conforms with the assumption that dark matter with large value of Planck constant and ordinary matter can be in thermal equilibrium: in the original framework it was assumed that larger space-time sheets are at so low temperatures that cyclotron energies are above thermal threshold.

The effect of the heating could have several explanations.

1. The simplest implication of heating is that cyclotron energies in question remain below thermal threshold and cannot anymore affect the behavior of the bio-matter. Heating can induce de-coherence phase transition of photons to ordinary ones so that the Bose-Einstein condensates of photons crucial for the effectiveness of homeopathic potency are lost temporarily. This could be tested by heating the homeopathic potency and finding whether its effect disappears. The re-appearance of imprinted frequencies seems more difficult to understand, at least if they correspond to cyclotron energies below thermal threshold.
2. Heating could also affect magnetic flux quanta, say decompose  $\lambda^k$ -folded flux quanta to  $\lambda$  flux quanta at level  $k - 1$  for which cyclotron photons have sub-thermal energies. Heating can induce split join along boundaries bonds between space-time sheets of ordinary matter and magnetic flux quanta.

According to [27] it is also possible to hide imprinted frequencies by succussing the vial on one side of an oscillator output coil. My guess for "hide" is that the imprinted frequencies are not lost permanently and can be re-established. If the Bose-Einstein condensates of dark photons are lost temporarily but the dark protonic super-nuclei or water molecule clusters responsible for the mimicry remain intact, the frequencies would be indeed "hidden".

#### 4.5.4 The effect of dilution to the imprinted frequencies

The effect of dilution can alter the imprinted frequency [27].

##### 1. *First example*

In the first example  $f = 1$  Hz was imprinted by succussion. Then the solution was diluted serially by a dilution factor  $D \equiv 1/p = 10$ .  $f = 1$  Hz remained but after a succussion it disappeared and was replaced by 10 Hz. More generally, the imprinted frequency does not follow in a continuous manner the dilution factor but changes in a stepwise manner. The fact that cyclotron frequencies of DNA sequences are around 1 Hz whereas 10 Hz corresponds to alpha band containing the cyclotron frequencies of most bosonic ions [M3] might have some significance in this special case.

One can imagine two different explanations for the replacement of 1 Hz frequency with 10 Hz frequency.

1. The protonic super-nuclear (closet string like structures) having 1 Hz as cyclotron frequency would contain 300 dark protons. It could happen that these strings are unstable against the decay to super-nuclei with 30 dark protons expected to be present since frequencies in alpha band are certainly present at magnetic flux tubes of Earth. The analog of induced emission due to presence of 10 Hz dark photons would increase the rate for the decay process induced by succussion.
2. Frequency imprinting could increase the area of some flux quanta of Earth's magnetic field by a factor of 10 and thus lower the value of the magnetic field and cyclotron frequency from 10 Hz to 1 Hz so that ions in alpha band could be responsible for the frequency imprinting. The increase of the thickness by factor 10 could involve the p-adic scaling up of the thickness of the flux sheet by a factor 8 ( $k = 169 \rightarrow 175$  or  $k = 151 \rightarrow 157$ ) followed by a continuous

increase of the thickness by a factor  $5/4$ . Succussion could bring the magnetic flux return to the ordinary stable state corresponding to  $\sim 10$  Hz cyclotron frequency for bosonic ions. For this option the effectiveness of homeopathic potency is not lost unlike for option 1).

### 2. Second example

In the second example 1 Hz is stable for a dilution factor  $D = 1.4$  but for a dilution factor 1.5 it changes to 1.5 Hz.

1. The instability of  $A = 300$  super-nuclei against decay to  $A = 200$  perhaps mimicking some important ion (actually Gold ion  $\text{Au}^+$  for  $B_E = .5$  Gauss) could be in question. In this case the homeopathic efficiency of the potency is lost.
2. 1.5 is so near to  $\sqrt{2} \simeq 1.414$  that one cannot avoid the question whether some kind of 2-adic effects are involved. The transition could reduce the thickness of the flux sheet by a factor  $1/\sqrt{2}$ , say in  $k = 169 \rightarrow 168$  or  $k = 151 \rightarrow 150$  p-adic transition. The efficiency of the homeopathic potency would not be lost. The stable magnetic field strengths for flux quanta would be piecewise constant functions of  $D$  reduced by a  $1/\sqrt{2}$ -factor at  $D/D_0 = \sqrt{2}^n$ : this for sufficiently small values of  $D$ . If the energy of the magnetic flux tube is invariant in the scaling then also its length varies as  $L \propto D$  for small enough values of  $D$ . Similar plateau effects suggesting underlying 2-adicity [I2] have been found to be associated with the intensity of sensation as a function of stimulus [49]. If the intensity of sensation is coded to ELF frequency this effect could perhaps be understood.

### 3. Other strange findings

Also other strange findings are reported in [27]: for instance, no frequency at all was imprinted for the dilution factors in the range 13-19 when starting from an imprinted frequency of 1 Hz. If these findings represent reality, the rate for the formation of the mimicking structures depends on the density of existing representatives and this range of dilution factors would represent kind of a transition zone between two kinds of situations allowing stable imprinting.

The rate for the formation of mimicking structures is enhanced by the presence of Bose-Einstein condensates of photons (the analog of induced emission). Destructive interference effects for dark photons from Bose-Einstein condensates of disjoint flux quanta could however reduce this effect. For sufficiently large values of  $D$  the destructive interference effects of photons from different flux quanta would not be significant. For small values of  $D$  the flux quanta could fuse to form single structure guaranteeing the absence of destructive interference effects. There could however exist a transition region in which destructive interference are important and reduce the rate for the formation of mimicking structures: perhaps this region corresponds to  $D$  in the range 13-19.

#### 4.5.5 Biological Aharonov-Bohm type effects

Even the vector potential of a vanishing magnetic field can affect the state of living matter and water. An example is provided by a ferrite toroidal coil containing its magnetic field inside the toroid [27]. This can be understood as follows.

Suppose that there exist closed flux tubes or more general flux quanta connecting the frequency source and the vial containing the imprinted water. The non-vanishing vector potential of the ferrite toroid in the exterior of the toroidal coil affects the vector potential along these flux tubes and thus also the wave functions of the super-conducting ionic BE condensates at the closed flux tubes. The condition for this is that the closed magnetic flux tubes traversing from the source of frequencies to the vial of the clean water are linked with the toroidal coil so that magnetic flux

through the surface bounded by the closed magnetic flux tube equals to the magnetic flux carried by the coil.

The vector potential  $A$  appearing in the quantization conditions for the magnetic flux

$$\oint (p - eA)dl = n \times 2\pi$$

for a linked loop is affected by the toroidal magnetic field since the loop integral is changed by the toroidal magnetic flux. This means that the momentum  $p$  of the super-conducting ion changes for this kind of magnetic flux loops going from the frequency source to the clean water. Thus ionic supra-currents change so that the ionic concentrations and homeostasis at the atomic space-time sheets are affected in case of living matter. Both the source and vial of clean water are 'magnetically entangled' in this kind of situation. An interesting question is what effects this kind of a toroid placed between two living organisms could induce. Note that for two toroidal coils with opposite current directions these effects should cancel out.

#### 4.5.6 Does a critical dilution factor exist?

The dilution ratios used correspond to powers of 10:  $p = 1/10^k$ ,  $k = 1, 2, 3, \dots$ . This is a mere convenient convention. There should however exist some critical dilution ratio  $p$  below which the rate for the formation mimicking molecules, be they water molecule clusters stealing the magnetic bodies of molecule or protonic super nuclei, is too low.

Similar critical ratios are encountered in the percolation of liquid to a porous substance: when the volume fraction of the wetted pores is overcritical the entire material gets wet. The strong mixing of the water could be seen as a manner to optimize the potentiation. It could also enhance the rate of dropping of protons to the magnetic flux quanta.

1. For instance, suppose that diluted potency generates at each step of the process dark super-nuclei (dark protonic strings with mass number  $A$  and charge  $Z$ ) mimicking the already existing super-nuclei mimicking the original molecules. If the presence of the already existing super-nuclei enhances the rate of this process as it does in induced emission so that Bose-Einstein condensation is the end step of the generation of the super-nuclei, a lower bound for the dilution factor emerges.
2. In the case of water molecule clusters stealing magnetic bodies, the critical dilution ratio would have much simpler interpretation since the rate for the loss of magnetic bodies is proportional the density of actual molecules. If so then the long sequence of dilutions would not have considerable effect. Situation could change if the magnetic bodies can replicate. This kind of replication must take place in cell division but whether it can happen under much more primitive conditions is unclear.

#### 4.6 A possible realization of water memory

The Benveniste's discovery of water memory [38, 39] initiated quite dramatic sequence of events. The original experiment involved the homeopathic treatment of water by human antigene. This meant dilution of the water solution of antigene so that the concentration of antigene became extremely low. In accordance with homeopathic teachings human basophils reacted on this solution.

The discovery was published in Nature and due to the strong polemic raised by the publication of the article, it was decided to test the experimental arrangement. The experimental results were reproduced under the original conditions. Then it was discovered that experimenters knew which bottles contained the treated water. The modified experiment in which experimenters did not possess this information failed to reproduce the results and the conclusion was regarded as obvious

and Benveniste lost his laboratory among other things. Obviously any model of the effect taking it as a real effect rather than an astonishingly simplistic attempt of top scientists to cheat should explain also this finding.

The model based on the notion of field body and general mechanism of long term memory allows to explain both the memory of water and why it failed under the conditions described.

1. Also molecules have magnetic field bodies acting as intentional agents controlling the molecules. Nano-motors do not only look co-operating living creatures but are such. The field body of the molecule contains besides the static magnetic and electric parts also dynamical parts characterized by frequencies and temporal patterns of fields. To be precise, one must speak both field and relative field bodies characterizing interactions of molecules. Right brain sings-left brain talks metaphor might generalize to all scales meaning that representations based on both frequencies and temporal pulse with single frequency could be utilized.
2. The effects of complex bio-molecule to other bio-molecules (say antigene on basofil) in water could be characterized to some degree by the temporal patterns associated with the dynamical part of its field body and bio-molecules could recognize each other via these patterns. This would mean that symbolic level in interactions would be present already in the interactions of bio-molecules. Cyclotron frequencies are most natural candidates for the frequency signatures and the fact that frequencies in 10 kHz range are involved supports this view.
3. The original idea was that water molecule clusters are able to mimic the bio-molecules themselves -say their vibrational and rotational spectra could coincide with those of molecules in reasonable approximation. A more natural idea is that they can mimic their field bodies. Homeopathy could rely on extremely simple effect: water molecule clusters would steal the magnetic bodies of the molecules used to manufacture the homeopathic remedy. The shaking of the bottle containing the solution would enhance the probability for bio-molecule to lose its magnetic body in this manner. For instance, water could produce fake copies of say antigens recognized by basofils and reacting accordingly if the reaction is based on interaction with the magnetic body of the antigene.
4. The basic objection against this picture is that it does not explain why the repeated dilution works. Rather, it seems that dilution of molecules reduces also the density of mimicking pseudo-molecules. Even more, the potency of the homeopathic remedy is claimed to increase as the the dilution factor increases. Also alcohol is used instead of water so that also alcohol must allow homeopathic mechanism. (I am grateful for Ulla Matfolk for questions which made me to realize these objections).
  - (a) The only way out seems to be that the magnetic bodies or water molecule clusters having these magnetic bodies can replicate. The shaking of the remedy could provide the needed metabolic energy so that the population of magnetic bodies grows to a limiting density determined by the metabolic energy feed. In principle it would be possible to infect unlimited amount of water by these pseudo-molecules. When in bottle the population would be in dormant state but in the body of the patient it would wake up and form a population of molecular actors and stimulate the immune system to develop immune response to the real molecule.
  - (b) The potency of the homeopathic remedy is claimed to increase with the increased dilution factor. This would suggest that the continued dilution and shaking also increases the density of pseudo molecules, perhaps by feeding to the system metabolic energy or by some other mechanism.
  - (c) Also magnetic bodies must replicate in cell replication and their role as intentional agents controlling bio-matter requires that this replication serves as a template for

biochemical replication. One can indeed interpret the images about cell replication in terms of replication of dipole type magnetic field. This process is very simple and could have preceded biological replication. The question is therefore whether water is actually a living system in presence of a proper metabolic energy feed. Also the water's ability near critical point for freezing to form nice patterns correlating with sound stimuli might be due to the presence of the molecular actors.

- (d) This picture fits nicely with the vision that evolution of water in this kind of life form might have happened separately and that pre-biotic chemical life forms have formed symbiosis with living water [L4]. In the model of DNA as topological quantum computer [L5] the asymptotic self organization patterns of water flow in the vicinity of lipid layers indeed define quantum computer programs by inducing the braiding of the magnetic flux tubes connecting DNA nucleotides to lipids so that this symbiosis would have brought in new kind of information processing tool.
- 5. The magnetic body of the molecule could mimic the vibrational and rotational spectra using harmonics of cyclotron frequencies. Cyclotron transitions could produce dark photons, whose ordinary counterparts resulting in de-coherence would have large energies due to the large value of  $\hbar$  and could thus induce vibrational and rotational transitions. This would provide a mechanism by which molecular magnetic body could control the molecule. Note that also the antigens possibly dropped to the larger space-time sheets could produce the effect on basophils.
- 6. There is a considerable experimental support for the Benveniste's discovery that bio-molecules in water environment are represented by frequency patterns, and several laboratories are replicating the experiments of Benveniste as I learned from the lecture of Yolene Thomas in the 7:th European SSE Meeting held in Rörös [46]. The scale of the frequencies involved is around 10 kHz and as such does not correspond to any natural molecular frequencies. Cyclotron frequencies associated with electrons or dark ions accompanying these macro-molecules would be a natural identification if one accepts the notion of molecular magnetic body. For ions the magnetic fields involved would have a magnitude of order .03 Tesla if 10 kHz corresponds to scaled up alpha band. Also Josephson frequencies would be involved if one believes that EEG has fractally scaled up variants in molecular length scales.

Consider now the argument explaining the failure to replicate the experiments of Benveniste.

- 1. The magnetic bodies of water molecules need metabolic energy for communications with their "biological body" using the fractally scaled analog of EEG. There is no obvious source for this energy in water. The model for protein folding and DNA as topological quantum computer assumes that magnetic flux tubes connecting subject person and target of directed attention serve as correlates for directed attention at the molecular level [L5, L7]. This should be true also in macroscopic scales so that the experimentalist and the bottle containing the treated water should be connected by magnetic flux tubes. If experimenter has directed his attention to the bottle of water, the resulting magnetic flux tubes could allow a transfer of metabolic energy as a radiation along massless extremals parallel to the flux tubes and defining TGD counterparts of Alfvén waves. Experimenter's strong motivation to replicate experiments would help to realize the transfer of the metabolic energy. Experimenters not knowing, which bottles were treated did not have these flux tube bridges to the bottles, and were not able to provide the needed metabolic energy, and the magnetic bodies of antigens failed to generate the cyclotron radiation making them visible to the basophil.
- 2. If this interpretation is correct, then Benveniste's experiment would demonstrate besides water memory also psychokinesis and direct action of desires of experimenters on physics at

microscopic level. Furthermore, the mere fact that we know something about some object or direct attention to it would mean a concrete interaction of our magnetic body with the object. The so called phenomenon of psi track [45] provides additional support for this conclusion.

## 4.7 Could virtual DNAs allow a controlled development of the genome?

The fundamental question in the evolution biology is the question about the interaction between genome ( $G$ ), phenotype ( $P$ ), and environment ( $E$ ).

1. The standard dogma is that the information transfer from  $G$  to  $P$  is unidirectional and that environment acts on  $G$  by inducing random mutations of  $G$ , from which  $E$  selects the lucky survivors as those with the best ability to reproduce. Lamarckism [43, 41, 42] represents a deviation from standard dogma by assuming direct information transfer from  $E$  to  $G$ .
2. Genetic expression is controlled by environment, at least by silencing [42], which is like selecting only few books to be read from a big library. Cell differentiation represents basic example of selective gene expression. DNA methylation and transposition are accepted to reflect information transfer from  $E$  to  $G$ , perhaps via  $P$ . These modifications are believed to be short lasting and not transferred to the offspring since it is difficult to imagine a mechanism transferring the mutations to the germ cells. There is however also evidence that epigenetic information transfer takes place [44]: this transfer would be selective expression of genes of germ cells rather than that of modified genes.
3. The question however remains whether the  $G \rightarrow P - E$  actually could complete to a closed loop  $G \rightarrow P - E - G$  so that genome could directly respond to the changing physical environment and could transfer the successful response to the next generation [43].

### 4.7.1 Could genome be developed like computer hardware?

In TGD framework the sequence  $G \rightarrow P - E$  is replaced with a closed loop  $G - P - M - E$  to which  $E$  is attached at  $P$  by bidirectional arrow (organisms do also modify their environment actively). Magnetic body thus controls genome and receives information from cell membrane ( $P$ ). The hierarchy of genomes (super-genome, hyper-genome,...) corresponding to the different levels of dark matter hierarchy allows this loop to be realized in different scales rather only at the level of single cell.

The question is whether the magnetic body of organism or higher level magnetic bodies could modify genomes, super-genomes, and hyper-genomes directly, perhaps by generating mutations of the genome in a short time scale; by monitoring how genetically modified organism survives in the environment; and -if the outcome of the experiment is successful - replacing the corresponding portion of DNA with the modified DNA both in ordinary germ cells. One can even ask whether the abstract model of the external environment provided by the internal chemical milieu might be mimicked by water magnetic bodies of water molecule clusters and provide a virtual world testing ground for a search of favorable mutations.

In DNA as a tqc vision essentially the development of a new computer hardware would be in question, and should take place in a controlled manner and involve an experimentation before going to the market rather than by random modifications taking place in computer CPUs. Second basic aspect of DNA as tqc paradigm is that water and bio-molecules live in symbiosis in the sense that self organization patterns of the cellular water flow define the tqc programs. The following first guess for how the development of computer hardware might be achieved is just a first guess but might have something to do with reality.

1. What would be needed is a mechanism generating rapidly modifications of DNA. The mutations should be carried out using a kind of virtual DNA mimicking all the essential aspects of the symbolic dynamics associated with DNA. The magnetic bodies of DNA consisting of flux tubes connecting the nucleotides of DNA strands to cell membrane satisfy these conditions since A,T,G,C is coded to exotic light quarks  $u, d$  and anti-quarks  $\bar{u}, \bar{d}$  at the ends of flux tubes [L5]. DNA nucleotides could be replaced with clusters of water molecules but also other options can be imagined. Note that it does not matter when one speaks of mimicry of RNA or DNA molecules.
2. If the proposed model of the phantom DNA and homeopathy has something to do with reality, this kind of virtual DNA exists and is generated in phantom DNA effect as magnetic bodies of DNA, including of course the magnetic flux tubes connecting the nucleotides to the cell membrane or conjugate strand of DNA.
3. The crucial additional assumption would be that also the reversal of phantom DNA effect is possible and corresponds to the analog of DNA replication in which nucleotides attach to the virtual conjugate nucleotides of the virtual DNA strand or RNA strand in turn transformed to DNA strand be reverse transcription. The hypothesis would have rather strong implications for the genetic engineering since homeopathic remedies of genetically engineered DNA sequences could be transferred to cell nuclei just by drinking them.
4. Phantom DNA sequences could form populations and - as far as their properties as a hardware of topological quantum computer are involved - evolve under selection pressures of the virtual world defined by the nuclear, cellular and extracellular water. A competition of components of tqc hardware developed by the higher level magnetic body to realize optimally tqc programs needed for survival would be in question. The simplest mutation of phantom DNA would replace the quark pairs at the ends the (wormhole-) magnetic flux tube with a new one and could occur in very short time scale. Also basic editing operations like cutting and pasting would be possible for these competing phantom DNA sequences. The winners in the competition would be transformed to actual DNA sequences by utilizing the reverse phantom DNA (or RNA -) effect and be inserted to genome. The genetic machinery performing cutting, gluing, and pasting of real DNA in a controlled manner exists. What is needed is the machinery monitoring who is the winner and making the decision to initiate the modification of the real DNA.
5. The transfer of the mutations to germ cells could be achieved by allowing the population of the virtual DNA sequences to infect the water inside germ cells. The genetic program inducing the modification of DNA by using the winner of the tqc hardware competition should run automatically.
6. One open question is whether the nuclear, cellular or perhaps also extracellular water should represent the physical environment and - if answer is affirmative - how it achieves this. As a matter fact, considerable fraction of water inside cells is in gel phase and it might be that the intercellular water, which naturally defines a symbolic representation of environment, is where the virtual evolution takes place. Internal chemical milieu certainly reflects in an abstract manner the physical environment and the ability of the water molecule clusters to mimic bio-molecules would make the representation of the chemical environment possible. Also sudden changes of external milieu would be rapidly coded to the changes in internal milieu which might help to achieve genetic re-organization. The craziest dream is water based simulation of both genes, proteins, and molecules representing external world running at dark space-time sheets.

