

A General Model for Metabolism

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Abstract

The general strategy in attempts to understand metabolism is based on the assumption that a very large class of anomalous phenomena rely on same basic mechanism. This includes life as a phenomenon, water memory and homeopathy, free energy phenomena involving over-unity phenomena related to the dissociation of water, lightning and ball lightning, anomalous effects associated with rotating magnetic systems, phenomena related to UFOs (light balls), even remote mental interactions. One must have a unified explanation for all these phenomena based on a real theory. Plasmoids are TGD inspired proposal for prebiotic lifeforms and the input from anomalies related to electrolysis of water together with TGD based proposal that sequences of dark protons define dark nuclei realizing vertebrate genetic code leads to the vision that the biochemical metabolic machinery including photosynthesis has a simple analog realized in terms of "polymers" of water molecules with one dark proton with protons bound to sequence by color bonds.

The old view about the metabolic energy quanta as energies liberated as particle "drops" to a larger space-time sheet is modified. Metabolic energy quanta are liberated when the space-time sheet at which the particles reside expands in a phase transition increasing its p-adic prime and reducing the value of Planck constant correspondingly so that the net result is that the size of the space-time sheet remains the same. This condition implies a close relationship between p-adic and dark matter hierarchies. This process is automatically coherent since all particles suffer the change simultaneously. It applies also to a situation in which particles are in magnetic field: in this case the scale of cyclotron energies changes since the strength of the magnetic field is scaled down to guarantee the conservation of magnetic flux. This transition is not cyclotron transition but liberates essentially the same energy as coherent cyclotron transition so that magnetic fields (their "motor actions") become essential players also in metabolic activities.

1 Introduction

The general strategy in attempts to understand metabolism is based on the assumption that a very large class of anomalous phenomena rely on same basic mechanism. This

includes life as a phenomenon, water memory and homeopathy, free energy phenomena involving over-unity phenomena related to the dissociation of water, lightning and ball lightning, anomalous effects associated with rotating magnetic systems, phenomena related to UFOs (light balls), even remote mental interactions. One must have a unified explanation for all these phenomena based on a real theory.

Plasmoid as primitive life form would be the underlying connecting thread between these phenomena so that all the listed phenomena would involve life and prebiotic (or possibly postbiotic!) life. This gives very strong constraints on the model. Plasmoid should consist of the analogs of linear biomolecules, it should metabolize and communicate, in TGD Universe it should have magnetic body, and even genetic code might be realized. In particular, the simplified analog of biological metabolism would be at work. In living matter photosynthesis relies on the splitting of water whereas cell respiration relies on the reversal of this process producing carbon di-oxide and water. Something very similar should happen in free energy systems involving electrolysis, and the fact that water splitting occurs also in several free energy phenomena suggests that these processes are analogous to photosynthesis and store energy to "molecules" analogous to various linear biomolecules, in particular sugars. Even the counterpart of ADP-ATP process might be realized.

TGD suggests a very general model for the metabolism of pre-biotic systems (or post-biotic ones: the identification depends on what general vision about evolution is adopted) identified as plasmoids consisting of cyclic linear structures formed by exotic water molecules. For a dark water molecule one proton would be dark and dark protons of the neighboring exotic water molecules would bind to form a linear structure identifiable as dark nucleus: this picture is a direct generalization of nuclear string model [K5, K4, K8]. These linear structures would define the analogs of linear biomolecules. This metabolism would be more fundamental than ordinary biochemical metabolism and form a yet unknown part of the latter. One cannot exclude the possibility that also other than water molecules contain dark protons: the signature would be the presence of apparently unallowed covalent bonds due to the fact the dark proton is not visible. In the following I will discuss the basic principles involved.

The old view about the metabolic energy quanta as energies liberated as particle "drops" to a larger space-time sheet is modified. Metabolic energy quanta are liberated when the space-time sheet at which the particles reside expands in a phase transition increasing its p-adic prime and reducing the value of Planck constant correspondingly so that the net result is that the size of the space-time sheet remains the same. This condition implies a close relationship between p-adic and dark matter hierarchies. This process is automatically coherent since all particles suffer the change simultaneously. It applies also to a situation in which particles are in magnetic field: in this case the scale of cyclotron energies changes since the strength of the magnetic field is scaled down to guarantee the conservation of magnetic flux. This transition is not cyclotron transition but liberates essentially the same energy as coherent cyclotron transition so that magnetic fields (their "motor actions") become essential players also in metabolic activities.

2 Three possible models for liberation of metabolic energy

One can imagine three different models for the liberation of metabolic energy.

1. The simplest TGD based model is as a phase transition increasing the value of p-adic prime p assignable to the space-time sheet at which particle is topologically condensed:
 - (a) Particle drops to a larger space-time sheet with larger p-adic prime p_1 with $p_1/p \simeq 2^k$. The problem is that different particles need not drop simultaneously so that coherent liberation of energy is not automatic consequence of the assumption.
 - (b) The space-time sheet itself suffers a phase transition increasing its p-adic length scale. In absence of interactions (particles in box) the energies are scaled down by factor 2^{-k} and the difference is liberated as usable energy. Coherent liberation of energy is achieved automatically. If the particle inside the space-time sheet is free in good approximation a model as particle in box applies, and if the expansion of the space-time sheet takes place adiabatically, the quantum numbers characterizing the state of the particle do not change in the transition. As a consequence, the energy $E_{\{n_i\}} = k \sum_i n_i^2 \hbar^2 / 2mL_p^2$ is reduced as $L_p \propto \sqrt{p}$ increases to L_{p_1} , where $p_1/p \simeq 2^k$ holds true. The difference of vacuum energies is liberated as usable energy in coherent manner: this is of special significance in living systems. This has led to the identification of p-adic length scales that would correspond to fundamental metabolic quantum with value about .5 eV. Entire hierarchy of metabolic quanta is predicted.
2. The space-time sheet could also carry magnetic energy and particles are expected to be in cyclotron states and perhaps form a cyclotron Bose-Einstein condensate. In this case the phase transition reduces the value of B but preserves the magnetic flux so that $B \rightarrow B/2^k$, $p_1/p \simeq 2^k$, takes place. This scales down the energies of cyclotron states by the same scaling factor 2^{-k} as in the case of free particle. The liberated energy is in good approximation just the cyclotron energy for large enough values of k . Coherence is achieved automatically. The value of the fundamental metabolic energy quantum and the value of endogenous magnetic field of about $B_{end} = .2$ Gauss deduced from the experiments of Blackman and others [J1] fix the value of h_{eff} . It would be proportional to particle mass number A .
3. The earlier model for the liberation of cyclotron energy was based on the assumption that the value of B is not changed but that the value of magnetic quantum number n changed. If n is reduced one achieves liberation of energy. Coherence of the transition might produce problems now. Both models can explain the observations of Blackman and others concerning the effects of ELF radiation on vertebrate brain since the spectrum of photons energies inducing effects correspond to cyclotron energies for the latter option and in excellent approximation to it for the previous model. The mechanism is however quite different.

This phase transition for the larger space-time sheet can take place in two steps.

1. First a phase transition increasing h_{eff} of the background space-time sheet by $n = 2^k$ occurs. This leaves ZPKE invariant but scales up the size of the space-time sheet by $2^{k/2}$. The interpretation would be as "electric expansion" of Brown's gas. No energy transfer takes place since both kinetic and magnetic energies are invariant under the scaling of \hbar . Note however than in the original situation the magnetic field can be very strong so that zooming up from microscopic scales can happen.
2. After this a phase transition reducing Planck constant back to h but increasing p-adic length scale by 2^k occurs. The size scale of the background space-time sheet is not affected but the zero point kinetic energy is reduced by factor 2^{-k} and liberated as usable energy. This phase transition would take place for the dark component of Brown's gas in the melting of the metal and other similar phenomena. Also the liberation of metabolic energy in living matter could correspond to this phase transition.