#### 4.7.2 Dark nuclear strings as analogs of DNA-, RNA- and amino-acid sequences and baryonic realization of genetic code?

The minimal option is that virtual DNA sequences have flux tube connections to the lipids of the cell membrane so that their quality as hardware of tqc can be tested but that there is no virtual variant of transcription and translation machinery. One can however ask whether also virtual amino-acids could be present and whether this could provide deeper insights to the genetic code.

1. Water molecule clusters are not the only candidates for the representatives of linear molecules. An alternative candidate for the virtual variants of linear bio-molecules are dark nuclei consisting of strings of scaled up dark variants of neutral baryons bound together by color bonds having the size scale of atom, which I have introduced in the model of cold fusion and plasma electrolysis both taking place in water environment [F9]. Colored flux tubes defining braidings would generalize this picture by allowing transversal color magnetic flux tube connections between these strings.
2. Baryons consist of 3 quarks just as DNA codons consist of three nucleotides. Hence an attractive idea is that codons correspond to baryons obtained as open strings with quarks connected by two color flux tubes. The minimal option is that the flux tubes are neutral. One can also argue that the minimization of Coulomb energy allows only neutral dark baryons. The question is whether the neutral dark baryons constructed as string of 3 quarks using neutral color flux tubes could realize 64 codons and whether 20 aminoacids could be identified as equivalence classes of some equivalence relation between 64 fundamental codons in a natural manner.

The following model indeed reproduces the genetic code directly from a model of dark neutral baryons as strings of 3 quarks connected by color flux tubes.

1. Dark nuclear baryons are considered as a fundamental realization of DNA codons and constructed as open strings of 3 dark quarks connected by two colored flux tubes, which can be also charged. The analogs of DNA -, RNA -, and of amino-acid sequences would in turn correspond to sequences of dark baryons. It is assumed that the net charge of the dark baryons vanishes so that Coulomb repulsion is minimized.
2. One can classify the states of the open 3-quark string by the total charges and spins associated with 3 quarks and to the two color bonds. Total em charges of quarks vary in the range  $Z_B \in \{2, 1, 0, -1\}$  and total color bond charges in the range  $Z_b \in \{2, 1, 0, -1, -2\}$ . Only neutral states are allowed. Total quark spin projection varies in the range  $J_B = 3/2, 1/2, -1/2, -3/2$  and the total flux tube spin projection in the range  $J_b = 2, 1, -1, -2$ . If one takes for a given total charge assumed to be vanishing one representative from each class  $(J_B, J_b)$ , one obtains  $4 \times 5 = 20$  states which is the number of amino-acids. Thus genetic code might be realized at the level of baryons by mapping the neutral states with a given spin projection to single representative state with the same spin projection. The problem is to find whether one can identify the analogs of DNA, RNA and aminoacids as baryon like states.

##### 1. States in the quark degrees of freedom

Consider first the states of dark baryons in quark degrees of freedom. These states can be constructed as representations of rotation group and strong isospin group.

1. The tensor product  $2 \otimes 2 \otimes 2$  is involved in both cases. Without any additional constraints this tensor product decomposes as  $4 \oplus 2 \oplus 2$ : 8 states altogether. This is what one should have for DNA and RNA candidates. If one has only identical quarks  $uuu$  or  $ddd$ , one obtains

only the 4-D representation corresponding to completely symmetric representation. These 4 states correspond to a candidate for amino-acids. Thus RNA and DNA should correspond to states of type  $uud$  and  $ddu$  and aminoacids to states of type  $uuu$  or  $ddd$ . What this means physically will be considered later.

2. It is known that only representations with isospin  $3/2$  and spin  $3/2$  ( $\Delta$  resonance) and isospin  $1/2$  and spin  $1/2$  (proton and neutron) are realized as free baryons. Now of course a dark -possibly p-adically scaled up - variant of QCD is considered so that more general baryonic states are possible. The spin statistics problem which forced to introduce quark color strongly suggests that the construction of the codons as sequences of 3 nucleons is not a good idea.
3. Second nucleon like spin doublet - call it  $2_{odd}$  - has wrong parity in the sense that it would require  $L = 1$  ground state for two identical quarks ( $uu$  or  $dd$  pair). Dropping  $2_{odd}$  and using only  $4 \oplus 2$  for the rotation group would give degeneracies  $(1, 2, 2, 1)$  and 6 states only. All the representations in  $4 \oplus 2 \oplus 2_{odd}$  to get 8 states with a given quark charge and one should transform the wrong parity doublet to positive parity doublet somehow. Since open string geometry breaks rotational symmetry to a subgroup of rotations acting along the direction of the string, the attractive possibility is to add a stringy excitation with angular momentum projection  $L_z = -1$  to the wrong parity doublet so that the parity comes out correctly.  $L_z = -1$  orbital angular momentum for the relative motion of  $uu$  or  $dd$  quark pair in the open 3-quark string would be in question. The degeneracies for spin projection value  $J_z = 3/2, \dots, -3/2$  are  $(1, 2, 3, 2)$ . Genetic code means spin projection mapping the states in  $4 \oplus 2 \oplus 2_{odd}$  to 4.

### 2. States in the flux tube degrees of freedom

Consider next the states in flux tube degrees of freedom.

1. The situation is analogous to a construction of mesons from quarks and antiquarks and one obtains the analogs of  $\pi$  meson (pion) with spin 0 and  $\rho$  meson with spin 1. States of a given charge correspond to the tensor product  $2 \otimes 2 = 3 \oplus 1$  for the rotation group. Drop the singlet and take only the analog of neutral  $\rho$  meson. The physical meaning of this will be considered later.
2. Without any further constraints the tensor product  $3 \otimes 3 = 5 \oplus 3 \oplus 1$  gives 8+1 states. By dropping the scalar state this gives 8 states required by DNA and RNA analogs. Bosonic statistics allows only 5 unless the two color bonds have different charges. The degeneracies of the states for DNA/RNA type realization with a given spin projection for  $5 \oplus 3$  are  $(1, 2, 2, 2, 1)$ .
3. For aminoacids only 5 completely symmetric under the exchange of flux tubes is required and is achieved if the two color bonds have identical charges. Genetic code means the projection of the states of  $5 \oplus 3$  to those of 5 with the same spin projection and same total charge.

### 3. Analogs of DNA, RNA, aminoacids, and of translation and transcription mechanisms

Consider next the identification of analogs of DNA, RNA and aminoacids and the baryonic realization of the genetic code, translation and transcription.

1. The analogs of DNA and RNA can be identified dark baryons with quark content  $uud$  and  $ddu$  and color bonds of different charges. There are 3 color bond pairs corresponding to charge pairs  $(q_1, q_2) = (-1, 0), (-1, 1), (0, 1)$  (the order of charges does not matter). The condition that the total charge of dark baryon vanishes allows for  $uud$  only the bond pair

$(-1, 0)$  and for  $udd$  only the pair  $(-1, 1)$ . These thus only single neutral dark baryon of type  $uud$  resp.  $udd$ : these would be the analogous of DNA and RNA codons. Amino-acids would correspond to either  $uuu$  or  $ddd$  with identical color bonds with charges  $(-1, -1)$ ,  $(0, 0)$ , or  $(1, 1)$ .  $uuu$  with color bond charges  $(-1, -1)$  is the only neutral state. Hence only the analogs of DNA, RNA, and aminoacids are obtained, which is rather remarkable result.

2. The basic transcription and translation machinery could be realized as processes in which the analog of DNA can replicate, and can be transcribed to the analog of mRNA in turn translated to the analogs of amino-acids. In terms of flux tube connections the realization of genetic code, transcription, and translation, would mean that only dark baryons with same total quark spin and same total color bond spin can be connected by flux tubes. Charges are of course identical since they vanish.
3. Genetic code maps of  $(4 \oplus 2 \oplus 2) \otimes (5 \oplus 3)$  to the states of  $4 \times 5$ . The most natural map takes the states with given spin to a state with the same spin so that the code is unique. This would give the degeneracies  $D(k)$  as products of numbers  $D_B \in \{1, 2, 3, 2\}$  and  $D_b \in \{1, 2, 2, 2, 1\}$ :  $D = D_B \times D_b$ . Only the observed degeneracies  $D = 1, 2, 3, 4, 6$  are predicted. The numbers  $N(k)$  of aminoacids coded by  $D$  codons would be

$$[N(1), N(2), N(3), N(4), N(6)] = [2, 7, 2, 6, 3] .$$

The correct numbers for vertebrate nuclear code are  $(N(1), N(2), N(3), N(4), N(6)) = (2, 9, 1, 5, 3)$ . Some kind of symmetry breaking must take place and should relate to the emergence of stopping codons. If one codon in second 3-plet becomes stopping codon, the 3-plet becomes doublet. If 2 codons in 4-plet become stopping codons it also becomes doublet and one obtains the correct result  $(2, 9, 1, 5, 3)!$

4. Stopping codons would most naturally correspond to the codons, which involve the  $L_z = -1$  relative rotational excitation of  $uu$  or  $dd$  type quark pair. For the 3-plet the two candidates for the stopping codon state are  $|1/2, -1/2\rangle \otimes \{|2, k\rangle\}$ ,  $k = 2, -2$ . The total spins are  $J_z = 3/2$  and  $J_z = -7/2$ . The three candidates for the 4-plet from which two states are thrown out are  $|1/2, -3/2\rangle \otimes \{|2, k\rangle, |1, k\rangle\}$ ,  $k = 1, 0, -1$ . The total spins are now  $J_z = -1/2, -3/2, -5/2$ . One guess is that the states with smallest value of  $J_z$  are dropped which would mean that  $J_z = -7/2$  states in 3-plet and  $J_z = -5/2$  states 4-plet become stopping codons.

#### 4. Understanding the symmetries of the code

Quantum entanglement between quarks and color flux tubes would be essential for the baryonic realization of the genetic code whereas chemical realization could be said to be classical. Quantal aspect means that one cannot decompose to codon to letters anymore. This raises questions concerning the symmetries of the code.

1. What is the counterpart for the conjugation  $ZYZ \rightarrow X_c Y_c Z_c$  for the codons?
2. The conjugation of the second nucleotide  $Y$  having chemical interpretation in terms of hydrophobia-hydrophily dichotomy in biology. In DNA as tqc model it corresponds to matter-antimatter conjugation for quarks associated with flux tubes connecting DNA nucleotides to the lipids of the cell membrane. What is the interpretation in now?
3. The A-G, T-C symmetries with respect to the third nucleotide  $Z$  allow an interpretation as weak isospin symmetry in DNA as tqc model. Can one identify counterpart of this symmetry when the decomposition into individual nucleotides does not make sense?

Natural candidates for the building blocks of the analogs of these symmetries are the change of the sign of the spin direction for quarks and for flux tubes.

1. For quarks the spin projections are always non-vanishing so that the map has no fixed points. For flux tube spin the states of spin  $S_z = 0$  are fixed points. The change of the sign of quark spin projection must therefore be present for both  $XYZ \rightarrow X_c Y_c Z_c$  and  $Y \rightarrow Y_c$  but also something else might be needed. Note that without the symmetry breaking  $(1, 3, 3, 1) \rightarrow (1, 2, 3, 2)$  the code table would be symmetric in the permutation of 2 first and 2 last columns of the code table induced by both full conjugation and conjugation of  $Y$ .
2. The analogs of the approximate  $A - G$  and  $T - C$  symmetries cannot involve the change of spin direction in neither quark nor flux tube sector. These symmetries act inside the A-G and T-C sub-2-columns of the 4-columns defining the rows of the code table. Hence this symmetry must permute the states of same spin inside 5 and 3 for flux tubes and 4 and 2 for quarks but leave  $2_{odd}$  invariant. This guarantees that for the two non-degenerate codons coding for only single amino-acid and one of the codons inside triplet the action is trivial. Hence the baryonic analog of the approximate  $A - G$  and  $T - C$  symmetry would be exact symmetry and be due to the basic definition of the genetic code as a mapping states of same flux tube spin and quark spin to single representative state. The existence of full 4-columns coding for the same aminoacid would be due to the fact that states with same quark spin inside  $(2, 3, 2)$  code for the same amino-acid.
3. A detailed comparison of the code table with the code table in spin representation should allow to fix their correspondence uniquely apart from permutations of n-plets and thus also the representation of the conjugations. What is clear that  $Y$  conjugation must involve the change of quark spin direction whereas  $Z$  conjugation which maps typically 2-plets to each other must involve the permutation of states with same  $J_z$  for the flux tubes. It is not quite clear what  $X$  conjugation correspond to.

##### 5. *Some comments about the physics behind the code*

Consider next some particle physicist's objections against this picture.

1. The realization of the code requires the dark scaled variants of spin 3/2 baryons known as  $\Delta$  resonance and the analogs (and only the analogs) of spin 1 mesons known as  $\rho$  mesons. The lifetime of these states is very short in ordinary hadron physics. Now one has a scaled up variant of hadron physics: possibly in both dark and p-adic senses with latter allowing arbitrarily small overall mass scales. Hence the lifetimes of states can be scaled up.
2. Both the absolute and relative mass differences between  $\Delta$  and  $N$  *resp.*  $\rho$  and  $\pi$  are large in ordinary hadron physics and this makes the decays of  $\Delta$  and  $\rho$  possible kinematically. This is due to color magnetic spin-spin splitting proportional to the color coupling strength  $\alpha_s \sim .1$ , which is large. In the recent case  $\alpha_s$  could be considerably smaller - say of the same order of magnitude as fine structure constant  $1/137$  - so that the mass splittings could be so small as to make decays impossible.
3. Dark hadrons could have lower mass scale than the ordinary ones if scaled up variants of quarks in p-adic sense are in question. Note that the model for cold fusion that inspired the idea about genetic code requires that dark nuclear strings have the same mass scale as ordinary baryons. In any case, the most general option inspired by the vision about hierarchy of conscious entities extended to a hierarchy of life forms is that several dark and p-adic scaled up variants of baryons realizing genetic code are possible.

4. The heaviest objection relates to the addition of  $L_z = -1$  excitation to  $S_z = |1/2, \pm 1/2\rangle_{odd}$  states which transforms the degeneracies of the quark spin states from  $(1, 3, 3, 1)$  to  $(1, 2, 3, 2)$ . The only reasonable answer is that the breaking of the full rotation symmetry reduces  $SO(3)$  to  $SO(2)$ . Also the fact that the states of massless particles are labeled by the representation of  $SO(2)$  might be of some relevance. The deeper level explanation in TGD framework might be as follows. The generalized imbedding space is constructed by gluing almost copies of the 8-D imbedding space with different Planck constants together along a 4-D subspace like pages of book along a common back. The construction involves symmetry breaking in both rotational and color degrees of freedom to Cartan sub-group and the interpretation is as a geometric representation for the selection of the quantization axis. Quantum TGD is indeed meant to be a geometrization of the entire quantum physics as a physics of the classical spinor fields in the "world of classical worlds" so that also the choice of measurement axis must have a geometric description.

The conclusion is that genetic code can be understood as a map of stringy baryonic states induced by the projection of all states with same spin projection to a representative state with the same spin projection. Genetic code would be realized at the level of dark nuclear physics and perhaps also at the level of ordinary nuclear physics and that biochemical representation would be only one particular higher level representation of the code. A hierarchy of dark baryon realizations corresponding to p-adic and dark matter hierarchies can be considered. Translation and transcription machinery would be realized by flux tubes connecting only states with same quark spin and flux tube spin. Charge neutrality is essential for having only the analogs of DNA, RNA and aminoacids and would guarantee the em stability of the states.

#### 4.7.3 Crying and screaming cells and magnetic bodies expressing their emotions

By using nanotechnological methods James Gimzewski [61], his student Andrew Pelling and collaborators discovered that the cell walls of bacterium *Saccharomyces cerevisiae* perform periodic motion with amplitude about 3 nm in the frequency range .8-1.6 kHz (one octave) [60]. Or more concretely, bacteria produce sounds audible to humans with average frequency of 1 kHz in a range of one octave. The frequency has strong temperature dependence, which suggests a metabolic mechanism. From the temperature dependence one deduces the activation energy to be 58 kJ/mol, which is consistent with the cell's metabolism involving molecular motors such as kinesin, dynein, and myosin. The magnitude of the forces observed (10 nN) suggests concerted nanomechanical activity is operative in the cell.

From less formal popular articles [62] one can learn that it is difficult to avoid the impression that intelligent communication is in question. Dying cells produce a characteristic screaming sound. One can also distinguish between normal cells and cancer cells on basis of the sound they produce as well as between mammalian and bacterial cells.

What might be the explanation of these findings in TGD framework?

1. It is known that the region of frequencies audible to human ear is from about 20 Hz to  $2 \times 10^4$  Hz. This is more or less same as the range of frequency range of sferics, the em noise in atmosphere [63]. This suggests a strong coupling between electromagnetic oscillations and sound as also the fact that biological structures are piezo-electrets transforming em oscillations to sounds and vice versa.
2. The activation energy per mole corresponds to .6 eV per molecule which is at the upper range for the variation range the energy associated with the fundamental metabolic energy quantum identified as the change of zero point kinetic as proton is transferred from atomic space-time sheet to much larger space-time sheet or vice versa. That metabolic energy is needed to produce the sounds supports the view that the sounds are produced intentionally.

3. If one takes seriously the notion of magnetic body as intentional agent controlling biological body, one is led to ask which must sound a totally crazy question in reductionistic ears: could magnetic body express its emotions in terms of frequencies of cyclotron transitions transformed to sound via genetic expression using piezo electric mechanism? Could it be that the photons involved are dark photons with large value of Planck constant so that their energy is above thermal energy. Could one propose a materialistic scientist to consider anything more irritating than singing and crying magnetic bodies!
4. Suppose that the homeopathic mechanism is based on replication of pseudomolecules with same magnetic body as that of solvent molecules and that neutral dark nuclear strings realize analogs of DNA, RNA, and aminoacids and realizing genetic code exactly in its vertebrate nuclear form and appearing also in the TGD based model of cold fusion and biological transmutations. If so, then homeopathic mechanism (recognition of molecules) could involve also the transformation of cyclotron radiation to sound at the level of "biological bodies" of molecules.
5. If this picture makes sense then also our speech as a self expression of the magnetic body might involve genetic code mapping sequences of DNA codons to temporal patterns of cyclotron radiation in turn transformed to speech by above mechanism. This would require a realization of genetic code at level of dark matter: could it be that dark nuclear code could define universal quantum level realization of language? The findings of Peter Gariaev and others and structural resemblance of intronic portion of genome with language and their report that DNA sequences are coded to temporal patterns of the rotation angle of the polarization of laser light (in turn inducing genetic expression).

## 5 Field codes associated with homeopathy and a model for the magnetic body

Homeopathy involves also more complex aspects than mere entrainment and imprinting. Benveniste represents evidence for codes based on the modulations of the carrier frequency [38, 39]. This kind of code brings in mind the magnetic pulse patterns inducing altered states of consciousness [32]. Cyril Smith claims that the imprinted frequency can be an arithmetic function (sum or product) of the imprinting pair of frequencies [27].

These claims of course look highly implausible in the reductionistic framework. The presence of magnetic bodies acting as intelligent intentional agents changes the situation in TGD Universe. Dark plasma oscillations patterns induced by state function reduction of charge entanglement by  $W$  MEs define an ideal representation for the code words inducing motor actions, and one ends up to a more detailed vision about how magnetic body receives and experiences sensory input from the biological body and controls it using codes with code words expressed as plasma oscillation patterns transformed to ionic waves. The model for Priore's machine [71, 69] allows to test these ideas.

### 5.1 Plasmoids as primitive life forms associated with magnetic bodies

In TGD framework plasmoids can be regarded as primitive life forms associated with rotating magnetic flux quanta, and it has been demonstrated that plasmoids seem to possess the basic characteristics of a living system [33]. The plasma in question is dark plasma. BE condensates of ions defining dark plasmas represent more advanced life forms of this kind. Dark plasma oscillations define ideal representations for field patterns inducing ionic (say  $\text{Ca}^{++}$ ) waves (by many-sheeted Faraday's law) in turn inducing generalized motor activities.

The possibility of charged entanglement induced by  $W$  MEs and generating Bose-Einstein condensates of exotic ions brings in a genuinely new element to the model of plasmoids discussed earlier as predecessors of biological life [L4]. The notion has been already applied in the model of nerve pulse [M2]. One can speak about non-Abelian holograms at the level of dark matter with  $W$  bosons taking key role in the realization of motor actions and neutral bosons playing similar role in the realization or sensory and memory representations.

### 5.1.1 Plasmoids as rotating magnetic systems

If plasmoids rotate they generate em charge by the effect known already by Faraday but not explained satisfactorily by Maxwell's electrodynamics. In TGD framework vacuum charge density induces radial electric field inducing radial Ohmic current which is not divergenceless and hence charges the rotating magnet. Cell, DNA, and other sub-systems in living matter are usually negatively charged and the underlying reason could be the presence of rotating plasmoids around which biochemical life forms have evolved.

Also Searl device [65, 66] discussed in [G2] is a rotating magnetic system. In this case the charging of the system implies an effective loss of weight in Earth's electric field. Searl device is known to develop cylindrical magnetic walls [66]. According to TGD based model of Searl device [G2], the rotating magnetic walls represent a simple example of a magnetic body containing dark matter. The energy and angular momentum transfer from the magnetic flux walls generated by the rotation to the rotating system is assumed to explain the accelerated rotation of the system.

### 5.1.2 Dark plasma waves

Dark plasma waves have synchronously oscillating spatial patterns. Charge densities correspond to the order parameters of BE condensates of bosonic ions so that the introduction of the ion densities is not an idealization as in the non-quantum situation.

The dispersion relation of dark plasma oscillations in the lowest order approximation reads as

$$f_p = \sqrt{e^2 n / m} \ ,$$

where  $n$  and  $m$  are the number density and mass of plasma waves. In the case of dark plasma waves  $n$  corresponds to the density defined by the order parameter of the Bose-Einstein condensate of ordinary or exotic ions. The dispersion relation does not depend on wave vector at all so that the plasma wave recurs to the same pattern again and again and therefore provide ideal representations of mental images.

Since the notion of ionic density is not an idealization in case of dark plasma waves, it seems sensible to assign energy quantum to the dark plasma waves. Since plasma frequency is purely classical quantity the plasma energy  $E_p = \hbar(k) f_p$  would scale as  $\hbar(k)$  and an increasing hierarchy of plasma wave energies is predicted. These energies could define the metabolic energy quanta in the case of plasmoid life forms. These quanta can decay to  $k_{em} = 0$  low energy quanta as they are used.

Plasma wave patterns could provide a realization for the control commands inducing motor activities and the energy of the plasma wave could be sucked from metabolic energy sources by time mirror mechanism and dissipated in the realization of motor action as the plasma wave decomposes into  $\lambda^{k_{em}}$  plasma waves at the lowest level of the hierarchy.

Quite large energies are involved at higher levels of dark matter hierarchy and the question arises whether there exist suitable sources of metabolic energy. The dropping of electrons from  $k = 137$  atomic space-time sheets could provide metabolic energy quantum  $E(137) \simeq 1$  keV. The dropping of electron from  $k = 131$  space-time sheet would liberate energy  $E(131) \simeq 64$  keV. The requirement that plasma wave energies correspond to zero point kinetic energies forces

quantization of the densities of ions for Bose-Einstein condensates. Also the cyclotron transition energies of electrons or their Cooper pairs can provide the metabolic energy quanta. Note that metabolic efficiency requires quantization of the densities of Bose-Einstein condensates.

A further source of metabolic energy could be dark microwave photons generated by quartz crystals in the rock. Callahan has found that rocks consisting mainly of quartz  $\text{SiO}_2$  serve as a source of bio-photons and that paramagnetic soil implying strong Schumann resonance amplitudes is favorable for the well-being of plants [36]. Bio-photons could be produced as de-coherence products of dark microwave photons. Interestingly,  $\text{SiO}_2^-$  ion has cyclotron frequency 10 Hz for the nominal value  $B_E = .5$  Gauss of the Earth's magnetic field equal to the fundamental bio-rhythm and the p-adic frequency  $f(2, 127)$  associated with the memetic code.

It is possible to assign definite time scales to various plasma densities in magnetosphere possibly relevant to consciousness and this in principle makes it possible to build a more detailed view about quantal magnetosphere.

### 5.1.3 Dark plasma wave patterns as a tool of bio-control

Dark plasma wave patterns correspond to small deviations of charge densities from the non-equilibrium charge density by exotic ionization. Charge entanglement by  $W$  MEs with the magnetic body is an ideal mechanism for the generation of these deviations.

$W$  ME generates oscillatory entanglement with coefficients which depend on space-time coordinates. In the state function reduction one of the outcomes is a state in which Bose-Einstein condensates in both systems carry exotic nuclear em and weak charges.

The reduction occurs for entire Bose-Einstein condensates of bosonic ions at biological body. The stronger the  $W$  field, the higher the probability that exotically charged BE condensate results. Ionic BE condensates define the pixels of the motor map as well as sensory map and the size of coherence region determines the pixel size. Similar mechanism works at the level of sensory input to the magnetic body.

Dark plasma waves induce ordinary ionic waves such as  $\text{Ca}^{++}$  waves as asymptotic self-organization patterns which would naturally correspond to generalized motor actions. Plasma wave patterns generate also cyclotron radiation the interaction of which with Josephson junctions induce a sensory representation for these patterns so that the control loop closes. Digital spatial and temporal modulation of the plasma wave patterns makes possible field codes for motor activities induced by ionic waves. Obviously the coding of plasma wave patterns to motor actions would be very robust.

## 5.2 Field representations of information using codes

As already mentioned, the work of Benveniste [38, 39], Gariaev [29], and Persinger [32] provides evidence for the existence of field codes and for the view that water can learn associations [40]. The basic distinction as compared to the genetic code is that field codes could be context dependent conventions somewhat like natural languages since magnetic body brings in conscious intelligence and flexibility. Therefore the earlier vision about memetic code [L1] assuming strict duration of the memetic codons could be un-necessarily restrictive.

### 5.2.1 Information theoretic aspects

Code words are names for biological functions which can be very complex.

#### 1. Associative learning of the code

Flexibility is the basic property of the field codes. The codes can be therefore context dependent and characterize individual organism rather than being biological invariants. Personal code might

well be necessary in order to guarantee that biological body cannot be "possessed" by outsiders. The higher the level of dark matter hierarchy, the higher this flexibility is expected to be (natural language in contrast to primitive signals which are rather universal). The work of Benveniste [38, 39] and the report of Smith about context specified 7-bit code for frequency importing [27] provide support for the associative learning in water.

Flexibility implies that an associative learning of the code is required. There are two diametrically opposite manners to understand what the establishment of the code could mean.

1. The definitely higher IQ and quantum flexibility of the magnetic body suggests that magnetic body learns by searching the patterns inducing the desired responses of the biological body.
2. Magnetic body could also teach, or rather modify, the biological body to respond in a desired manner to plasma wave patterns. This mode of learning requires plasticity and might be important at the level of brain: associative regions of the cortex of higher primates are indeed known to be highly plastic so that changes of connectivity could make possible this kind of learning. The learning requires feedback circuit. An input signal representing the motor action is dark plasma wave pattern. There is also a motor input modifying the response function of the biological body using already learned code. The feedback is essentially the output allowing to decide about next motor input modifying the response function. Automatic associative learning results if the control loop is made automatic. A fascinating possibility is that this kind of modification could occur at the level of genes as a kind of genetic self engineering.

Quite generally, spin glass degeneracy and classical non-determinism are prerequisites for learning at various levels of dark matter hierarchy. In neuroscience rewards and punishments represented by neurotransmitters and various information molecules are believed to drive the learning.

## 2. *The information content of code is maximized*

Negentropy Maximization Principle [H2] is expected to pose constraints on the possible codes but it is difficult to imagine deduction of these constraints directly from NMP. The number theoretic model reproducing the genetic code as well as its variants [L3] suggests much more direct approach.

Number theoretical variants of Shannon entropy allow interpretation as positive information measures. The information content of the code should be maximized by assigning to it somehow a statistical ensemble or a set of statistical ensembles. In the model of genetic code the 64 codons labelled by integers in the range  $0, \dots, 63$  and the corresponding aminoacids are labelled by the 18 primes  $p < 64$  and integers  $0, 1$  which correspond to DNAs labelled by  $0, 1$ . Hence the task reduces to finding an assignment  $n \rightarrow p(n)$ . The prime associated with a given integer from the maximization of negentropy for the entire code. Dynamics is thermodynamics for the partitions of  $n$  to a sum of  $r$  integers,  $r = 1, \dots, n$ . Quantum criticality suggests that the Hamiltonian  $H(r)$  (or rather, Boltzmann weights) can be engineered freely. The negentropy  $N(n)$  is maximum over  $p$ -adic negentropies  $N_p(n)$  (formally Shannon entropies) fixing the prime  $p(n)$ .

This principle generalizes to an arbitrary code provided one can label the codewords using integers  $n$  and their images by primes  $p(n)$ . In the model of the genetic code  $n$  codons code for  $0, 1$  and primes  $p < n$ , whose number  $N(n)$  behaves for large values of  $n$  like  $N(n) \simeq n/\log(n)$ . This is obviously a highly non-trivial prediction about the code. The model as such does not tell anything about how the plasma oscillation patterns are labelled by integers.

The patterns to which codons are mapped should be effectively digital just as in the case of a computer graphics. Dark matter Bose-Einstein condensates react as single particles and serve as natural digits and the number of codons is finite. BE condensate patterns induce patterns of ionic waves (such as  $\text{Ca}^{++}$  waves), and if it is only the asymptotic self-organization pattern which matters, the degeneracy of the code follows naturally.

### 3. How the meaning emerges?

Information without meaning is not information. The model based on magnetic body and biological body allows to understand how the meaning of the symbolic signals used in the communications emerges. The biological self-organization process induced by the signal acting as a control signal give rise to a mental image at the level of biological body (symbolic mental image at the level of brain and sensory mental images at the level of sensory organs) shared by the magnetic body via entanglement. This mental image would give the meaning for the signal.

#### 5.2.2 How magnetic body perceives?

In order to speak about perception as something more than a completely automatic process, it is necessary to assume that the perceiver is an intentional agent receiving sensory input and able to perform motor actions. Magnetic bodies at higher levels of dark matter hierarchy would be a natural identification for the recognizer. To a given length scale range obtained by scaling up the length scale range from  $L(151) = 10$  nm to  $L(173) = 20$   $\mu$ m by powers of  $\lambda \simeq 2^{11}$  one can assign both weak and em levels of dark matter hierarchy related to  $k_W = k_{em} + 2$  [M3]. The most primitive levels correspond to  $k_W = 0, 1$  with  $k_{em} = 0$  and cell itself corresponds to  $(k_{em}, k_W) = (0, 2)$  [M3].

##### 1. The general model for motor action and sensory communications

The general model for motor actions and communications of sensory input to the magnetic body relies crucially on magnetic flux quanta connecting system to its magnetic body and Josephson junctions serving the role of sensory receptors. This model was first developed for cell with cell/nuclear membrane serving as Josephson junction and DNA double strand as a basic instrument of motor action allowing to realize motor commands via gene expression. An essential assumption is the presence of quantum critical high  $T_c$  super-conductivity, or actually two kinds of super-conductivities possible in some finite temperature range for which a good guess is 36-37 °C [M3]. The model assigns to the cell membrane and its scaled up variants a hierarchy of Josephson junctions and generalized EEGs.  $k_{em} = 4$  corresponds to the ordinary EEG.

This model allows to develop a model of sensory perception using the patterns of Josephson radiation. The model of Comorosan effect [67] suggests that even molecules could be carriers of supra currents and that the structures formed by enzymes and substrate molecules contain Josephson junctions. Hence the model might apply even when the perceiving system is the magnetic body of bio-molecule, say that of a molecular motor. In the case of DNA double strand the identification of the candidates for Josephson junctions is obvious.

Josephson junction codes information about all kinds of radiation to the pattern of Josephson radiation. In particular, the dark cyclotron radiation generated by the cyclotron transitions of the cyclotron BE condensates at the magnetic bodies creates a voltage perturbation and thus affects Josephson current in the Josephson junctions assignable with the recognizing system and the resulting Josephson radiation received by the magnetic body contains information about the cyclotron radiation emitted by the target.

##### 2. How magnetic body perceives the sensory input from the biological body?

An important question is how the magnetic body generates the cyclotron radiation to which the biologically important molecules respond. In the vicinity of Earth (say below ionosphere) this radiation could be generated by the ions themselves but at high enough heights it is basically protons and electrons which are present in significant amounts.

An elegant resolution of the problem would be provided by the model of frequency imprinting and entrainment. Exotically ionized super-nuclei formed by protonic strings dropped to magnetic flux sheets are able to mimic ordinary ions. These super-nuclei could also act as receiving antennas

and can serve as kind of amplifiers in the recognizing system. Time mirror mechanism would also allow to amplify phase conjugate signal using population reversed cyclotron laser.

### 3. Sensory input from biological body as a somatosensory map at magnetic body

The basic recognition process is related to the recognition of the patterns of Josephson radiation consisting of frequencies  $f_{n,\pm} = nf_c \pm f_J$ . Somehow these patterns must define what might be called somatosensory maps at the level of magnetic body.

The previous work with frequency coding of positions of objects of perceptive field using varying cyclotron frequencies [M4, M5] suggests that the magnetic field at the magnetic flux quanta is slowly varying so that the input at frequency  $f_{n,\pm} = nf_c \pm f_J$  generates resonant cyclotron transitions at a position of the magnetic flux quantum determined by the condition  $\hat{f}_c = f_{n,\pm}$ .

This would map the sensory input to a geometric pattern along magnetic body defined by the varying intensity of induced cyclotron transitions and magnetic body would experience the input from the biological as a kind of bodily sensation. It is quite possible that same sensory input is mapped to several positions at the magnetic body.

The harmonics of "alpha" band would correspond to  $\hat{f}_c = nf_c$  and would correspond to motor areas of the magnetic body disjoint from sensory areas. "Beta" and "theta" bands would correspond to  $nf_c + f_J$  and  $nf_c - f_J$  and receive sensory input. This allows two options.

1. The magnetic flux could vary in discrete manner so that  $\hat{f}_c = nf_c$  would corresponds to magnetic flux  $n\hbar(k)$ : in this case the harmonics of alpha band would correspond to disjoint flux quanta within which magnetic field varies in a relatively narrow range. In this case EEG bands would have precise geometric correlates.
2. If the magnetic flux has minimal value of  $\hbar(k)$ , the area of the magnetic flux quantum would vary as  $S(n) \propto 1/\sqrt{n}$  by flux quantization. There would be a cutoff in  $n$  since the field strength cannot be too high.

If the magnetic field strength decreases as a function of distance from Earth as one might expect, beta and gamma bands would be nearer to the biological body than theta and delta bands for both options. This conforms with the fact that the EEG activity above alpha band is typically associated with rapid reactions and the time delay due to the sensory communications should be minimal. The magnetic body can extent below the Earth's surface where the field strength increases: also the model for EEG leads to the same conclusion: the Josephson junction associated with  $k_{em} = 4$  level is through the layer formed by ionosphere and lithosphere [M3].

The role of brain would be to construct symbolic representations by abstracting only the essential features of the sensory input so that also pattern completion would become possible. Magnetic body itself would accept the sensory input from brain and body as such.

### 5.2.3 Dark plasma wave patterns as motor commands

Since dark plasma waves recur again and again to the same pattern they are ideal for the field representation of codewords representing biological activities. Dark plasma oscillations can induce various ionic waves such as  $\text{Ca}^{++}$  and  $\text{Mg}^{++}$  waves since plasma wave modifies the scalar potential at dark space-time sheets and thus also at ordinary space-time sheets by Faraday law in many-sheeted space-time. Plasma wave pattern generates also a pattern of cyclotron radiation in the magnetic field and its presence is detected at the magnetic body via sensory system so that a motor-sensory feedback loop results.

Dark plasma wave patterns would define self-organizing "motor mental images" assignable to the biological body and perhaps also with motor areas of magnetic bodies since the motor control of magnetic bodies from higher levels is also expected to be present. These self-organization patterns would represent control commands realized in terms of frequencies and spatial field patterns

assignable to  $W$  MEs. Digitalization would be implied by the size of the coherent region of the BE condensate making collective quantum phase transition to a state involving plasma oscillation with a probability proportional the intensity of  $W$  field inside coherence region.

The realization of motor action involves  $W$  MEs. Exotic  $W$  bosons behave as massless particles below the weak length scale but above this scale they possess a mass obtained by p-adically scaling down the mass  $\sim 80$  GeV of the ordinary  $k = 89$   $W$  boson. This suggests that a large metabolic energy of order  $W$  boson mass is needed to generate  $W$  ME and that this energy transformed to the energy of plasma oscillation as charge entanglement is reduced and produces exotic ionization. This metabolic energy could be provided by the dropping of an electron from atomic or sub-atomic space-time sheet to a larger space-time sheet.

### 5.3 Priore's machine as a test bench for the model

Theoretician encounters often inventions which work but seem to defy all attempts to understand them. Even more, it seems a complete mystery how the inventor has ended up with his device, unless one accepts the idea that the inventor was working under the guidance of some higher level conscious entities. Priore's machine demonstrated to heal cancer certainly belongs to this category. Although the biological effects of the Priore's device are described in high detail, the construction of the machine, which is very complicated, is described in a very sketchy manner [71]. This makes it difficult to see what is essential and what is not. In the following the model for bio-control is taken as a guideline in attempts to understand why Priore's machine works.

#### 5.3.1 Three approaches to the cure of cancer

One can approach the cure of cancer from at least three different directions.

##### 1. *Cure the cancer cells*

The general vision about biological evolution as emergence of higher levels of dark matter hierarchy suggests that some higher levels in the hierarchy of magnetic bodies are lacking in the case of cancer cell population so that cells become lonely individuals having replication as the sole purpose of life. Dysfunction at the level of super-genes looks a plausible reason for the asocial behavior. Magnetic flux sheets corresponding to some super genes could be lacking so that "social" control from some magnetic bodies in the hierarchy would fail. A possible cure of cancer would be healing of the cancer cells by super-gene therapy: something probably not possible for a long time even if the concept made sense.

The basic problem could be the absence of a magnetic body responsible for the quantum bio-control at some levels of the p-adic and dark matter hierarchies. The cure would be the restoration of this magnetic body by using external magnetic fields. The control of this magnetic body by higher level magnetic bodies should be mimicked by inducing periodic modulations of the magnetic field strength with frequencies which correspond to important bio-rhythms. The functioning of Priore's machine supports this interpretation.

##### 2. *Help immune system in its task*

The presence of cancer cells is not a fatal problem if immune system is intact. The simplest reason for the failure of the immune system to eliminate cancer cells would be that it does not possess metabolic resources or that it lacks "soldiers" doing the dirty jobs, or messengers mediating commands to the battle field. Perhaps the restricted metabolic energy resources do not allow to generate plasmoids realizing the control commands from higher levels of the immune system as plasma wave patterns. In this case a possible cure would be the introduction of metabolic energy from outside and generation of additional plasmoids. Priore's machine seems to stimulate the

immune system somehow and there is no detectable direct effect on the replication of the cancer cells. Thus this strategy could be realized by Priore's machine to some extent.

### 3. *Could cancer be cured by editing the geometric past?*

The earlier attempt to understand the functioning of Priore's machine was based on the idea that cancer cells realize some biological program ("replicate", more or less) plus the hypothesis that control commands correspond to holograms and the reversals of these commands to phase conjugates of the holograms. This allows to imagine the possibility of curing cancer by using the phase conjugate of the command "replicate".

This does not however work. The simple reason is that the general model for the realization of intentions implies that *all* motor actions are realized in terms of phase conjugate MEs, in particular negative energy  $W$  MEs inducing charge entanglement. The phase conjugate of the motor command would thus represent communication of sensory information rather than negation of the motor command. This duality between passive and active aspects of consciousness seems rather deep and has remained without sufficient attention hitherto.