This model for electric expansion, implosion, and energy liberation assumes nothing about the particles involved since dark particle means ordinary particle topologically condensed on dark space-time sheet and having wave function de-localized in the n-sheeted structure. For instance, water can be dark in this sense. One could indeed consider the possibility that the vapour phase identified as charged water cluster is just water containing positive ions H_+^3 or protons and electrons and that phase transition to large \hbar phase expands the space-time sheet at which water is topologically condensed at evaporates the water. Ordinary liquid to gas transition could proceed in the same manner and involve liberation of ZPKE at the second step of the process. In the general case the binding energy involved with the formation of the denser phase could compensate for the energy gain in the increase of the p-adic prime so that the melting would require energy feed.

3 Model for the building bricks of plasmoids

I have already earlier discussed a model for dark proton sequences as primitive life forms. The observation discussed by Moray B. King inspired a more detailed formulation of the model of plasmoids identified as primitive life forms in TGD framework.

1. The key observation was that the model for dark nuclei [K8, K7], in particular dark proton, predicts counterparts of DNA, RNA, tRNA, and amino-acids and also vertebrate genetic code follows naturally. This together with nuclear string model led to the vision that life appears already at the level of dark variants of nuclei. The observed anomalous $H_{1.5}O$ stoichiometry of water in atto-second scale supports the view that dark protons appear in ordinary water.
2. This model was first introduced to explain water memory and homeopathy. The basic idea was that the process creating homeopathic remedy induces the analog of molecular evolution for the dark proton sequences, which in turn provide representations for the molecules appearing in environment. These representations

would be fundamental also for the functioning of immune system of living matter. The dark life could provide R&D laboratory for living matter allowing to test say various gene candidates and transcribe them to ordinary biological DNAs if they are successful in the virtual model world. Evolution would not be random but directed just as evolution of technologies.

3. The latest step in the process [K10] was the proposal that cell membranes involve dark proton sequences providing a representation of dark DNA and connected by magnetic flux tubes to the units of DNA in genome. These two DNA representations would be identical. Quite generally, dark and ordinary biomolecules might be connected by magnetic flux tubes.

This picture does not yet provide model for the metabolism of the building bricks of plasmoids. Something very much analogous to the splitting of sugars to carbon di-oxide and water is however expected. Since carbon is not present now, this leaves only the option that the linear dark structures are nothing but exotic form of water for which the proton of one hydrogen atom of each water molecule is dark. These dark protons would combine by strong interactions to a nuclear string and O-H groups would be attached to them. The cyclic analog of DNA, RNA, or amino-acid realizing genetic code would be the outcome. The stoichiometry $H_{1.5}O$ observed in atto-second time scale would be achieved in average sense if the portions of exotic and dark water are same. The prediction is that dark water is heavier than ordinary water: the molecular weight would correspond to average length of the dark water cycle. This is consistent with the observations about Brown's gas.

Plasmoid should also possess a magnetic body. This requires a currents rotating along the cyclic structures. The obvious identification of the current is as dark supra currents assignable to dark protons so that the building bricks of plasmoid would be analogous to super-conducting rings.

4 Model for the metabolism of plasmoids

The proposed dark analogs of basic biomolecules would be created through the analog of photosynthesis involving the splitting of water to $H + OH$ followed by $H \rightarrow H_{dark}$ and by recombination to a sequence of dark water molecules. The process would be analogous to translation of mRNA to amino-acids and could proceed by an analogous mechanism. The process would be spontaneous since the energy of cyclotron states would not change in $h \rightarrow h_{eff} = 2^k \times h$.

Metabolic energy would be liberated in the decay of the exotic water back to water with $h_{eff} = h$ and p-adic prime scaled by about 2^k . This process is completely analogous to the splitting of various linear biomolecules in metabolism in order to obtain metabolic energy. This process would explain the ability of cool Brown's gas to melt metal for instance. When fossil fuels are used, the outcome is carbon di-oxide and water. Now only water is obtained so that this form of free energy might not contribute to the warming of environment.

The process differs from ZPE in that it does not provide any endless source of energy. Since water is in practice an unlimited natural resource, this should not be a problem. A closed cycle at the level of visible matter is obtained only if the reverse

phase transition transforming the water with $h_{eff} = h$ and p-adic prime $p_1 \simeq 2^{k/2}p$ to that with $h_{eff} = 2^k \times h$ and p-adic prime p takes place spontaneously.

The irradiation with carrier frequency f_h and modulation frequency f_l such that one has $f_l/f_h = 2^k$ is one possibility which I have proposed. Dark solar radiation at magnetic flux tubes with magnetic field $B_{end} = .2$ Gauss (guess from the experiments of Blackman [J1]; also many other values can be considered) could provide automatically the needed pulsed radiation inducing the phase transition. The most optimistic option is that this transition occurs even in the case of closed system in which water circulates.

Before attempting to identify reasonable candidates for f_l and f_h it is useful to consider estimates for $h_{eff}/h = 2^k$. Note that this assumption might be too strong: the vision about evolution as emergence of number theoretical complexity suggests that so called Fermat integers defining polygons, which are constructible using ruler and compass, define favored values of $h_{eff}/h = n$ [K5]. These integers are expressible as products of different Fermat primes $F_n = 2^{2^k} + 1$ and power of 2. The known Fermat primes correspond to $k = 0, 1, 2, 3, 4$ and are 3, 5, 17, 257, 65537. Only the two lowest ones differ significantly from power of two. This raises the question whether also the scale hierarchies $\sqrt{3}L(k)$, $\sqrt{5}L(k)$, and $\sqrt{15}L(k)$ are important besides p-adic length scale hierarchy $L(k) = 2^{k/2}R_{CP_2}$. They could be associated with the algebraic extensions of p-adic numbers involving $\sqrt{3}$ and $\sqrt{5}$.

1. The condition that cold nuclear fusion is possible via the TGD based mechanism requires dark variant of weak interactions corresponds to scaled up p-adic length scale of order atomic size. The condition that weak bosons are effectively massless in atomic length scale gives one estimate for h_{eff}/h . The condition that weak scale characterized by M_{89} is increased to that characterized by M_{127} gives $h_{eff}/h = 2^{48} \simeq 2.8 \times 10^{14}$.
2. Second estimate for h_{eff}/h follows from the condition that cyclotron energy for given charged particle is of the order of metabolic energy quantum. For proton $B_{end} = .2$ Gauss gives $f_c = 300$ Hz. The energy is about .5 eV for $h_{eff}/h = 1.37 \times 10^{14}$ rather near to $h_{eff}/h = 2^{47}$ which is by a factor of 1/2 smaller than the previous estimate. It is however clear that the estimates are internally consistent: skeptic would see this as a pure accident and some-one taking anthropic principle seriously as an outcome of evolution in very general sense. Note that for electron the metabolic energy quantum would be about 938 eV suggesting that keV energy scale assignable to the dark weak interactions has its own metabolic energy quantum.

For ion of mass number A and ionization z the value producing the same value of metabolic quantum is $A/z \times 1.37 \times 10^{14}$. An alternative assumption is a hierarchy of metabolic quanta coming as z/A multiples of the fundamental metabolic energy quantum for a fixed value of h_{eff}/h . The condition that the metabolic energy quantum is above thermal energy of photon at physiological temperature for which peak wavelength for blackbody radiation corresponds to energy of .13 eV. This gives $A/z \leq .5/.13 = 3.84$. The estimate is too stringent since Ca^{++} with $A/z = 20$ should allow metabolic energy quantum above the thermal energy. This suggests that h_{eff}/h characterizes given ion and that its multiples coming as power of two are allowed.