One can however consider the possibility of sending the motor command "do not replicate" to a sufficiently distant geometric past or a command for an immune system to eliminate the replicators more effectively than it does in the recent geometric past. This would be essentially editing of geometric past affecting also the geometric now and could induce rather dramatic quantum jumps in which the state of patient would suddenly change. Highest levels of dark matter hierarchy consistent with the duration of the human life cycle should be involved which suggests that this kind of healing is based on spiritual practices indeed claimed to induce miraculous healings. Indeed, in the case of Priore's machine the time scales involved are so fast that there is no reason to believe that it could send motor commands to the immune system of the distant geometric past.

## 5.3.2 Description of the device

Consider first the main points related to the structure and function of the device.

### 1. *Plasma is present*

Priore's machine is a tube containing rotating plasma. Ions of Ne and Argon gas are used. No information about how complete the ionization is given although the field used is enough to ionized  $n = 3$  electrons in the case of Argon. The estimate for the pressure is given but temperature is not reported so that it is not possible to make reliable estimates about the density of the plasma.

The voltage  $V = .43$  kV voltage generates the plasma in the tube. Argon and Neon are reported to be used as plasma gases. For Argon ionization energy is  $E_1 \sim 18^2 \times 13.6$  eV = 4.405 keV. The ionization of  $n = 3$  electrons with energy  $E_3 = E_1/9$  is possible by the electrons accelerated in the voltage and gaining thus maximal energy of .49 keV if dissipative effects can be neglected. 8-fold ionization is possible for Ar since the energies of  $n = 3$  electrons are nearly degenerate. For Ne the potential ionizing electrons at  $n = 2$  shell would differ by a factor  $(3 \times 10/2 \times 18)^2 = 25/36 \simeq .7$  from that for Ar. Also *Hg* plasma is mentioned [69]: the tube is reported to be 2 mmHg vacuum: my interpretation is that it contains 2 millimoles of Hg that is  $1.2 \times 10^{21}$  Hg atoms per tube volume. For Hg the ionization energy of  $n = 6$  electrons would be about 5 times higher than for Ar so that 5 times higher voltage would be needed.

### 2. *Cyclotron frequencies of Ar and Ne ions are equal to the cyclotron frequency of Ca ion*

The observation which puts bells ringing is that  $\text{Ar}^{++}$  and  $\text{Ne}^+$  have same cyclotron frequency as  $\text{Ne}^+$  as  $\text{Ca}^{++}$ . The radiation at the cyclotron frequency of  $\text{Ca}^{++}$  is known to have effects on living matter [34], and TGD based model for these effects led to the model for the hierarchy of generalized EEGs associated with the dark matter hierarchy [M3].

### 3. Plasma is rotating

A rotating deflector to which ions arrive induces a rotation of the plasma in the direction of the axis of the cylindrical cavity. Rotation frequency  $f$  is reported to be below 100 rpm ( $f \leq 1.7$  Hz). Rotation makes the plasmoids charged by an effect known already by Faraday. Also Searl device is a rotating magnetic system and its charge explains the reported effective loss of weight as being due to the interaction with the Earth's radial electric field. Searl device is also known to develop cylindrical magnetic walls [65, 66]. According to the TGD based model of the Searl device the rotating magnetic walls represent a simple example of a magnetic body containing dark matter. In this case the dropping of electrons from atomic space-time sheet to a larger space-time sheet provides the energy for the accelerated rotation and for the formation of magnetic walls. Also transfer of angular momentum to magnetic walls is in principle possible.

The rotation of the plasma with the magnetic flux lines frozen to the plasma could create a similar situation, and the rotating magnetic walls could receive metabolic energy from the dropping of electrons and provide it for the immune system whose stimulation seems to be involved with the healing. Also the magnetic field in the region of target would rotate so that plasmoids containing biologically important dark ions could be generated also here.

### 4. Magnetic field of order kGauss is present

Magnetic field of order kGauss is present also in the target. 620 Gauss and 1240 Gauss are the typical field values used. It would be nice to understand why the strength of the magnetic field used is what it is. The ratio of the magnetic field  $B_1 = 612$  Gauss to the dark magnetic field  $B_d = .2$  Gauss playing key role in the TGD based model of living matter is  $B_1/B_d = 2^{11+1/2}$  with 5 per cent accuracy, which suggests that p-adically scaled up version of this magnetic field corresponding to the p-adic length scale  $k = 169 - 23 = 146 = 2 \times 73$  could be in question. The scaling down would be in single direction only so that the flux quanta would be flux sheets with width of 25  $\mu\text{m}$  and thickness 8.8 nm not far from cell membrane thickness of 10 nm if one assumes that  $B_d$  corresponds to  $n_F = 5$  level of dark matter hierarchy implying that magnetic flux is quantized in multiples of flux quantum which is 5 times the standard quantum of magnetic flux.

The external magnetic field is modulated between some limits with the period of heart beat in the optimal situation. Hence the values of magnetic fields at which biological effects occur could differ from the nominal values. The cyclotron energies of all biologically important ions are above thermal threshold if the magnetic flux quanta correspond to  $k_{em} = 3$  level of dark matter hierarchy.

### 5. Modulated microwave radiation is present

Microwave radiation with frequency  $f_1 = 9.4$  GHz modulated by a frequency  $f_2 = 17$  MHz in a typical experiment is also present. The wavelengths used are in range 3 cm–80 cm corresponding to the range 10 GHz–38 GHz. The optimal microwave frequency depends on the organ irradiated. Microwave radiation is crucially important and there are reasons to believe that its frequency can vary only in a narrow range. The intensity of the microwave radiation correlates strongly with healing effects. The presence of the modulation is necessary to achieve the healing effect. Several modulation patterns are used which suggests that control commands based on field code are involved.

### 6. Also highly energetic charged particles are involved

The system involves very high voltages generating highly energetic electrons and ions [71]. These voltages are much higher than the ionization voltage for Ne and Ar or even Hg. Hence the highly energetic electrons and X rays could be essential also for the primary function of the Priore's machine. Highly energetic electrons and ions could give their energy for the  $k_{em} = 3$  dark microwave photons. High energy X rays with energies  $E \simeq 300$  keV would transform to dark microwave photons which in turn would be transformed to plasma oscillations. The patent

of Priore mentions that a typical voltage  $V = 300$  kV is present in the device [71] so that electrons accelerated in this voltage could indeed provide the X rays transforming to dark microwave photons to dark plasma oscillations.

### 5.3.3 9.4 GHz microwave photons as counterparts of Josephson radiation at the first level of biological dark matter hierarchy

The model for the hierarchy of EEG:s discussed in [M3] is a good starting point in attempts to understand that role of the modulated microwave photons and external magnetic field.

Microwave photons have frequency 9.4 GHz. The corresponding photon energy is below the thermal threshold. It is however quite possible that microwave photons are dark so that their energy is above thermal energy. If microwave photons correspond to  $n_F = 2^{11}$ , their energy would be 79.6 meV. Cell membrane resting potential is 80 mV so that the dark microwave photons correspond to the energy of photons associated with the Josephson radiation of the  $k = 1$  scaled up variant of cell membrane in the hierarchy of  $n_F = 2^{k11}$ .

The modulating frequency would correspond to energy of .14 meV: postsynaptic miniature potentials correspond to energies of order .5 meV. Hence the dark microwave photons and corresponding dark cyclotron photons with same energy could couple directly to the quantum dynamics of the cell membrane via Josephson radiation, which corresponds to same energy at all levels of the hierarchy of scaled up cell membranes. The dependence of the cell membrane resting potential on organ would also explain the observed dependence of  $f_1$  on the organ.

This observation suggests that the Josephson junction defined by the  $k = 1$  scaled up variant of the cell membrane is not functioning properly in the sense that Josephson radiation is not generated. A possible reason is that the corresponding scaled up variant of cell membrane is absent or the corresponding resting potential vanishes so that Josephson radiation is not generated. Also the corresponding magnetic body could be absent. Microwave radiation would provide the system with the lacking Josephson radiation and the magnetic field could provide the lacking magnetic body controlling this level of dark matter hierarchy. The modulation of magnetic field of magnetic body modulates cyclotron frequencies and is basic control mechanism in the model for the hierarchy of EEGs. Hence the modulation of the magnetic field with biorhythms would provide a mimicry of this control action.

### 5.3.4 Does Priore's machine establish a lacking level in the hierarchy of bio-control

The natural guess is that the basic function of the Priore's machine is to re-establish Josephson junction at  $k = 1$  level of dark matter hierarchy, build up artificially the corresponding magnetic body, and establish the corresponding level in the hierarchy of dark EEG:s [M3]. The basic frequencies involved are cyclotron frequencies of biologically important ions, in particular bosonic ions, and most importantly the cyclotron frequency of  $Ca^{++}$  ion. This ion would be mimicked by noble gas ions.

This means that the flux quanta of the magnetic field with strength about 612 Gauss could be present in healthy tissue and contain BE condensate  $Ca^{++}$  ions and corresponding cyclotron photons. The magnetic body defined by the flux quanta of the magnetic field in question would receive information from the biological body and perform quantum bio-control. Artificial modulation of this magnetic field strength by frequency  $f_2$  and by various bio-rhythms would induce a modulation of corresponding cyclotron frequencies present also in the healthy situation and in this manner would allow Priore's machine to mimic the functioning of the magnetic body absent from the cancer tissue.

#### 1. Transformation of $k = 1$ microwave photons to $k = 3$ microwave photons

The cyclotron energy associated with  $Ca^{++}$  cyclotron frequency at  $k = 1$  level of the biological

dark matter hierarchy is below the thermal threshold. This is avoided if magnetic body corresponds to  $k = 3$  level of this hierarchy.

This would require that  $k = 1$  microwave photons should transform to  $k = 3$  level photons with frequency equal to  $\hat{f}_1 = f_1/2^{33} = 2.24$  kHz (intriguingly,  $\hat{f}_1 = f_1/2^{33} = 1.09$  Hz is a typical cyclotron frequency associated with DNA molecule which carries a constant negative charge density).

The transformation of laser photons to dark variants of cyclotron photons generated by electron Cooper pairs appear in the model explaining the recent discovery that the polarization direction of laser light of wavelength  $1 \mu\text{m}$  rotates in magnetic field of 5 Tesla [77]. The rate of rotation is by several orders of magnitude faster than the predicted rate if caused by the mixing of photon with axion [77]. The TGD based model for the phenomenon [C8] involves a transformation of the photons to dark cyclotron photons associated with electrons in the magnetic field considered with  $\hbar = 2^{11}\hbar_0$ . These photons in turn could transform to the pions of a scaled down variant of ordinary QCD in the external magnetic field via the same interaction Lagrangian as axions would do so that the experiment gives direct support for the hierarchy of QCD:s predicted by TGD. The mass of the dark pion candidate is  $\simeq 1$  meV and from the ratio of this mass to ordinary pion mass one can conclude that the p-adic length scale corresponds to  $k = 181$ .

*2. Are beta and theta bands too near alpha band for  $k = 3$  cyclotron photons?*

Alpha and theta bands result in the TGD based model of the EEG hierarchy by splitting of cyclotron frequencies due to the modulation by Josephson frequency  $f_J$ :  $f_c \rightarrow f_c \pm f_J$ . This predicts correctly the narrow resonances in theta and beta bands as satellites of cyclotron frequencies of biologically important bosonic ions most of which are in alpha band in dark magnetic field  $B_d = .2$  Gauss.

Two values of the magnetic field differing by scaling by a factor two are involved ( $B_1 = 612$  Gauss and  $B_2 = 1224$  Gauss). Also the TGD based model of EEG involves two values of the dark magnetic field corresponding to  $B_d = .2$  Gauss and  $B_d = .1$  Gauss. Alpha band for  $B_d = .1$  Gauss is at 5 Hz and during sleep only  $B_d = .1$  Gauss contributes to the EEG. This suggest that  $B_2 = 1224$  Gauss corresponds to the wake-up EEG.

From the point of view of generalized EEG the smallness of  $\hat{f}_1$  is somewhat disturbing since  $\text{Ca}^{++}$  cyclotron frequency would be 91.8 kHz for  $B_2$ . Therefore alpha band would be around  $\hat{f}(\alpha) = f_c(\text{Ca}^{++})/3 = 30.6$  kHz and theta and beta bands would be at  $\hat{f}(\alpha) \pm \hat{f}_1$  meaning that the shifts between bands would correspond to 0.5 Hz for ordinary EEG: beta and theta bands would belong inside alpha band. There are however more general options to be considered.

*3. Polygons constructible using ruler and compass and favored values of Planck constant*

The previous considerations were based on the hypothesis that only the values  $\hbar = 2^{11k}\hbar_0$  of Planck constant are possible in living matter. The recent view about the quantization of Planck constant [C8] suggests a much more general spectrum of favored values of Planck constant.

The basic prediction is that the values of Planck constant come as integer multiples of the ordinary Planck constant:  $\hbar = n\hbar_0$ . The preferred values for the scaling factors  $n$  of  $\hbar$  correspond to n-polygons constructible using ruler and compass. The values of  $n$  in question are given by Fermat integers  $n_F = 2^k \prod_i F_{s_i}$ , where the Fermat primes  $F_s = 2^{2^s} + 1$  appearing in the product are distinct. The lowest Fermat primes are 3, 5, 17, 257,  $2^{16} + 1$ . In the model of living matter the especially favored values of  $\hbar$  come as powers  $2^{k11}$ .

One might hope that also more general transformations  $f_1 \rightarrow f_1/n$  are possible such that the product  $n_F = n_{F,i}n$  characterizes the Planck constant of the magnetic body and  $n_{F,i}$  the Planck constant assignable to  $f_1$  such that  $n_F$  guarantees that the cyclotron energy is above thermal threshold.

*4. Smaller value of Planck constant at magnetic flux quanta allows non-overlapping alpha and*

*beta bands*

The more general view about quantization of Planck constant allows to consider the possibility where the value of Planck constant at the magnetic body allows a more reasonable splitting between alpha band and theta and delta bands.

1. The cyclotron frequencies of noble gas ions involved are equal to the cyclotron frequency of  $\text{Ca}^{++}$  ion playing a key role in TGD based model of living matter. The ratio of Josephson frequency  $f_J = 5$  Hz and  $\text{Ca}^{++}$  cyclotron frequency 15 Hz for ordinary EEG is 1/3 for ordinary EEG. The natural requirement is however that  $f_c \pm f_J$  is non-negative and that  $f_J/f_c$  is not too small in alpha band so that bands do not overlap.
2. If  $f_1 \rightarrow \hat{f}_1 \sim f_c/3$  is possible, the scale of the splitting of the ordinary EEG would be reproduced.  $n_F = 2^{18} \times 2^{11} = 2^{29}$  would give  $f_J/f_\alpha = 35.8/61.2 = .6$  to be compared with  $f_J/f_\alpha = .5$  for the ordinary EEG.  $n_F = 3 \times 5 \times 2^{14} \times 2^{11}$  would give exactly the same ratio.

### 5.3.5 Does Priore's machine provide the immune system with additional plasmoids?

Suppose that the immune system fails to generate plasma waves with a sufficient efficiency because of lacking sources of metabolic energy or (consequent) lack of plasmoids. Plasmoids are rotating magnetic systems and the flux quanta of the magnetic fields 612 Gauss and 1224 Gauss used by Priore's machine could give rise to these plasmoids defined as rotating magnetic field quanta carrying plasma.

The generation of plasma waves indeed requires a lot of energy if plasma frequency corresponds to a quantal energy dissipated when various ionic waves are generated. If so, Priore's machine would do a lot of things.

1. Priore's machine would create magnetic body, the rotating plasmoids,  $k = 1$  scaled up variant of cell membrane.
2. Priore's machine would establish scaled up variant of EEG including the needed cyclotron radiation and Josephson radiation and stimulate plasma wave patterns by microwave radiation at plasma frequency, and perhaps also generate temporal codewords representing control commands of the immune system by modulating microwave radiation. The minimal function of modulation would be to define temporal units defining a unique decomposition of control commands to codewords (like rhythm in music or clock in computer). The frequency of the microwave radiation could correspond to both Josephson energy of cell membrane and to the plasma frequency  $f_p = \sqrt{e^2 n/m}$ , where  $n$  is the density of Ar or Ne ions and  $m$  the mass of ion, and the irradiation might help to generate plasma oscillations. The value of  $f_p$  requires in the case of argon ( $m(A) = 40m_p$ ) the density  $n \sim 3.6 \times 10^{20}/\text{m}^3$ .  $f_p(A) \simeq f_p(\text{Hg})$  requires  $n(\text{Hg}) \simeq 5n(\text{Ar})$ . This is the case if the volume of the tube is  $V \sim .66 \text{ m}^3$  (from the knowledge that the amount of Hg is 2 millimoles).
3. Priore's machine would also provide the metabolic energy needed to achieve all this.

The dependence of the optimal value of  $f_p$  on organ would mean that the density of biologically important ions is a characteristic of organ, consistent with the resting potential of the cell membrane. If  $f_1$  corresponds to plasma frequency, if plasma frequency corresponds to energy quantum  $E_p = \hbar(k)f_p$ , and if one has  $k_{em} = 1$ , the energy quantum associated with  $f_1$  would be the Josephson energy associated with cell membrane and its scaled up counterparts with different values of  $\hbar$ .

A more precise formulation of the model goes as follows.

1. The basic function of Priore's machine is to provide immune system with additional magnetic flux quanta containing BE condensates of  $\text{Ca}^{++}$  ions or their equivalents. The fact that the cyclotron frequencies of  $\text{Ne}^+$  and  $\text{Ar}^{++}$  ions are same as  $\text{Ca}^{++}$  ions suggests that Ne/Ar cyclotron radiation helps to generate  $\text{Ca}^{++}$  BE condensates at these flux quanta by the same mechanism as in the case of induced emission. The mechanism explains also why the procedure yielding homeopathic potencies works and the mechanism homeopathic healing.
2. Plasma oscillation patterns would represent commands from a higher level of the hierarchy and help immune system in its task. If this interpretation is correct, then also living matter should contain magnetic flux quanta carrying magnetic fields of order kGauss. The model for Gariaev's findings assumes also the presence of a p-adic hierarchy of magnetic fields [29].
3. If plasma oscillations are in a key role then  $f_1 = 9.4$  GHz would naturally correspond to the plasma frequency of Ne or Ar: the modulated radiation would help to stimulate plasma oscillations and couple directly with the Josephson radiation. The simplest possibility is that the radiation contains  $k_{em} = 1$  dark component ( $n_F = 2^{11}$  and the dark microwave photons are directly transformed to plasmoid oscillations and Bose-Einstein condensates of plasma oscillations are formed. Unfortunately the density of the plasma is not known so that this remains a non-tested hypothesis. Encouragingly, the needed density is such that Hg and Ar plasma frequencies can be nearly identical.
4. The modulation by  $f_2 = 17$  MHz frequency is also essential for achieving the healing effect. According to [71], several modulation patterns are used. This suggests that there could be some kind of temporal code involved and used also by living system. Each period  $T_2$  could contain at most four memetic codewords of duration  $128T_1$  made of 127 bits of duration  $T_1$ , perhaps starting at zeros and maxima of the intensity of the modulating wave. Perhaps a more realistic interpretation is that logarithmic scale is used so powers of 2 for basic frequency correspond define separate bits. In this case the number of bits is  $\log_2(128) = 7$ . Since the number DNA triplets corresponds to 6 bits the interpretation as genetic code words with one parity bit suggests itself.

### 5.3.6 What could be the function of high energy energy electrons and X rays?

Priore's machine involves also highly energetic electrons and X rays and one can wonder also these could play some role in the metabolism of the system. Relativistic particles produced in a particle accelerator serving as a source of metabolic energy is something very difficult to imagine in the framework of elementary particle physics in single-sheeted space-time. The following considerations allow however to identify high energy electrons as providers of cyclotron energy for electrons at dark plasmoid space-time sheets created by Priore's machine.

If one allows only the hierarchy  $n = 2^{11k_{em}}$ ,  $k_{em} = 3$  is the minimal condition guaranteeing that cyclotron frequencies in the magnetic field used are above the thermal threshold. As found, this condition could be weakened if magnetic flux quanta correspond to a value of  $n_F = n2^{11}$  guaranteeing that cyclotron energies are above thermal threshold and a transition increasing the value of  $n_F$  from  $n_{F,i} = 2^{11}$  to  $n_F$  occurs for the microwave photons.