3. For $h_{eff}/h = n = 2^{k_{dark}}$ with $k_{dark} \in \{47, 48\}$ dark electron would have p-adic length scale $L(k)$, $k = 127 + d_{dark} \in \{174, 175\}$. This corresponds to a Compton length $l_c \in \{28, 40\}$ μm . That this corresponds to the size scale of cell gives additional support for the vision. Note also that for electron the size scale of CD identified as secondary p-adic time scale associated with $M_{127} = 2^{127} - 1$ corresponds to .1 seconds, which defines a fundamental biorhythm. Proton Compton length would be scaled to the range [15, 21] nm (10 nm defines the thickness of the cell membrane) and light current quarks with energy of 5-20 MeV to the size scale of cell nucleus.

A reasonable guess is that the candidates for f_h and f_l should satisfy the condition $f_h/f_l = 2^k$, $k = 47$ or $k = 48$. f_h can be deduced from the estimate for h_{eff} .

1. Schumann frequency 7.8 Hz is the first candidate for the modulating frequency. This would give UV frequency $f_h \simeq 1.1 \times 10^{15}$ Hz corresponding to energy of 9.7 eV for $k = 47$, which corresponds to the energy scale for covalent bonds. The energy scale of hydrogen atom is 13.6 eV.
2. For the cyclotron frequency of DNA (which depends only weakly on the length of the DNA sequence due to the constant charge density per unit length) of about 1 Hz (the frequency of heart beat) one would obtain $f_h = 1.4 \times 10^{14}$ Hz for $k = 47$, which corresponds to energy of 1.4 eV and is just below the visible range starting around 1.65 eV. The scaling of this energy by $\sqrt{3}/2$, $\sqrt{5}/4$, and $\sqrt{15}/4$ By multiplying the For $k = 48$ the energy would be to 3.3 eV, which is quite near to the UV end 3.36 eV of visible portion of spectrum. Again one can ask whether just accidents are in question.

Allowing the generalization of the p-adic length scale hypothesis one obtains 7 photon energies in the visible range corresponding to the scalings of 1.4 eV by $[\sqrt{3}/2, \sqrt{5}/4, \sqrt{5}/2, \sqrt{15}/4, \sqrt{3}, 2, \sqrt{15}/8, \sqrt{5}]$ giving $E/eV = [1.71, 1.57, 2.21, 1.91, 2.42, 2.8, 2.8, 2.8]$. Note that 2 eV corresponds to red light and metabolic energy quantum of .50 eV to $k = 51$. An interesting question is whether these special frequencies relate to the peak wave lengths for color vision.

A macroscopic variant of photosynthesis using the possibly existing dark photons at the flux tubes of $B_{end} = .2$ Gauss [J1] can be imagined. The flux tubes of B_{end} could correspond to those of B_E with nominal value .5 Gauss if a weakening of the field value takes place inside living matter. Note that in case of $h_{eff}/h \sim 10^{14}$ this field value would correspond to about 10^{10} Tesla for the ordinary value of \hbar (a field strengths assignable to supernovas!) and assignable to electron Compton scale.

The sequences of these two phase transitions involved with dark metabolism would be very much analogous to ..-ATP-ADP-ATP-... "Karma's cycle". There is also a strong analogy with breathing and even sleep-wake-up cycle and longer bio-rhythms. p-Adic fractality forces to ask whether all these rhythms involve the same dark metabolic cycle but in different scales. Increase of h_{eff} indeed corresponds to an increase of "IQ" in TGD inspired theory of consciousness and its reduction to its lowering. This could quite concretely correspond the experience of becoming tired. There is also a close analogy with the state function reduction sequence in ZEO. State function reductions occur alternatively at the opposite boundaries of causal diamond (CD) of given scale and I have proposed an interpretation in terms of generalized sleep-awake cycles.