1. The cyclotron frequency of electron in the magnetic field  $B_2 = 1224$  Gauss is  $f_c(e) = 1.725$  GHz. For  $n_F = 3 \times 5 \times 2^{14} \times 2^{11}$  reproducing exactly the same relative shifts between bands as in the ordinary EEG electron's cyclotron energy at dark magnetic flux quanta is  $E_c = 7.1$  keV. Electron's zero point kinetic energy is 7.1 keV for  $k = 134 = 2 \times 67$  space-time sheet if it is .47 eV for proton at  $k = 137$  space-time sheet. For  $n_F = 2^{29}$  one would have  $E_c = 12.7$  keV. The value of zero point kinetic energy varies somewhat but the option producing exactly the same relative shifts is definitely favored.

Note that  $k = 134$  corresponds to a secondary p-adic length scale  $L(2, k)$  for prime  $k = 67$  whereas for the ordinary EEG the secondary p-adic length scale associated with  $M_{127}$  ( $k = 127$ ) corresponds to 10 Hz alpha peak.

2.  $k_{em} = 3$  predicting very small splitting between the bands of the scaled up EEG corresponds to  $n_F = 2^{33}$  and would give  $E_c \simeq 122$  keV for  $B_2 = 1224$  Gauss.  $k = 130 = 2 \times 5 \times 13$  would correspond to 128 keV zero point kinetic energy for electron: also p-adic length scales for which  $k$  is not prime are in principle allowed. For electrons the dropping from  $k = 131$ , which is prime, zero point kinetic energy would be 64 keV.

For both options the strong electric fields present in Priore's machine could provide for electrons at the dark magnetic flux quanta their cyclotron energy. This would be necessary if Cooper pairs of electrons are essential for the quantum bio-control. The strong fields used could also drive electrons to sub-atomic space-time sheet having  $k \leq 134$  and in this manner generate metabolic resources.

To sum up, if this picture is correct and if Priore's machine does not provide bio-system with exceptional metabolic resources but only contributes to the existing ones, sub-atomic length scales would contribute to the cyclotron metabolism of dark plasmoids carrying magnetic fields 612 Gauss and 1224 Gauss.

## 5.4 Fields and genes

Fields and genes could relate in several manners. Field patterns could code for genes in the sense that  $W$  MEs would induce the  $Mg^{++}$  waves activating genes. Coding of genes by plasma wave patterns would be a higher level code in which genes take the role of amino-acids and plasma wave patterns that of genes. Genes could be also expressed as field patterns: introns are good candidates in this respect. There are claims that field patterns can induce genetic modifications: perhaps there are genes coding for genetic self engineering operations.

### 5.4.1 Coding of genes by plasma wave patterns

According to the dark matter inspired vision, magnetic bodies act as intentional agents inducing processes like DNA transcription and translation. The model for the findings of Gariaev [29] led to the proposal that the radio wave spectrum emitted by DNA subject to irradiation by laser light could be a superposition of copies of EEG like spectra corresponding to various p-adic length scales. The spectrum suggests that cyclotron frequencies of  $Mg^{++}$  ions are present (25 Hz for ordinary EEG).  $Mg^{++}$  ions are indeed known to be important for the functioning of DNA. Therefore magnetic bodies could excite  $Mg^{++}$  waves use dark plasma oscillations induced by  $W$  MEs as control commands to excite  $Mg^{++}$  waves leading to the activation of various processes like translation and transcription. Perhaps even topological quantum computation like processes could occur [E9]. Each gene could be sensitive to a particular subset of  $Mg^{++}$  wave patterns and thus to a particular subset kind of  $W$  field patterns. The frequency assignable to  $W$  ME in turn correlating directly with its distance from magnetic body could be automatically select the correct group of genes.

In principle the coding of genes by plasma oscillation patterns could be context sensitive and perhaps the genome contains a subset of genes which are purely personal so that foreign magnetic bodies cannot activate them. Also the portions of hyper genes in given organism could be activated by plasma oscillation patterns characteristic for this organism. Language could correspond directly to this kind of oscillation patterns perhaps activating intronic portions of the genome to express itself in some un-orthodox manner, say processes involving RNA, field patterns, or topological quantum computation [E9].

At lower levels field codes are expected to be rather hard-wired just like computer languages or primitive languages consisting of signals. The codons of the memetic code could be realized as sequences of 21 DNA triplets at the intron level [L1] and corresponding plasma oscillation patterns might correspond directly to linguistic expressions.

If field codes are learned, the question arises whether also genetic code is learned in the same manner. Variations of the genetic code and the slight context dependency of some variants of the genetic code [L3] support the view that genetic code is probably also learned at very early stages of biological evolution. The deviations from universality would suggest that the maximization of the total information of the code occurs only locally in the space of all codes.

#### 5.4.2 Is electromagnetic information represented using genetic code?

The TGD based model of the genetic code as a single code in a hierarchy of codes results from a model for abstraction process as a repeated formation of Boolean statements about Boolean statements [L1]. This process starts from two statements (0 and 1) and gives at the first step  $2^2 - 1 = 3$  statements if one statement (represented set-theoretically by empty set) is thrown away. At the next steps one obtains by a similar procedure  $2^3 - 1 = 7$ ,  $2^7 - 1 = 127$ ,  $2^{127} - 1$ , etc. statements: the numbers of statements are obviously given by Mersenne numbers. The number of the mutually consistent statements is 1, 2, 4, 64, ... at various levels of the hierarchy and the interpretation of DNA and its conjugate as representations of mutually consistent statements and their negations suggests itself as being associated with the level  $M_7 = 127$ . There are good reasons to assume that these codes are realized in many manners in living matter and can represent all kinds of information.

Smith gives in his article support for the existence of seven bit electric code emerging already at the level of frequency imprints in water making possible arithmetic operations for the external frequencies imprinted to water [27]. The seven bit character of the code brings in mind the hierarchy of genetic codes predicted by TGD [L1] and encourages the conjecture that the sequences of 7 vacuum current pulses with single pulse representing either zero or one should provide an electromagnetic realization of the genetic code and its conjugate each consisting of 64 different pulse sequences and that a sequence and its Boolean conjugate represent command and its time reversal.

In his talk about water memory effects related to homeopathy Cyril Smith reported in CASYS2001 conference [27] evidence for a context dependent 7-bit coding of binary arithmetic operations (addition, subtraction, multiplication and division) of two source frequencies, call them  $f_1$  and  $f_2$ , giving as a result the imprinted frequency  $f(f_1, f_2)$ . The experimental arrangement involves two frequency sources ( $f_1$  and  $f_2$ ) contained by beakers, a pulse generator and the 'receiver'. The arithmetic operation determining the frequency imprinted into water as a function  $f(f_1, f_2)$  of  $f_1$  and  $f_2$  is coded by a pair of pulse sequences consisting of 7 pulses with 1 and 0 represented by the polarity of the electrical pulse.

1. For instance, when the beakers and receiver are (in this order) along East-West axis (Earth's magnetic field is important!) and connected serially to the pulse generator, the pulse sequence 1001001 1111111 codes for addition. When the receiver is replaced between the beakers connected to the pulse generator in a parallel manner, multiplication results.
2. When the beakers are in East-West direction and coupled serially to the pulse generator, 1000001 1111111 codes for subtraction. When the beakers are along North-South axis, the same sequence codes for division.  $f_1/f_2$  or  $f_2/f_1$  results depending on the order of the frequency sources connected in a serial manner to the pulse generator.
3. When the latter sequence 1111111 is replaced by 0000000, the imprint is in the 'opposite phase' (biologically depressive instead of being stimulatory). Thus the latter sequence might

tell whether genetic code or its conjugate is used and thus whether the imprinted frequency represents command or its time reversal realized as a reference wave giving rise to a hologram.

What one can conclude about the general structure of the code on basis of these experimental evidence?

1. The result of the arithmetic operation is context dependent and thus not coded completely by the binary sequence. As a consequence, single bit can code for the binary operation in question and 3+3 bits can be used to code for additional operations acting on each of the two arguments.
2. The structure of the code word should reflect the structure of the binary arithmetic operation, which is quite generally of form  $(f_1, f_2) \rightarrow X f_1 O Y f_2$ , where  $O$  denotes  $+$ ,  $-$ ,  $\times$  or  $/$  and  $X$  and  $Y$  are operations acting on the arguments  $f_1$  and  $f_2$ .
  - i) The requirement that the time reversal of the bit sequence also codes for a binary operation fixes the general structure of the codeword to be  $XOY$  where  $X$  and  $Y$  have same length and  $O$  is thus in the middle of the codeword.
  - ii) The context dependence of the operation implies that  $O$  can be represented by a single bit.  $O = o_1$  in the middle of the codeword is indeed invariant under the time reversal.  $O = 1$  signifies addition or multiplication whereas  $O = 0$  signifies subtraction or division.
  - iii) The 3-bit sequences  $X = x_1 x_2 x_3$  and  $Y = y_1 y_2 y_3$  should code for the possible operations performed for the arguments. Note that the number of bits is same as that for the codewords at the level  $M_3 = 7$  below  $M_7 = 127$ . For commutative operations like  $+$  and  $\times$  the time reversal of the codeword obtained by changing the order of the bits in the command should yield the same end result. This is the case if the time reversal  $Y = X_T$  of  $X$  obtained by reversing the order of bits in  $X$  has the same effect on  $f_2$  as  $X$  has on  $f_1$ .  $X = 100$  and  $Y = 001$  appearing in the operations are indeed mirror images and have interpretation as identity operations. Besides identity operation 7 additional operations for the arguments are predicted to be possible (this brings in mind octonion units). Clearly, the pairs  $(X, Y)$  of operations correspond to 64 DNA code words and the arithmetical operation itself corresponds to the 7:th bit in the middle of the codeword.
  - iv) The proposed structure of the codeword is consistent with the data reported in [27]. In particular, the symmetry of the sequence 1000001 coding for a division with respect to the reversal of the bits is compensated by the asymmetry induced by the exchange of the beakers. In the case of subtraction the change of the order of beakers should change the sign of the imprinted frequency: does this mean that the effect of resulting frequency is changed to its time reversal?

Of course, one can pose several critical questions relating to the experimental arrangement. Has it been tested how the situation changes when the direction of the linear arrangement is not East-West or North-East? Does the outcome of the operation change continuously in this kind of operation? In how wide a range of frequencies the coding of the arithmetic operations has been verified? However, the mere demonstration that

1. the structure of the pulse sequences consisting of a pair of 7 pulses determines the imprinted frequency as function  $f(f_1, f_2)$  of the source frequencies  $f_1$  and  $f_2$  and that
2. the effect of this frequency is changed from stimulatory to depressive by the binary conjugation of the binary sequence is consistent with the view that a realization of the genetic code by electromagnetic pulse sequences is in question and that reference wave and its phase conjugate induce opposite biological effects.

### 5.4.3 Is it possible to transfer genetic information using field patterns?

The work of Yu. Chen Kangeng gives evidence that the transfer of the genetic information by electromagnetic means is possible [51]. According to [52], where the method is summarized, the successful transfer of the genetic information from a donor bio-system to an acceptor system was achieved via high-frequency electromagnetic fields feed repeatedly through the optically-active donor bio-system and then delivered over a long period of time to the receiving bio-system in its early developmental stages. The hybrids created through the irradiation of eggs and seeds with such "genetically loaded" fields are claimed to show very specific mixed characteristics that were transferred to the next generation without need for further irradiation.

It would seem that the donor genome or parts of it are imprinted to the electromagnetic field pattern in the process and that this field pattern is able to modify the target genome.

Nothing precludes the possibility that genes/supergenes/hyper genes at some level of dark matter hierarchy can also code for genetic self engineering since these activities are after all very similar to other genetically coded bio-chemical activities. The computer analogy would be programs writing programs. The engineering genes would be activated by  $W$  MEs inducing plasma oscillation patterns. The claimed effects could be understood if the interaction with genetically imprinted electromagnetic field pattern activates genes inducing genetic self engineering yielding the genetic modifications consistent with the pattern represented by the em radiation.

Magnetic body would receive information about the desired outcome as electromagnetic field patterns emitted by other organisms, most naturally members of the same species. If these modifications are successful, the magnetic body is exposed to this information for long enough time to react and activate  $W$  MEs inducing the genetic program inducing the genetic program leading to the suggested genetic modification.

Hyper-genes integrating groups of organisms to larger wholes would be naturally involved with the mechanism. This mechanism would guarantee a rapid propagation of successful genetic modifications to the entire population and would be much more effective than the slowly occurring selection of random mutations. The possibly existing genes responsible for the genetic self engineering could be also introns and express themselves by activating nuclear RNA and process like reverse transcription.

The mechanism could explain the findings of Sheldrake about learning at the level of species. The observed rather recent emergence of 223 new genes into human genome [19, 20] could be understood as a genetic self engineering rather than genetic engineering by more advanced civilizations as suggested in [N3] (note however that the higher levels of dark matter hierarchy can be also regarded as "more advanced civilizations"). A further quite recent mystery discussed in [L1] is that corals seem to possess genes responsible for higher level psychological functions in mammals [21]: it is very difficult to understand this as an outcome of selective pressures combined with random mutations. The proposed mechanism might explain these genes as a result of genetic engineering.

The basic ingredient of the coral backbone is calcium carbonate  $CaCO_3$ . Salt is in question so that also  $Ca^{++}$  and  $CO_3^{--}$  ions are present.  $Ca^{++}$  could obviously give rise to Calcium waves.  $CO_3^{--}$  has atomic weight  $A = 60$  with cyclotron frequency 10 Hz for the nominal value of the Earth's magnetic field. This frequency defines the fundamental biological rhythm and characterizes also memetic code. It characterizes also effectively 2-dimensional waves closed inside the ionospheric cavity: for  $l^{th}$  harmonic the frequency is  $f = \sqrt{l(l+1)}/2\pi R_E$ ,  $R_E$  Earth's radius, and  $l = 1$  gives 10 Hz frequency. Could the transfer of the genetic information in the Earth's length scale with 126-bit memetic codons be realized as ripples 10 Hz waves make possible genetic self engineering of coral genome?

During the early developmental stages the genome might be plastic enough to allow genetic self engineering. The genetic modification during this period also the most rational option since this gives the best guarantee that the modifications are transferred to the offspring.

#### 5.4.4 Could genes be expressed in terms of field patterns?

The previous considerations assume that genes are activated using field patterns. It is also possible to consider the possibility that genes are expressed in terms of field patterns. Introns which are chemically silent are excellent candidates in this respect and the notion of memetic code relies to the idea that intronic portions of genome consist of sequences of 21 DNA triplets defining memetic codons expressed electromagnetically. This would also fit nicely with the hypothesis that introns correspond to hyper genes. Note however that introns could also express themselves by activating processes involving nuclear RNA, in particular genetic self engineering. Even process like topological quantum computation can be assigned to introns.

### 5.5 Magnetic mirrors, remote viewing and remote healing

Magnetic mirrors formed by the magnetic flux tube-ME pairs occur in many different contexts in TGD inspired theory of consciousness. Magnetic mirrors of length of order light life appear in the model of long term memory (when I, that is my magnetic body, looks at sufficiently distant mirror I see the me of the geometric past). Magnetic mirrors are crucial for the model of the sensory canvas and there seems to be no sharp difference between different types of memory which suggests that there is an entire hierarchy of memories in various p-adic time scales.

Dark matter hierarchy provides a classification for the memories in terms of the level of the dark matter hierarchy [M3], and it is possible to identify the time scale of sensory experience as a very short term memory with time of .1 seconds (in accordance with the findings of Libet), minute scale short term memory, a memory with a time scale of days, and what is usually regarded as long term memory in terms of the levels of the dark matter hierarchy.

Magnetic mirrors play a key role in the model of frequency imprinting and provide a general molecular recognition mechanism as well as model for how sensory percepts are communicated to the magnetic body and how magnetic body performs motor actions. Magnetic mirrors allow also a generalization of many-sheeted DNA so that magnetic mirrors represent genetic information in electromagnetic form.

The wide applicability of the magnetic mirror notion suggests in accordance with the fractality of consciousness that various functions associated with the magnetic mirrors are aspects of the same basic phenomenon. Magnetic mirrors would thus provide sensory canvases, long term memory mirrors and recognition mechanism at all length scales. Even many-sheeted DNA would possess sensory canvas and long term memories, perhaps an entire hierarchy of them. One can even consider the possibility that our long term memories are average over those associated with genes associated with various neurons!

Nothing in principle precludes the possibility that magnetic mirrors can also serve as bridges between different organisms: even the notion of organism must be generalized if the idea of multi-brained magnetic selves is taken seriously. The notions of super- and hyper genes give a concrete content for this generalization [L2, M3]. This could make possible effects similar to observed at DNA level (such as self assembly and translation of RNA to proteins). Why this kind of telepathic bridges are rarely realized in the post-modern society can be understood as a result price to be paid for the gradual individualization taken place during evolution from bacteria to bicamerality to modern consciousness: in the era of market economy it would not be wise to allow a direct access to your personal consciousness from outside.

#### 5.5.1 A general model for remote viewing and healing

The last observation suggest also a general model for the phenomena like remote viewing and healing defying standard science explanations (see the article of Lian Sidorov [31]). One healing method goes under name Qigong (see the article [53]). Qigong is a general term for a large

variety of traditional Chinese energy exercises and therapies. Qigong is generally considered as a self-training method or process through Qi (vital energy) and Yi (consciousness or intention) cultivation to achieve the optimal state of both body and mind. The traditional Chinese medicine postulates the existence of Qi, which could be regarded as a kind of subtle energy circulating around the physical body.

In TGD framework the energy associated with MEs and supra-currents flowing along magnetic circuitry would be a natural counterpart of Qi. Yi would in turn would translate to p-adic cognitive representations representing also intentions, perhaps p-adic variants of MEs. Internal Qigong refers to self healing whereas external Qigong means directing Qi energy or intention to help others by opening Qi blockages or inducing the sick Qi to get out of body, or helping to achieve Qi balance. The physiological, chemical and electromagnetic effects of both internal and external Qigong have been studied ([31] contains large number of related references). Also the effects of Qigong healing on cancer has been studied [53].

Skeptics tend to eliminate these effects from their consciousness simply by denying their reality or claiming that only placebo effects are in question. The deep irony is that placebo effect represents a basic example of this kind of effect. The basic psychological reason for this reactive attitude is very simple: only the understood phenomenon is an existing phenomenon. In TGD framework these phenomena can be indeed understood using a model generalizing the vision about endogenous bio-control so that the sender and receiver of the control signal can be different organisms. Thus independently whether the claimed effects are replicable not, this kind of effects are more or less predicted by TGD framework.

The general model for remote viewing and healing is roughly following.

1. Magnetic mirrors connecting the sender and receiver make possible a universal mechanism for the transfer of intent (Yi) and action (Qi). p-Adic MEs represent the transfer of a mere intent and real MEs represent a transfer of action. p-Adic ME can be transformed to real ME either by receiver or some higher level magnetic self.
2. The transfer of intent gives rise to a healing mechanism which can act both endo- and exogenously. ME-magnetic flux tube pairs characterized by their fundamental frequencies make possible bridges between healer and healee and allow a resonant interaction in which healer can initiate various control commands or 4-dimensional templates represented as holograms. Also smaller MEs can be send along these MEs serving as bridges (this is like throwing balls with light velocity!).
3. The ME-magnetic flux tube pair connecting healer and healee acts as a reference wave which can initiate an arbitrarily complex hologram representing biological program. Healer has the ability to generate and amplify the frequencies which induce holograms representing the control commands. In particular, healer can initiate complex biological programs without knowing anything about their functioning.
4. It is quite possible that also multi-brained and -bodied higher level magnetic selves actively participate in the process.

### 5.5.2 Dark matter hierarchy and remote mental interactions

The ideas inspired by dark matter hierarchy allow a concretization of these ideas.

#### 1. Charge entanglement as basic mechanism of remote mental interactions

The sharing of mental images could quite universally involve charge entanglement by  $W$  MEs so that remote mental interactions, the basic mechanism of intentional action, and exotic weak interactions would be very closely related.

Negative  $W$  MEs become also a basic tool of intentional interaction and the active party could in principle use the body of the subject person to realize his intentions. Hypnosis could rely on this mechanism. This could occur also in the case of healing, and the generalized motor commands would include gene expression. The body of the healee would provide the metabolic energy in this case.

There is a mental disorder in which patient mimics with an amazing authenticity the gestures of persons which she does not know beforehand. The neuro-scientific explanation would probably relay on exceptionally active/abundant mirror neurons. One can imagine two alternative quantum explanations: either the motor areas of the patient quantum entangle with those of the object of mimicry or the magnetic body of the object entangles with the motor areas of patient, whose magneto-immune system fails for some reason.

If the code defined by the proposed map of plasma oscillation patterns mediated by  $W$  MEs to generalized motor actions (induced by ionic waves) is not universal, the healer must use only the universal part of the code, be able to learn the personal code of the healee, or act with the mediation of collective levels of self hierarchy able to utilize "multi-person" codes. The universality might fail only at the higher levels of dark matter hierarchy where organisms become individuals.

### *2. Time mirror mechanism as energy source*

The healee can suck metabolic energy from the healer by time mirror mechanism, that is by sending neutral negative energy MEs received by the healer or possible third party.

Remote mental interactions affecting non-biological targets would rely on same mechanisms, in particular charge entanglement by  $W$  MEs. For instance, capacitors with voltage near to a dielectric breakdown might be sensitive targets of remote mental interactions. The model of Priore's machine suggests that remote mental interactions could affect and even generate plasmoids in rotating plasma.

### *3. Hierarchy of time scales associate with remote mental interactions*

It is possible to assign to the remote mental interactions a hierarchy of time and length scales and in time scales shorter than human life cycle there are seven levels involved. This brings in mind chakra hierarchy. Since magnetic bodies at levels  $k_{em} \geq 4$  have astrophysical size scale, the distance between the biological bodies of the healer and healee does not matter at these levels. The time scale remote viewing process would correspond to the time scale of entanglement identifiable as the time scale of the generalized EEG involved.  $k_{em} = 6$  would correspond to a time scale of few days and  $k_{em} = 5$  to a time scale of few minutes.

## **5.5.3 Comparison with data**

The model of remote healing and vision proposed above seems to conform with the findings described in [31] (the URL references of this article provide a comprehensive source of background data).

### *1. Coordinate healing and healing using adjunct*

The basic observation [31, 54] is that there are two classes of transfer of intent (including remote healing and vision as special cases).

1. The target is found by the remote healer or viewer being given a name, location, birthdate, etc. What is strange is that this information need not have any conscious meaning for healer. This can be understood if multi-brained magnetic selves are involved with the process so that it is enough that the information has meaning for some brain involved. The well-documented effects of prayer groups (see [54] which gives various aspects of spiritual healing) could be understood if the higher level selves receiving information from all prayers are

actively engaged in the process. Also a coherent amplification of the effect (the so called Maharishi effect in transcendental meditation proportional to the square of the number of participants) would be involved.

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

### *2. The role of imagery*

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

### *2. Two kinds of healing mechanisms seem to be involved*

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

### *3. Distance does not seem to matter*

The model explains also how healing effects can be achieved over distances of thousands of miles. The basic characteristic of MEs is that they allow a directed propagation of classical energy without attenuation (Maxwell's equations do not allow this kind of solutions). Thus, if magnetic mirrors serve as bridges between the sender and receiver of intent, the high precision communication of intent does not look mysterious.

Lian Sidoroff [31] mentions the experiment performed by M. Sue Benford et al. (unpublished), where exposing half of a hair sample to a non-ionizing radiation produced radiographic film exposure underneath the other half of the sample, located many miles away. The explanation of this effect must be based on macroscopic entanglement. The basic idea is that the effect is analogous to spin measurement in Einstein-Rosen-Podolski experiment: that is, the measurement of the spin of an electron fixes the spin of the electron entangled with it. The simplest explanation that come in mind are following.

1. The exposure to the non-ionizing radiation reduced charge entanglement by dark  $W$  MEs between the two halves of the the sample and that the resulting exotically ionized state produced the radiation leading to the exposure of the film.
2. In another experiment of Sue Benford [74] (to be discussed in the next section) the intentional action of the experimenter is reported to induce dots and tracks in the photographic emulsion. It is not possible to exclude the possibility that the subconscious intentional action of the experimenter might have produced the exposure also in this experiment.

Variants of this experiment could provide a justification for the notion of macroscopic quantum entanglement. In particular, charge entanglement by  $W$  MEs could in principle be demonstrated

by proving so simultaneous generation of opposite charges by state function reduction that it cannot be explained in terms of em currents flowing with sub-luminal velocity.

#### 4. *Supra currents in astrophysical length scales as an alternative for charge entanglement*

A competing explanation for genuinely nonlocal generation of charge is charge transfer by supra currents along magnetic flux quanta. One could test also the hypothesis of super-conductivity in macroscopic length scale by using variant of this kind of experiment. For instance, a variant of this test is based in the addition isotopes of selected ions to other half of the sample and finding whether the fraction of ion isotopes increases in the second half of the sample located, say, at the second side of the globe. That supra-currents could flow in these length scales is in consistency with the magnetic sensory canvas model.

The model for auroras as an astrophysical quantum phenomenon discussed in [J1, J2, J3] relies on the assumption that the magnetic flux tubes of both earth's and solar magnetic fields are super-conductors (solar wind would thus flow as supra currents). A topological model for the crucial reconnection phenomenon of the magnetic field lines of earth's and solar magnetic fields results. Recombination is accompanied by the leakage of the supra currents to nonconducting space-time sheets through join along boundaries bonds: this mechanism is a good candidate for a universal mechanism leading to breakdown of super-conductivity and is presumably involved with a wide class of atmospheric phenomena like lightnings, ball lightnings, tornadoes, etc.. The model allows to identify the mechanism generating the electric fields responsible for the acceleration of ions eventually giving rise to auroras via collisions with the ions of the ionosphere.

What is fascinating that the sounds claimed to be heard during auroras but not measured by micro-phones might represent genuine extrasensory percepts resulting from the perturbations of the magnetic auditory canvas caused by the auroras. The breakdown of the super conductivity might even correlate with the loss of consciousness reported to sometimes occur during perceiving auroras. This picture encourages to think that weather phenomena, in particular thunder storms, relate to our consciousness also in extrasensory manner.

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

There is evidence that healers can affect the em frequency spectrum of water. In [31] examples of these effects are listed: the Raman spectra of water can be influenced from a distance up to 1900 km; the polarization angle of He-Ne laser can be affected by so called waiqi method; the IR spectrum (hydrogen bonds) of sterile water changes in the proximity of therapeutic touch practitioners. Experiments do not support the hypothesis that the time of exposure correlates with the intensity of the effect. On the other hand, the treatment time of adjuncts is known to be an important factor in the distant healing. Also the UV spectrum of the water treated by healers differs from that for control samples.

It is not difficult to understand these effects in terms of  $W$  entanglement inducing an exotic ionization of dark Bose-Einstein condensates in turn inducing electric fields at the level of ordinary matter (recall the many-sheeted version of Faraday's law). Atoms with exotically ionized nuclei behave effectively like isotopes and have thus slightly different energy levels than their ordinary counterparts. This could serve as a test for the presence of exotic ions. Same applies to exotically ionized molecules.

The effects at UV frequencies could involve MEs with lengths shorter than  $10^{-7}$  meters are involved and produced in de-coherence of dark photons to ordinary photons. Micro-tubules in UV length scale range are natural candidates for being accompanied by  $k_{em} = 0$  UV MEs (for instance, the receptors in retina contain micro-tubuli in UV wave length range). The cell membrane could contain an array of MEs of length  $L(151) = 10$  nm parallel to lipids whereas genes should involve also MEs with lengths corresponding to the wave lengths of visible light [28].

Especially interesting wave lengths for bio-photons in IR-UV range are the p-adic length scales  $L(151) = 10$  nm,  $L(157) = 80$  nm,  $L(163) = 640$  nm, and  $L(167) = 2.52 \mu m$  which all correspond to

Gaussian Mersenne primes (Mersenne primes are in a preferred role in elementary particle physics: all charged leptons, nuclei, hadrons and intermediate gauge bosons correspond to ordinary or Gaussian Mersennes). That these primes span all p-adic length scales between cell membrane thickness and cell length scale could be the number theoretic correlate for the miracle of life. Needless to emphasize, the finding that these frequencies are biologically special frequencies would give an enormous boost for TGD approach.

According to the original model the transfer of intent could involve sending of MEs with short lengths, say in UV or IR range: this would be like throwing a ball to a tunnel. The model based on de-coherence of dark MEs does not seem to require this. Be as it may, these MEs would move inside larger MEs forming the bridge between sender and receiver.  $L(163) = .640 \mu\text{m}$ , which is in the lower end of the visible portion of photon spectrum (.4 – .7  $\mu\text{m}$ ) and thus corresponds to red light, equals with .6 per cent precision with the wave length  $\lambda = 644 \mu\text{m}$  associated with photosynthesis by chlorophyll b) and with 6 per cent precision to the wave length  $\lambda = 680 \mu\text{m}$  associated with the photosynthesis by chlorophyll a). Could it be that magnetic mirrors with these wave lengths amplify photosynthesis by first amplifying the incoming visible light in a resonant manner?

### 6. Exotic weak force and biology

The basic prediction of TGD is entire hierarchy of exotic electro-weak and color physics corresponding to preferred p-adic length scales. These p-adic physics in turn involve dark hierarchy. It is clear that dark variants of exotic weak bosons would play key role in living matter. There is evidence that exotic weak interactions is involved with remote mental interactions. According to [55], even radioactive decay rate of Am241 has been influenced by intent. There is evidence also for weak interactions in astrophysical length scales. The lifelong work of Russian scientist Shnoll demonstrates the fluctuations for the rates of various chemical and radioactive processes vary with periods related to astrophysical phenomena (see [73] and [G1]. Exotic weak forces would also explain also the mysterious chiral selection occurring in living matter. These observations together with other applications of exotic weak forces encourage to think that weak MEs could have an important biological role.

Ordinary neutrinos seem to correspond to  $k = 13^2 = 169$  space-time sheet. The quantum model of hearing revised so that it is consistent with the vision about dark matter [M6] forces to assume the existence of exotic neutrinos with  $k = 127$  space-time sheet (electron length scale) coupling to  $k = 113$  weak bosons. This encourages a generalization: perhaps leptons and quarks can reside in many length scales: for instance, at the space-time sheets  $k = 151, 157, 163, 167$  corresponding to the biological Gaussian Mersennes. This assumption does not imply any conflict with what is known about weak and color interactions, in particular asymptotic freedom, since the bosons of different physics would couple directly only to the particles of their own physics.

There are several reasons to suspect that above atomic length scales several p-adic length scales can define copies of electro-weak and color physics and their dark variants. This is actually not new finding. The masses of low lying hadrons can be understood if the p-adic prime  $p \simeq 2^k$ ,  $k$  integer, characterizing quark can depend on hadron [F4]. The poorly understood aspects related to the determination of top quark mass suggest that the p-adic length scale assignable to quarks can vary in a wide range [F5]. Also the mass scale of neutrinos seems to depend on environment [F3, F5]. In condensed matter physics the huge variations of electrons effective mass might be partly due the variation of the p-adic length scale assignable to electron.

### 7. The role of the magnetic fields

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

frequently measured in the proximity of healers. This is easy to understand if MEs and magnetic fields form magnetic mirrors so that presence of either makes the presence of another probable. For instance, magnetic fields could stimulate the formation of plasmoids.

*8. The transfer of intent has EEG correlates.*

In one class of experiments described in [31] the sender and receiver are located separately in sensory shielded rooms and extrasensory transfer of information is attempted while both sender and receiver are connected to electroencephalographs. The sender transmits his intent during randomly selected intervals and receiver attempts to guess the moments of transmission. Experiments demonstrate no conscious ability to guess the moment of transmission. However, a statistically significant correlation between the actual sending time and the alpha wave amplitude was found in the receiver.

Alpha wave synchronization was detected between pairs of qigong masters and their receivers even when they were separated by a distance of 4 km. A possible interpretation is that the low frequency part of EEG, in particular alpha band (perhaps Schumann frequency) are used by the higher level multi-brained magnetic selves which act as relay stations receiving the intent of the sender and communicating it to the receiver. That alpha band is involved fits nicely with the fact that the cyclotron frequencies of most biologically important bosonic ions are in alpha band. Note that the energies of dark EEG quanta are above thermal threshold for  $k_{emg} \geq 4$ .

This hypothesis is also natural since Schumann frequencies are associated with the oscillations of the magnetic flux quanta also representing sensory canvases and magnetic components of our selves (the quantum energies assignable to Schumann frequencies  $f_S$  would come as  $E_S(k) = \hbar(k)f_S$ ). Note however that for the complex structures formed by the magnetic flux tubes of Earth's magnetic field also other resonance frequencies than Schumann frequencies are expected. The time lapse between the sending and onset of the unconscious physiological response in the receiver was found in these experiments to vary in the range 10–17 seconds: this would suggest that  $k_{em} = 5$  level of the dark matter hierarchy is involved. This corresponds to p-adic length scale of order 3 – 5 Gmeters. Perhaps magnetic mirrors with length in the time interval of 5-8.5 light seconds are involved.

## 6 The role of dark micro waves in living matter

It has already earlier become clear that microwaves play a fundamental role in living matter and I have performed a considerable amount of work in attempts to integrate various ideas to a coherent overall view. The ideas about dark matter hierarchy provide new insights to the problem although much remains to be understood.

### 6.1 Dark microwaves and metabolism

Already the model for plasmoids leads to the idea that microwave photons could serve as 'food' of plasmoids. The basic objection that microwave photons have sub-thermal energies can be circumvented when microwave photons are dark.

#### 6.1.1 Are dark microwaves produced in protein dynamics?

Micro-waves are produced by the protein conformational dynamics and the rotational transitions of water molecules and their clusters might mimic and amplify the rotational spectra of molecules. This could provide a first principle explanation for why one encounters microwaves in so many strange phenomena related to living matter.

In the most conservative approach, the internal degrees of freedom for atoms and molecules cannot be dark so that the conformational dynamics of proteins could not produce dark photons. It is however good to avoid too strong prejudices at this stage, and one can indeed imagine the existence of the dark counterparts of atoms and molecules having the same energy spectrum as ordinary atoms. One can also imagine what might be called  $N$ -atoms and  $N$ -molecules for which the spectrum of transition energies would be scaled up by a factor  $N \leq \lambda^k$ ,  $\lambda \simeq 2^{11}$  and the emitted photons would have  $\lambda^k$ -fold MEs as space-time correlates and could decay to bunches of  $N^k$  ordinary photons.

If this picture makes sense, the conformational and rotational dynamics of DNA and proteins could produce dark microwave photons at arbitrarily level of dark matter hierarchy. One can argue that the idea about  $N$  molecules literally on top of each other from the point of view of  $M^4$  factor of imbedding space looks rather strange. On the other hand, nothing strange is involved if one looks the situation at space-time level. Here only the experiment can decide and the claims of Randell Mills [72] might be seen as an experimental support for the notion of  $N$ -atom in the case of hydrogen.

### 6.1.2 Dark microwaves as metabolic currency

If the intensity of the magnetic field is of about .2 Tesla, which by the quantization of magnetic flux corresponds to the p-adic length scale  $L(157)$ , (80 nanometers), electronic cyclotron transitions generate micro-waves and the system can thus generate its 'food' itself. Also dark microwave photons can result in this manner.

Also the liberation of zero point kinetic energy in the dropping of protons and ions from  $k = 151$  to larger space-time sheets generates micro-wave radiation and could be an essential part of the self-organization. In this case however the microwave photons would be ordinary photons and have sub-thermal energy.

The conformational and rotational dynamics of proteins provides a further mechanism producing microwaves and if the notions of inherently dark atom and molecule make sense this dynamics could produce metabolic energy utilizable by plasmoids.

### 6.1.3 Micro-wave MEs as bridges between space-time sheets

The earlier model for various phenomena discussed in this chapter emphasized the breaking of super-conductivity induced by a transfer of particles between super-conducting and non-super-conducting space-time sheets. In the recent framework the breaking of dark super-conductivity could occur by a phase transition to the ordinary phase. If the atoms and molecules are dark only in the sense they are ordinary particles topologically condensed on dark space-time sheets, their identity is not affected by the process. The mysterious appearance of atoms to places where they should exist is a signature of the phase transition. Sue Benford has documented this kind of phenomenon to be discussed later.

The transfer of charged particles between space-time sheets is possible provided join along boundaries bonds connecting the boundary of a smaller space-time sheet to the boundary of a larger space-time sheet are generated [J1, J2, J3]. Particles simply flow along this bond connecting the space-time sheet to the larger space-time sheet, say magnetic flux tube, and also vice versa.

One can imagine various kinds of join along boundaries bonds and also MEs could act as bridges allowing particles to flow between different space-time sheets. In this case the acceleration of the charged particle in the electric field of ME gives it energy so that the mechanism could act also as a metabolic mechanism. In particular, MEs could drive protons from large space-time sheets to  $k = 137$  space-time sheets by providing them with the energy of about .5 eV of metabolic energy quantum. Same applies to electrons.

The transfer could occur in several steps.

1. Quantum-classical correspondence suggests that it should be possible to understand how absorption of photons corresponds to the process in which the 'bridges' are generated by MEs. MEs carry transversal electric field 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.
2. By generalizing the quantization of the 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 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 how 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.
3. The proposed classical picture implies that ordinary micro-wave MEs can induce the transfer of ions to  $k = 149$  and  $k = 151$  space-time sheets and the transfer of electrons to  $k = 157$  space-time sheets. The bridge generated by ME is expected to have a width given by atomic length scale. A good guess is that the thickness of MEs is given by the exotic weak length scale involved with the level of dark matter hierarchy in question. For the dark weak bosons  $W(13, k_W = 1)$  weak length scale would correspond to the atomic length scale. Note that one must distinguish between  $k_{em} = 0$  photons according to which electro-weak physics they belong to. The de-coherence of dark microwave MEs with  $k_{em} = 1$  could generate ordinary MEs corresponding to .5 eV metabolic energy quantum: the corresponding wavelength is  $\lambda \simeq 5$  mm.

## 6.2 Poorly understood effects related to micro-waves

Micro-waves span the wave length range 1 mm–30 cm corresponding to the frequency range 300–1 GHz. There is support for the importance of micro-waves for living systems coming from various anomalous phenomena involving micro-waves. The connection with homeopathy has been already discussed and this discussion will not be repeated.

### 6.2.1 Microwave hearing

Micro-wave hearing [58] is a phenomenon in which micro-waves in the frequency range .2-3 GHz (wave length range 150-10 cm) induce hearing sensation.

The basic features of the microwave hearing are following.

1. There is evidence that ears are not involved with the micro-wave hearing [59]. The average pressure of the radar wave at the threshold of hearing is roughly three orders of magnitude less than the average pressure of a sine wave in air at the threshold of hearing air waves.
2. The location of the most sensitive area for hearing radar is remote from the ears, on top of the head.
3. The subjective frequency spectrum seems to include higher frequencies for radar hearing than for normal hearing of air waves.
4. The direction from which sound is experienced to arrive does not change as the head is turned around in the radar field.

For dark microwave photons the energies of photons would be higher by a factor  $\lambda^k$  and much above the thermal threshold which could explain the strong physiological effect.

Brain space-time sheet has correct size scale to serve as a receiving (dark) micro-wave antenna: it could also act as active radar generating (dark) microwave photons. That the most sensitive region is at the top of head, would conform with the assumption that dark microwave MEs modulated by audible frequencies induce the formation of plasma oscillations and these generate the sensation of hearing directly. This would suggest that the sensory input in ears could also generate microwave plasmoids as auditory mental images.

Microwave hearing allows to interpret the auditory hallucinations of schizophrenics as messages from various magnetic bodies, not necessarily the personal ones. Perhaps the immune system of schizophrenic fails to eliminate communications from non-personal magnetic bodies. Microwave hearing could also be involved with "God's voice" which according to the theory of Jaynes was a key element of the bicameral consciousness [24, N6]. That micro-wave hearing could also explain the strange buzzing sounds reported by the witnesses of the Fatima apparitions, which served as a clue to the TGD based model of this phenomenon [N1].

### 6.2.2 Microwave static and taos hum

Micro-wave static is a strange phenomenon starting after sunset and ceasing after sunrise. It is known to be of biological origin. Taos hum [80] is in turn a painful auditory experience resembling the sound of diesel engine having all physiological correlates of the ordinary hearing sensation although it has not been possible to detect the sound using microphones. The heard sound also reflects the geometric properties of the acoustic environment.

The interpretation in terms of microwave hearing suggests itself [M1]. Microwave static has a strong correlation with taos hum [80]: taos hum begins and ends at same time. Physiological evidence suggests that microwave static can generate a response in the entire body of the patient. Perhaps the electromagnetic immune system of the patient is unable to censor out the microwave static.