5 Does dark biology represent pre- or post-biotic evolution?

The discovery of dark proton realization of genetic codons [K8, K7] was an accident and I am still puzzled about whether the vertebrate genetic code can really emerge from dark nuclear physics or is it only a curiosity or self deception. The first interpretation for the dark code is as a code associated with prebiotic evolution [K6]. This is suggested by the enormous simplicity for the analogs of counterparts of linear biomolecules, and the fact that the utilization of metabolic energy means that these "molecules" decay to ordinary water. In this view life would have migrated from dark space-time sheets to visible space-time sheets. This higher level life would be gradually migrating to lower levels in the hierarchy and taking visible matter to its control and that biological evolution represents a step in this process.

There are however some objections against this view. The dark code corresponds to vertebrate code, which can be seen as an outcome of along genetic evolution. There are also other codes, which are less perfect (thes are discussed in [K1] representing a number theoretic approach to genetic code). For instance, the meaning of the codeword is context dependent for some codons and Peter Gariaev has proposed that this context dependence is a more general phenomenon. One would expect that prebiotic code is much simpler than genetic code and I have considered a model for how genetic code might have emerged from more primitive codes with 4 and 16 code words as a "product code" [K1, K6].

These objections inspire the question whether life could migrate from lower to higher scales. The dark genetic code would in this framework correspond to the emergence of a new level in evolution - perhaps identifiable as cultural evolution. This would explain why dark variant of the genetic code corresponds to vertebrate code. One could also solve Fermi paradox [K9] due to the fact that no signs of intelligent life have been observed in cosmos and probabilistic estimate suggests that cosmos is full of life. The answer could be very simple: in some stage the civilization transforms to dark matter invisible to us! The civilizations are there but living on magnetic flux quanta and probably communicate with us telepathically. The higher evolutionary level would also conform with the fact that the spatial and temporal scales of consciousness are much longer than for the consciousness assignable to visible manner. This could allow also to understand also the mystery of crop circles. To my opinion many of them are genuine, and the interpretation as some kind of cognitive representations analogous to those realized in brain is highly suggestive. Certainly these representations would represent mental images of conscious entities, which are at higher evolutionary level than us [K2, K3].

Many great leaps in evolution have occurred via crisis periods involving extinction. Could it be that gradual transition to dark matter based life could be begin as a response to the recent crises of human kind? The gradual transition of life to the dark matter level would indeed solve the energy problem by coupling us to the energy sources assignable to the dark matter hierarchy at various magnetic bodies. It would also solve the problem caused by the climate warming if it is indeed is due to the liberation of CO₂ as fossil fuels are used. The dark matter "molecules" as analogs of biomolecules and hydrocarbons would produce only water when used.

What has been bothering me somewhat are the messianic elements of free energy movement: something totally new is believed to be emerging even at the level of consciousness and ethics and moral rules. Skeptic scientist finds it difficult to accept the idea that new form of energy could have so wide implications: the fundamental problems of the society relate to ethics and moral. On the other hand, if one interprets free energy phenomena as manifestations of post-biotic life forms realizing genetic code at the level of dark matter, it becomes possible to defend the messianic view about free energy. The transition to dark matter dominated world would mean also leap in the level of consciousness.

The belief in ZEP has also some features that worry me. I believe that there is some great intuition behind this view but to me its realisation in terms of ZEP is wrong thing to do: the existing mathematical physics simply fails to provide the needed language and concepts. My own proposal is zero energy ontology (ZEO) in which physical states are replaced with physical events and continual re-creation becomes possible without giving up the symmetries and laws of physics.

I find it also alarming that some advocates of free energy also have a hostile attitude towards science. This is easy to understand as a reaction to the arrogant attitude of the academic world towards free energy and actually all visions challenging the basic dogmas of the standard science. Christianity emerged as the Roman Empire collapsed and something similar seems to happening now: at this time free energy movement might take the role of Christianity. It would be a pity if also now blind beliefs would replace rational thinking for almost two millenia.

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