The fact that delta band of EEG dominates during deep sleep suggests a possible correlation with microwave static. Microwave static could be generated by the de-coherence of dark photons in delta band. Dark photon with frequency 1.5 Hz and  $k_{em,1} = k_{em} + 3$  corresponds to dark 300 GHz microwave photon at level  $k_{em}$  and ordinary EEG would with  $k_{em} = 4$  would give rise to  $k_{em} = 1$  microwave photons the energies of which are above thermal threshold for  $f \geq 1$  Hz. It is also possible that microwave MEs possess negative energy so that they suck metabolic energy from the victim.

### 6.2.3 Tectonic lights and microwaves

Observations interpreted in terms of UFOs are often made near the lines of the tectonic activity and they could represent a life-form using the tectonic dark micro-wave photons energy as their 'food' (quartz crystals generate micro-waves) and therefore following the micro-wave beam emanating from the spot of the tectonic activity. This would explain their random looking butterfly like motion as being due to the random variation of the direction of the microwave beam. The de-coherence of dark microwave photons to ordinary photons having  $k_{em} = 1$  could in turn explain the observed but hard-to-understand luminous phenomena associated with tectonic lines.

## 6.3 X-ray images and remote realization of intentionality

M. Sue Benford has discovered rather fascinating and puzzling phenomenon in which some unidentified mechanism causes dots and tracks of size of order millimeter to X ray film [74]. The interpretation in terms of tracks of ordinary charged particles is not possible. The intention of the

experimenter or subject person seems to be strongly involved as well as a non-local information transfer. In particular, the emotional state affects the size of the dots. What makes these experiments so fascinating is that they dramatically differ from the ideal Cartesian experiment in which experimenter's mind does not affect the result of experiment in any manner.

These experiments provide support for the many-sheeted space-time concept of TGD and for a concrete remote realization of intentions as changes on X ray sensitive film by a mechanism involving micro-waves also associated with the conformational dynamics of bio-molecules such as proteins. The mechanism which basically involves a transfer of ions between atomic space-time sheets and super-conducting magnetic flux quanta, relates closely to the many-sheeted models of metabolism, quantum control of homeostasis, and molecular machines.

There is a close connection with other well-established anomalous phenomena such as taos hum and micro-wave hearing. The mechanism is involved also with the anomalous phenomena in the field of free energy [G2]. TGD predicts the possibility of plasmoidic life forms and dark micro-wave photons would serve as 'food' of this life forms. This leads to a model of UFOs and UFO experiences: the model for Fatima Marian apparition witnessed by as many as 70.000 people was actually the key to the understanding of the role of micro-waves [M1]. The mechanism could also serve as a basic mechanism of psychokinesis and remote mental interactions [H9]. Also a remote information transfer might have been involved with the experiments. The sharing of mental images by quantum entanglement is a general TGD based mechanism making this possible [H9].

Holography type mechanism has been also suggested as a mechanism of remote mental interactions and is based on the idea that the fields generated by a living system form a representation for the system. In [68] Benford has analyzed Dela Warr images [75], and has shown that they possess hologram like aspects. There is indeed experimental evidence [57] that holography might be a basic representational mechanism allowing to represent information about body part in the radiation pattern generated by other body parts. The notion of conscious hologram discussed in [K4] allows to understand the hologram like aspects of delaWarr images and the mechanism of bio-holography. As a matter fact, remote quantum entanglement and self-organization induced by the leakage of supra currents and/or by the reduction of charge entanglement induced by *W* MEs are basic aspects of conscious holograms. The holographic aspects are not considered in the sequel but the model to be discussed is consistent with the notion of conscious holography since the mechanism generating the X-ray images generates also conscious holograms.

I want to thank for M. Sue Benford for very enlightening and detailed discussions concerning axion experiments as well to as yet unpublished experiments in which intentional action induces similar effects on X-ray film. I am also grateful for Keith Fredericks for discussions related to his findings about tracks in nuclear emulsions which he interprets as evidence for tachyons [82] and for Lian Sidoroff for telling me about the work of Keith Fredericks.

### 6.3.1 A brief summary of the empirical findings

The effects of several mechanisms to the photosensitive emulsion (X ray dental film) were studied in the experiments. Part of the data are yet unpublished and in the following only the published data are discussed. In the case studied [74] the so called axion generator developed by a Russian physicist Shpilman was used. The torsion field believed to be generated by the generator is in TGD framework replaced by Bose-Einstein condensate of dark photons associated with MEs. Exotic weak bosons and their dark variants induce long range parity breaking interactions possibly responsible for chiral selection in living matter.

The working hypothesis in [74] was that the rotating axion generator generates so called axions, neutral pseudoscalar elementary particles, which transform to X-rays in the presence of an external magnetic field and might be detectable in the photosensitive emulsion. The spectrum of the electromagnetic radiation generated by axion generator was found to contain MHz portion and micro-waves in the range .1 – 2.5 GHz. Microwaves modulated by MHz waves are produced also

by Priore's machine [71], which suggests that the model of Priore's machine might apply almost as such also here. Interestingly, the micro-waves in the frequency range .1 – 3 GHz are known to be associated with the micro-wave hearing.

It was found that the film contained dots and tracks. According to the specialists, the dots and tracks could not be due to any known elementary particle traversing through the emulsion. What was strange that the sizes of the dots had sizes of order millimeter. This size is much larger than the typical sizes of dots. The size of the silver grains is below micro-meter [82] and the number of grains along the track of a charged particle can be counted. This suggests that the interpretation in terms of an ordinary charged particle traversing the emulsion is not correct. What was also strange that the dots and tracks contained trace amounts of S, Mg and Al whereas the background region contained only C, N and O. Where did these elements come from?

In the case of charged particle very many X rays are emitted. The roughest estimate is one ionizing X ray per atom. In the case of axion only single X ray would result and it does not seem that the effect of single X ray could be so dramatic as to be much larger as the effect produced by very many X rays produced by a charged particle. Furthermore, if axion generates X rays it must have a mass measured in several electron volts. This does not conform with the cosmological bounds on axion mass (mass should be below  $10^{-3}$  eV). Thus it would seem that the axion hypothesis is not supported by the experimental findings.

A further strange finding was that the intentional action of the experimenter affects the generation of dots and tracks and that there is a correlation with the emotional state of the experimenter and size of dots. The model for Priore's machine suggests that experimenter generated  $W$  MEs giving rise to plasmoids producing the tracks and dots, and that axion generator served as a source of metabolic energy in form of dark microwave photons.

### 6.3.2 The origin of the dots and tracks?

The model for the generation of dots and tracks is essentially same as that for the functioning of Priore's machine.

1. The role of axion generator could be analogous to that of Priore's machine: to produce dark microwave photons providing the energy needed to generate plasma wave oscillation quanta at microwave plasma frequencies making it possible to realize generalized motor actions using by generating plasma oscillation patterns.
2. In the present case the plasma oscillation patterns would be produced in the photographic emulsion. The reason why photographic emulsion can take the role of living matter could be that gelatin is one component of the X-ray emulsion. Gelatin consists of animal proteins and might have inherited some of the many-sheeted space-time structure of living matter making it possible to induce dark plasmoids provided the metabolic energy in form of dark microwave photons are present.

The generalized motor action by the magnetic body of the experimenter would now affect the emulsion instead of brain of the experimenter, where 1 mm sized neuron blobs could correspond to the seats of microwave plasmoids. This picture conforms with the fact that also mere intentional action can affect photographic emulsions. The correlation of the size of dots with emotional state would be understood if the intensity of classical  $W$  boson field (number of  $W$  bosons in BE condensate) and perhaps also the thickness of  $W$  ME correlates with the emotional state.

3. Dots and tracks can be generated intentionally, even within a very brief time interval measured in minutes. The time scale suggests that the level of dark matter hierarchy involved is  $k_{em} = 5$  corresponding also to the time scale of short term memory.

4. The size of the apparatus suggests that dark microwave photons with  $k_{em} = 2$  result from the de-coherence of  $k_{em} = 5$  photons with frequencies in Hz region. The energies of the resulting microwave photons would be in the range 40- 100 eV for frequencies 1-2.5 GHz reported to be produced by axion generator. These observations suggests a two-step process in which ( $k_{em} = 5, k_W = 7$ ) magnetic body affects ( $k_{em} = 2, k_W = 4$ ) magnetic body with size scale in the range 4 cm-80 m (brain size scale is the natural size scale now) which in turn affects the photographic emulsion by generating  $k_W = 3$   $W$  MEs inducing the formation of plasmoids in the presence of  $k_{em} = 2$  dark microwave photons, which then transform to ordinary matter. It is possible that the millimeter sized neuron blobs in cortex act as antennas generating  $W$  MEs.
5. Dots and tracks contain S, Mg, Al which should not be there but they are in trace amounts. The phase transition transforming dark space-time sheets to ordinary ones involving possibly also the transformation of inherently dark S, Mg, and Al atoms to ordinary ones could explain this finding. Neither zero point kinetic energy nor atomic and molecular energies are changed in this process. The process involves the dissipation of the energy of plasmoid which could transform to UV photons and X rays by de-coherence.

### 6.3.3 How to understand the sizes of the dots and tracks?

Dots would result when  $W$  bosons transversal to the plane of emulsion decay to plasmoids and tracks when they travel parallel to this plane. Also tracks could actually correspond to sequences of dots corresponding to individual  $W$  bosons rather than genuinely continuous structures. The decay of  $W$  bosons to plasmoids could perhaps be interpreted as involving electro-weak symmetry breaking implying massivation in the dark time scale involved.

One can consider two explanations for the size of about 1 mm of the dots.

1. The size of the dot corresponds to the wavelength of microwave photons and  $W$  MEs. The wavelengths of the microwave photons reported to be produced by the axion generator vary in the range 30-12 cm whereas dark photons with wavelength of  $\sim 1$  mm would have frequency 300 GHz. The size of the pyramid used in the axion experiments corresponds relatively low micro-wave frequencies so that this option does not look plausible.
2. The size of the dot corresponds to the transversal size of  $W$  ME perhaps determined by the dark weak length scale predicted to be about  $L(113, k_W = 3) = .4$  mm for dark  $W(113, k_W = 3)$  bosons. This length scale would naturally determine the thickness of the track if  $W$  ME representing Bose-Einstein condensate of exotic dark  $W$  bosons travelling parallel to the emulsion and producing the track as  $W$  bosons are decay and generate a sequence of plasmoids. The addition of a magnetic field to the experimental arrangement would allow to see whether the tracks represent propagation of charged particles.

The dependence of the dot size on emotional state of the experimenter supports the view that the experimenter is the intentional agent producing the dots and tracks. Neuronal columns with height and transversal size scale of order 1 mm are the basic information processing units in the cortex. This is consistent with the assumption that neuronal columns controlled from magnetic body by dark  $W$  MEs generating millimeter sized plasmoids via de-coherence. The control by  $k_{em} = 5$  level of dark matter hierarchy could be of special importance in frontal lobes believed to be specialized to intentional actions.

### 6.3.4 Alternative model for dots and tracks

The original model for dots and tracks was based on the leakage of supra currents to atomic space-time sheets. If join along boundaries bonds connecting magnetic flux tubes to the atomic

space-time sheets are formed in the millimeter sized regions then also super-conducting dark ions can leak to the atomic space-time sheets and transform to ordinary matter at the same time. The dots could have been caused by the ionizations caused by these super-conducting ions if they had sufficient energy.

Already the Nobel chemist Langmuir observed for 100 years ago effects with this interpretation when he was desperately to build vacuum tubes and realized that gas was flowing inside the tubes by an unknown mechanism [64]. Crop circles [N2] are known to involve micro-wave explosions in growth nodes and the mysterious appearance of a layer of magnetized meteoric iron to the plants and soil proposed to involve currents from ionosphere. Leakage of dark ionic supra-currents from magnetic flux tubes explains the phenomenon and provides support for supra conductivity in astrophysical length scales [N2, N3].

The mechanism is involved also with the anomalous phenomena in the field of free energy and the recent experiments of Modanese and Podkletnov [78] provide additional support for the leakage phenomenon [G2]. An interesting question is whether the dots and tracks in X-ray films disappear if the local magnetic field of Earth is artificially cancelled.

## 6.4 Explanation of tachyonic events using the same model

Keith Fredericks has performed experiments, which he believes to provide a support for tachyons [82]. The experiments involved exposing human fingertips to the emulsion surface, for 5 to 30 minutes, with and without a dielectric isolator. Tracks had a thickness about 40 microns and were much thicker than usually (the size of the silver grain being about .3 micro-meters) which does not support the interpretation as tracks of ordinary charged particles. The thickness is about 4 percent of the dot size in the experiments of Sue Benford, which suggests that  $W$  bosons correspond to the p-adic length scale  $L(109, k_W = 3)$  rather than  $L(113, k_W = 3)$ .

The bending of the tracks in the external magnetic field was proposed as a support for the tachyonic interpretation but the report does not provide a detailed argument. In any case, tachyons would be necessarily charged in consistency with the identification as  $W$  MEs. Cyclotron radius has the same expression  $r = p_T / ZeB$  as for ordinary particles and does not reveal the tachyonic character in any obvious manner. From  $\omega_c = ZeB / \sqrt{-E^2}$  and  $E^2 = -m^2 + p^2$  it is however clear that cyclotron frequency can be arbitrarily high and anomalously large number of turns around the direction of the magnetic field would serve as a signature of tachyonicity.

The mechanism could be the same as in the experiments of Sue Benford. If the thickness of tracks is proportional to the wavelength of microwaves, the frequency would be  $\sim 25$  GHz with a wavelength of 1.2 cm by extrapolating from the findings of Sue Benford. The estimate is certainly reasonable.

$W$  MEs would represent Bose-Einstein condensates of exotic dark  $W$  bosons. Tracks would actually consists of nearby dots representing a sequence of plasmoids generated as  $k_{em} = 3$   $W$  bosons are absorbed. The bending of the tracks would be due to the fact  $W$  MEs represent orbits of Bose-Einstein condensates of charged particles.

The following argument suggests how to understand the tachyonic character of  $W$  MEs.

1. MEs can be much shorter than wave length  $\lambda$  but representing locally a wave with wave length  $\lambda = c/nf$ ,  $n = 1, 2, \dots$ . The interpretation would be as tachyonic virtual MEs. Indeed the Fourier expansion in longitudinal coordinate contains momenta which are multiples of  $\pi/L \gg \pi/\lambda$ . Tachyonicity in this sense does not mean that classical field would propagate with super-luminal velocity.
2. In TGD framework all quantum phenomena should have space-time correlates, in particular virtual particles which can have also tachyonic character. Almost vacuum 'mind like' sheets having finite temporal duration serve as the space-time correlates of virtual particles, and

are generated from vacuum and carry charge. If the space-time sheets involved with the tracks correspond to tachyonic virtual  $W$  bosons, they would behave effectively like charged tachyons in the magnetic field.

## References

### Online books about TGD

- [1] M. Pitkänen (2006), *Topological Geometrodynamics: Overview*.  
<http://www.helsinki.fi/~matpitka/tgdview/tgdview.html>.
- [2] M. Pitkänen (2006), *Quantum Physics as Infinite-Dimensional Geometry*.  
<http://www.helsinki.fi/~matpitka/tgdgeom/tgdgeom.html>.
- [3] M. Pitkänen (2006), *Physics in Many-Sheeted Space-Time*.  
<http://www.helsinki.fi/~matpitka/tgdclass/tgdclass.html>.
- [4] M. Pitkänen (2006), *Quantum TGD*.  
<http://www.helsinki.fi/~matpitka/tgdquant/tgdquant.html>.
- [5] M. Pitkänen (2006), *TGD as a Generalized Number Theory*.  
<http://www.helsinki.fi/~matpitka/tgdnumber/tgdnumber.html>.
- [6] M. Pitkänen (2006), *p-Adic length Scale Hypothesis and Dark Matter Hierarchy*.  
<http://www.helsinki.fi/~matpitka/paddark/paddark.html>.
- [7] M. Pitkänen (2006), *TGD and Fringe Physics*.  
<http://www.helsinki.fi/~matpitka/freenergy/freenergy.html>.

### Online books about TGD inspired theory of consciousness and quantum biology

- [8] M. Pitkänen (2006), *Bio-Systems as Self-Organizing Quantum Systems*.  
<http://www.helsinki.fi/~matpitka/bioselforg/bioselforg.html>.
- [9] M. Pitkänen (2006), *Quantum Hardware of Living Matter*.  
<http://www.helsinki.fi/~matpitka/bioware/bioware.html>.
- [10] M. Pitkänen (2006), *TGD Inspired Theory of Consciousness*.  
<http://www.helsinki.fi/~matpitka/tgdconsc/tgdconsc.html>.
- [11] M. Pitkänen (2006), *Mathematical Aspects of Consciousness Theory*.  
<http://www.helsinki.fi/~matpitka/genememe/genememe.html>.
- [12] M. Pitkänen (2006), *TGD and EEG*.  
<http://www.helsinki.fi/~matpitka/tgdeeg/tgdeeg/tgdeeg.html>.
- [13] M. Pitkänen (2006), *Bio-Systems as Conscious Holograms*.  
<http://www.helsinki.fi/~matpitka/hologram/hologram.html>.
- [14] M. Pitkänen (2006), *Magnetospheric Consciousness*.  
<http://www.helsinki.fi/~matpitka/magnconsc/magnconsc.html>.

- [15] M. Pitkänen (2006), *Mathematical Aspects of Consciousness Theory*.  
<http://www.helsinki.fi/~matpitka/magnconsc/mathconsc.html>.

## References to the chapters of books

- [C6] The chapter *Was von Neumann Right After All* of [4].  
<http://www.helsinki.fi/~matpitka/tgdquant/tgdquant.html#vNeumann>.
- [C8] The chapter *Does TGD Predict the Spectrum of Planck Constants?* of [4].  
<http://www.helsinki.fi/~matpitka/tgdquant/tgdquant.html#Planck>.
- [D7] The chapter *TGD and Astrophysics* of [3].  
<http://www.helsinki.fi/~matpitka/tgdclass/tgdclass.html#astro>.
- [E9] The chapter *Topological Quantum Computation in TGD Universe* of [5].  
<http://www.helsinki.fi/~matpitka/tgdnumber/tgdnumber.html#tqc>.
- [F3] The chapter *p-Adic Particle Massivation: Hadron Masses* of [6].  
<http://www.helsinki.fi/~matpitka/paddark/paddark.html#padmass2>.
- [F4] The chapter *p-Adic Particle Massivation: Hadron Masses* of [6].  
<http://www.helsinki.fi/~matpitka/paddark/paddark.html#padmass3>.
- [F5] The chapter *p-Adic Particle Massivation: New Physics* of [6].  
<http://www.helsinki.fi/~matpitka/paddark/paddark.html#padmass4>.
- [F8] The chapter *TGD and Nuclear Physics* of [6].  
<http://www.helsinki.fi/~matpitka/paddark/paddark.html#padnucl>.
- [F9] The chapter *Nuclear String Model* of [6].  
<http://www.helsinki.fi/~matpitka/paddark/paddark.html#nuclstring>.
- [F10] The chapter *Dark Nuclear Physics and Living Matter* of [6].  
<http://www.helsinki.fi/~matpitka/paddark/paddark.html#exonuclear>.
- [G1] The chapter *Anomalies Related to the Classical  $Z^0$  Force and Gravitation* of [7].  
<http://www.helsinki.fi/~matpitka/freenergy/freenergy.html#Zanom>.
- [G2] The chapter *The Notion of Free Energy and Many-Sheeted Space-Time Concept* of [7].  
<http://www.helsinki.fi/~matpitka/freenergy/freenergy.html#freenergy>.
- [H1] The chapter *Matter, Mind, Quantum* of [10].  
<http://www.helsinki.fi/~matpitka/tgdconsc/tgdconsc.html#conscic>.
- [H2] The chapter *Negentropy Maximization Principle* of [10].  
<http://www.helsinki.fi/~matpitka/tgdconsc/tgdconsc.html#nmmpc>.
- [H6] The chapter *Quantum Model of Memory* of [10].  
<http://www.helsinki.fi/~matpitka/tgdconsc/tgdconsc.html#memoryc>.
- [H9] The chapter *Quantum Model for Paranormal Phenomena*  
of [10].  
<http://www.helsinki.fi/~matpitka/tgdconsc/tgdconsc.html#parac>.

- [I2] The chapter *Possible Role of p-Adic Numbers in Bio-Systems* of [8].  
<http://www.helsinki.fi/~matpitka/bioselforg/bioselforg.html#biopadc>.
- [I4] The chapter *Quantum Control and Coordination in Bio-systems: Part I* of [8].  
<http://www.helsinki.fi/~matpitka/bioselforg/bioselforg.html#qcococI>.
- [I5] The chapter *Quantum Control and Coordination in Bio-Systems: Part II* of [8].  
<http://www.helsinki.fi/~matpitka/bioselforg/bioselforg.html#qcococII>.
- [J1] The chapter *Bio-Systems as Super-Conductors: part I* of [9].  
<http://www.helsinki.fi/~matpitka/bioware/bioware.html#superc1>.
- [J2] The chapter *Bio-Systems as Super-Conductors: part II* of [9].  
<http://www.helsinki.fi/~matpitka/bioware/bioware.html#superc2>.
- [J3] The chapter *Bio-Systems as Super-Conductors: part III* of [9].  
<http://www.helsinki.fi/~matpitka/bioware/bioware.html#superc3>.
- [J4] The chapter *Quantum Antenna Hypothesis* of [9].  
<http://www.helsinki.fi/~matpitka/bioware/bioware.html#tubuc>.
- [J6] The chapter *Coherent Dark Matter and Bio-Systems as Macroscopic Quantum Systems* of [9].  
<http://www.helsinki.fi/~matpitka/bioware/bioware.html#darkbio>.
- [K4] The chapter *Bio-Systems as Conscious Holograms* of [13].  
<http://www.helsinki.fi/~matpitka/hologram/hologram.html#hologram>.
- [K6] The chapter *Macroscopic Quantum Coherence and Quantum Metabolism as Different Sides of the Same Coin* of [13].  
<http://www.helsinki.fi/~matpitka/hologram/hologram.html#metab>.
- [L1] The chapter *Genes and Memes* of [11].  
<http://www.helsinki.fi/~matpitka/genememe/genememe.html#genememec>.
- [L2] The chapter *Many-Sheeted DNA* of [11].  
<http://www.helsinki.fi/~matpitka/genememe/genememe.html#genecodec>.
- [L3] The chapter *Could Genetic Code Be Understood Number Theoretically?* of [11].  
<http://www.helsinki.fi/~matpitka/genememe/genememe.html#genenumber>.
- [L4] The chapter *Pre-Biotic Evolution in Many-Sheeted Space-Time* of [11].  
<http://www.helsinki.fi/~matpitka/genememe/genememe.html#prebio>.
- [L5] The chapter *DNA as Topological Quantum Computer* of [11].  
<http://www.helsinki.fi/~matpitka/genememe/genememe.html#dnatqc>.
- [L7] The chapter *A Model for Protein Folding and Bio-catalysis* of [11].  
<http://www.helsinki.fi/~matpitka/genememe/genememe.html#foldcat>.
- [M1] The chapter *Magnetic Sensory Canvas Hypothesis* of [12].  
<http://www.helsinki.fi/~matpitka/tgdeeg/tgdeeg/tgdeeg.html#mec>.
- [M2] The chapter *Quantum Model for Nerve Pulse* of [12].  
<http://www.helsinki.fi/~matpitka/tgdeeg/tgdeeg/tgdeeg.html#pulse>.

- [M3] The chapter *Dark Matter Hierarchy and Hierarchy of EEGs* of [12].  
<http://www.helsinki.fi/~matpitka/tgdeeg/tgdeeg/tgdeeg.html#eegdark>. The chapter *Dark Matter Hierarchy and Hierarchy of EEGs* of [12].  
<http://www.helsinki.fi/~matpitka/tgdeeg/tgdeeg/tgdeeg.html#eegdark>.
- [M4] The chapter *Quantum Model for EEG: Part I* of [12].  
<http://www.helsinki.fi/~matpitka/tgdeeg/tgdeeg/tgdeeg.html#eegI>.
- [M5] The chapter *Quantum Model of EEG: Part II* of [12].  
<http://www.helsinki.fi/~matpitka/tgdeeg/tgdeeg/tgdeeg.html#eegII>.
- [M6] The chapter *Quantum Model for Hearing* of [12].  
<http://www.helsinki.fi/~matpitka/tgdeeg/tgdeeg/tgdeeg.html#hearing>.
- [N1] The chapter *Magnetospheric Sensory Representations* of [14].  
<http://www.helsinki.fi/~matpitka/magnconsc/magnconsc.html#srepres>.
- [N2] The chapter *Crop Circles and Life at Parallel Space-Time Sheets* of [14].  
<http://www.helsinki.fi/~matpitka/magnconsc/magnconsc.html#crop1>.
- [N3] The chapter *Crop Circles and Life at Parallel Space-Time Sheets* of [14].  
<http://www.helsinki.fi/~matpitka/magnconsc/magnconsc.html#crop2>.
- [N6] The chapter *Semitrance, Language, and Development of Civilization* of [14].  
<http://www.helsinki.fi/~matpitka/magnconsc/magnconsc.html#langsoc>.

## Physics

- [16] D. M. Pepper (1982), *Nonlinear Optical Phase Conjugation*, in *Optical Engineering*, vol. 21, no. 2, March/April.
- [17] S. Mancini *et al* (2002), *Entangling Macroscopic Mirrors Exploiting Radiation Pressure*, PRL 88, 120401.

## Biology

- [18] M. W. Ho (1993), *The Rainbow and the Worm*, World Scientific, Singapore.  
*Ibid* (1994), *Coherent Energy, Liquid Crystallinity and Acupuncture*,  
<http://www.consciousness.arizona.edu/quantum/Archives/Uploads/mifdex.cgi?msgindex.mif>.
- [19] International Human Sequencing Consortium (2001), *Initial sequencing and analysis of the human genome*, Nature, vol 409, Feb 15. <http://www.nature.com> .
- [20] Celera Genomics (2001), Science, vol 291, issue 5507, Feb 16. <http://www.sciencemag.org/> .
- [21] R. D. Kortschak, G. Samuel, R. Saint and D. J. Miller (2003), *EST Analysis of the Cnidarian Acropora millepora Reveals Extensive Gene Loss and Rapid Sequence Divergence in the Model Invertebrates*, Current Biology, Vol 13, 2190-2195, 16 December 2003. <http://www.current-biology.com/content/article/fulltext?uid=PIIS0960982203008728> .

## Brain science

- [22] P. Pietch, (1972), *Shuffle Brain: The Quest for Hologramic Mind*, <http://www.indiana.edu/~pietsch/shufflebrain-book00.html>.
- [23] W. J. Freeman (2001), *Making sense of brain wave s: the most baffling frontier in neuroscience*, <http://sulcus.berkeley.edu> .
- [24] Julian Jaynes (1982), *The origin of consciousness in the breakdown of the bicameral mind*, Princeton University Press.
- [25] *Genetics of neuromuscular diseases*, <http://www.mdausa.org/publications/genetics.html>.
- [26] L. F. Jaffe (2001), *Calcium Waves*, <http://waves.mbl.edu/calcium.waves.html>.

## Effects of em fields on living matter

- [27] C. Smith (2001), *Learning From Water, A Possible Quantum Computing Medium*, talk in CASYS'2001, 5th international conference on Computing Anticipating Systems held in Liege, Belgium, August 13-18. Abstract book published by Chaos.
- [28] P. Gariaev *et al* (2000), *The DNA-wave bio-computer*, International Journal of Computing Anticipatory Systems. Ed. Daniel Dubois, Published by CHAOS, Vol. 10, 2001.
- [29] P. P. Gariaev *et al*(2002), *The spectroscopy of bio-photons in non-local genetic regulation*, Journal of Non-Locality and Remote Mental Interactions, Vol 1, Nr 3. <http://www.emergentmind.org/gariaevI3.htm>.
- [30] P. Dobson and E. O'Keeffe (2000), *Research into the efficacy of the Gas Discharge Visualisation Technique as a measure of physical and mental health* <http://www.gdvresearch.com/experiments/paul-elena/index.html>.
- [31] L. Sidoroff (2002): *The imprinting and transmission of mentally-directed bio-information*. <http://www.emergentmind.org/sidorovI.htm> . *On the possible mechanism of intent in paranormal phenomena*, <http://www.emergentmind.org/sidorovII.htm> .
- [32] M. Persinger (1999), *The tectonic strain theory as an explanation for UFO phenomena* <http://www.laurentian.ca/www/neurosci/tectonicedit.htm>.  
M. Persinger (1995), *On the possibility of directly accessing every human brain by electromagnetic induction of fundamental algorithms*, Percept. Mot. Skills, 80(3 Pt 1), 791-9.  
M. Persinger (1987) *Neuropsychological Bases of God Beliefs*, Praeger Publishers.
- [33] E. Lozneanu and M. Sanduloviciu (2003) *Minimal-cell system created in laboratory by self-organization*, Chaos, Solitons & Fractals, Volume 18, Issue 2, October, p. 335.  
See also *Plasma blobs hint at new form of life*, New Scientist vol. 179 issue 2413 - 20 September 2003, page 16.
- [34] N. Cherry (2000), Conference report on effects of ELF fields on brain, <http://www.tassie.net.au/emfacts/icnirp.txt> .
- [35] S. Silberman (2003), *The Bacteria Whisperer*, Wired Magazine, Issue 11.04, April 2003 <http://www.wired.com/wired/archive/11.04/quorum.html>.

- [36] See also the interview *Dr. Phil Callahan on Power of Paramagnetism*, Nexus, February-March 2003, <http://www.nexusmagazine.com>, p. 37.
- [37] *Homeopathy*, <http://en.wikipedia.org/wiki/Homeopathy>.
- [38] J. Benveniste *et al* (1988). *Human basophil degranulation triggered by very dilute antiserum against IgE*. Nature 333:816-818.
- [39] J. Benveniste *et al* (198?). *Transatlantic transfer of digitized antigen signal by telephone link*. Journal of Allergy and Clinical Immunology. 99:S175 (abs.). For recent work about digital biology and further references about the work of Benveniste and collaborators see <http://www.digibio-.com/>.
- [40] L. Milgrom (2001), *Thanks for the memory*. An article in Guardian about the work of professor M. Ennis of Queen's University Belfast supporting the observations of Dr. J. Benveniste about water memory. <http://www.guardian.co.uk/Archive/Article/0,4273,4152521,00.html>.
- [41] L. Brent *et al* (1981) *Supposed Lamarckian inheritance of immunological tolerance*. Nature, 290,508-512.  
A. Durrant (1962) *The environmental induction of heritable change in Linum*. Heredity, 17,27-62.
- [42] *Epigenetics?*, A website devoted to epigenetics, <http://epigenome.eu/en/1,38,0>.
- [43] A. Giudetta (1982), *Proposal of a Spiral Mechanism of Evolution*, Rivista di Biologia, 75: 13-31.
- [44] M. E. Pembrey (2002), *Time to take epigenetics seriously*, European Journal of Human Genetics 10, 669-671. <http://www.nature.com/ejhg/journal/v10/n11/index.html>.
- [45] J.A. Tellefsen Jr. and S. Magnusson (2007), *Have the Swedish psi-researchers produced something very important - a repeatable experiment?*, <http://www.hessdalen.org/sse/program/psi-track.pdf>.
- [46] E. Strand (editor) (2007), *Proceedings of the 7<sup>th</sup> European SSE Meeting August 17-19, 2007, Røros, Norway*. Society of Scientific Exploration: <http://www.scientificexploration.org/>.
- [47] R. O. Becker and G. Selden (1990) *The Body Electric: Electromagnetism and the Foundation of Life*. William Morrow & Company, Inc., New York.
- [48] E. Del Giudice and G. Preparata (1994), *Coherent dynamics in water as a possible explanation of biological membrane formation*, J. of Biol. Phys. 20: 105-116.
- [49] Geissler H.-G. (1997) *Is there a way from behavior to non-linear brain dynamics? On quantal periods in cognition and the place of alpha in brain resonances*. International Journal of Psychophysiology 26, 381-393.
- [50] P. Marcer *et al* (2000), *Quantum Millennium, Quantum Universe, Quantum Bio-sphere, Quantum Man- or What Physicists can teach Biologists, and Biology, Physics*, International Journal of Computing Anticipatory Systems. Ed. Daniel Dubois, Published by CHAOS, Vol. 10, 2001.
- [51] Yu. V. Dzang Kangeng, Patent N1828665. *A method of changing biological objects hereditary signs and a device for biological information directed transfer*. Application N3434801, invention priority as of 30.12.1981, registered 13.10.1992.

- [52] B. I. Birshtein, A.M. Yarochenko, P.P. Gariaev, G.G. Tertishny and K. A. Leonova (2001), *Why are we still not able to successfully treat cancer and HIV?*. <http://www.sciteclibrary.com/eng/catalog/pages/1171.html>.
- [53] K. Chen and G. He (2001), *Preliminary Studies of the Effect of Qigong Therapy on Cancer*. A presentation prepared for "Comprehensive Cancer Care 2001: Integrating Alternative and Complementary Therapies" Arlington, VA. <http://www.emergentmind.org/chen.htm> .
- [54] D. J. Benor (2001), *Spiritual Healing: scientific validation of a healing revolution*, Vol. I. Vision publications, Southfield MI.
- [55] X. Yan *et al* (1988), *The influence of the external Qi of Qigong on the radioactive decay rate of  $^{241}\text{Am}$* , Nature Journal (Chinese), Vol 11. <http://home.eol.ca/~yuan/yansci/yan241.html> .
- [56] L. A. Frank, W. R. Paterson, K. L. Ackerson, S. Kokubun, and T. Yamamoto (1996), *Plasma velocity distributions in the near-Earth plasma sheet: A first look with the Geotail spacecraft*, J. Geophys. Res., 101, pp. 10,627-10,637. <http://www-pi.physics.uiowa.edu/www/cpi/cpi-nuggets.html> .
- [57] M. Shaduri. & G.Tshitshinadze (1999), *On the problem of application of Bioenergography in medicine*. Georgian Engineering News 2, 109-112.  
See also <http://www.bioholography.org/> .
- [58] J. C. Lin, S. Sales-Cunha, J. Battocletti, A. Sances, (1980), *The Micro-wave Auditive Phenomenon*, Proceedings of the IEEE, vol. 68, #1.
- [59] C. E. Ingalls (2002), *Sensation of Hearing in Electromagnetic Fields*, <http://www.angelfire.com/or/mctrl/ingalls.htm> .
- [60] Pelling *et al* (2004), *Local Nanomechanical Motion of the Cell Wall of Saccharomyces cerevisiae*, Science 20 August: Vol. 305. no. 5687, pp. 1147 - 1150.
- [61] *James Gimzewski*, [http://en.wikipedia.org/wiki/James\\_Gimzewski](http://en.wikipedia.org/wiki/James_Gimzewski).
- [62] A. Goho (2004), *Rattle and Hum: molecular machinery makes yeast cells purr*, [http://findarticles.com/p/articles/mi\\_m1200/is\\_/ai\\_n6205978](http://findarticles.com/p/articles/mi_m1200/is_/ai_n6205978). Science News, August 21.  
M. Wheeler, (2004) *Signal Discovery?*, Smithsonian Magazine. March issue. <http://www.smithsonianmag.com/science-nature/10012426.html>.  
M. Wertheim (2003), *Bucky Balls and Screaming Cells: the amazing miniature world of UCLA chemist Jim Gimzewski*, LAWeekly, April 4-10. <http://pellinglab.net/media/laweekly.pdf>.
- [63] A. Saleh (2001), *Capturing the Earth's songs*. ABC Science Online. <http://www.abc.net.au/science/news/stories/s237849.htm>.

## Anomalies, etc...

- [64] N. Möller (2001), *Irving Langmuir and Atomic Hydrogen*, New Energy Technologies, Issue #3.

- [65] J. Searl (2001), *The Searl effect generator and the levity disc*, in conference proceedings *Neu Wasserstofftechnologien un Raumantriebe*, Jupiter Verlag. There are also other articles related to Searl effect, in particular the articles of S. M. Godin and V. V. Roschin and of P. LaViolette.
- [66] Roshchin, V.V and Godin, S.M., *An Experimental Investigation of the Physical Effects in a Dynamic Magnetic System*, New Energy Technologies Issue #1 July-August 2001.
- [67] S. Comorosan(1975), *On a possible biological spectroscopy*, Bull. of Math. Biol., Vol 37, p. 419.  
S. Comorosan, M.Hristea, P. Murogoki (1980), *On a new symmetry in biological systems*, Bull. of Math. Biol., Vol 42, p. 107.
- [68] M. S. Benford , P. Moscow , E. Mitchell E, P. Marcer. *QuantaGraphy: Images from the quantum hologram*. A CASYS'2001 presentation by Peter Marcer. <http://www.homestead.com/newvistas/CASYS~ns4.html> .
- [69] J. B. Bateman (1978), *A Biologically Active Combination of Modulated Magnetic and Microwave Fields: the Priore Machine*, in "Office of Naval Research," London Report R-5- 78, Aug. 1978.
- [70] T. E. Bearden (1988), chapters 'Extraordinary Physics' and 'Extraordinary Biology' in *Aids: Biological Warfare*. Tesla Book Company, P. O.Box 1649, Greenville, TX 75401, See also the html article *The Priore Machine and Phase Conjugation* at the homepage of Bearden: <http://www.cheniere.org/priore/index.html> .
- [71] *U.S. Office of Naval Research Report on the Priore Machine*, 16. August 1978. <http://www.cheniere.org/priore/nr%20report/>.
- [72] R. Mills *et al*(2003), *Spectroscopic and NMR identification of novel hybrid ions in fractional quantum energy states formed by an exothermic reaction of atomic hydrogen with certain catalysts*. <http://www.blacklightpower.com/techpapers.html> .
- [73] S. E. Shnoll *et al* (1998), *Realization of discrete states during fluctuations in macroscopic processes*, Uspekhi Fisicheskikh Nauk, Vol. 41, No. 10, pp. 1025-1035.
- [74] M. Sue Benford (1999), *Probable Axion Detection via Consistent Radiographic Findings after Exposure to a Shpilman Axion Generator*, Journal of Theoretics Vol. 4-1.
- [75] L. Day (with G. DelaWarr)(1956), *New Worlds Beyond the Atom*. Vincent Stuart.
- [76] M. Chaplin (2005), *Water Structure and Behavior*, <http://www.lsbu.ac.uk/water/index.html>.  
For 41 anomalies see <http://www.lsbu.ac.uk/water/anmlies.html>.  
For the icosahedral clustering see <http://www.lsbu.ac.uk/water/clusters.html>.  
J. K. Borchardt(2003), *The chemical formula H2O - a misnomer*, The Alchemist 8 Aug (2003).  
R. A. Cowley (2004), *Neutron-scattering experiments and quantum entanglement*, Physica B 350 (2004) 243-245.  
R. Moreh, R. C. Block, Y. Danon, and M. Neumann (2005), *Search for anomalous scattering of keV neutrons from H2O-D2O mixtures*, Phys. Rev. Lett. 94, 185301.
- [77] G. Cantatore *et al* (2005), *Experimental observation of optical rotation generated in vacuum by a magnetic field*. arXiv-org hep-exp/0507107.  
See also S. Battersby (2006), *Let there be dark*, New Scientist, vol. 191, No 2560, 15 July, 2006.

- [78] E. Podkletnov and G. Modanese (2002), *Investigation of high voltage discharges in low pressure gases through large ceramic super-conducting electrodes*,  
<http://xxx.lanl.gov/abs/physics/0209051>.
- [79] D. Da Roacha and L. Nottale (2003), *Gravitational Structure Formation in Scale Relativity*,  
 astro-ph/0310 036.
- [80] G. Vassilatos (2001), *Nocturnal Disturbances and the Infrasonic "HUM"*,  
<http://www.borderlands.com/journal/nux.htm> .
- [81] W. C. Levensgood and J. A. Burke (1995), *Semi-Molten Meteoric Iron Associated with a Crop Formation*,  
 Journal of Scientific Exploration, Vol 9, No. 2, pp. 191-199.  
<http://www.blresearch.com/published.html> .  
 W. C. Levensgood (1994),  
*Anatomical Anomalies In Crop FormationPlants*, Physiologia Plantarum, 92:356-363.  
<http://www.blresearch.com/published.html> .  
 W. C. Levensgood and N. P. Talbott (1999), *Dispersion of Energies in Worldwide Crop Formations*, Physiologia Plantarum 105: 615624.  
<http://www.blresearch.com/published.html> .
- [82] K. A. Fredericks (1997), Un-identified tracks of developed silver in photographic emulsions: do these tracks correspond to tachyon trajectories?, Private communications from Lian Sidoroff.