

Quantum metabolism

1. Background about metabolism:
 - (a) ATP-ADP believed to be the fundamental step. Analogy with power plant. ATP synthase is nano-motor containing rotating shaft. 3 ADPs are phosphorylated to ATPs per turn, single proton per ATP flows through the shaft. High energy phosphate bond is believed to receive the metabolic energy transferred from the the flow of protons through the mitochondrial membrane.
 - (b) The nominal value of metabolic energy quantum about .5 eV. The Coulomb energy associated with the mitochondrial membrane is 50-80 meV and by almost order of magnitude too small. The large chemical potential difference is believed to explain the large metabolic energy gain. This requires that the process is regarded as purely thermodynamical. Questionable assumption and does not conform with the idea that transmembrane proteins such as ATP synthase act as Josephson junctions.
 - (c) The notion of high energy phosphate bond is not well understood.
 - (d) Conclusion: construction of quantum model highly nontrivial challenge but must be faced in TGD framework.
2. What could be the mechanism of energy liberation?
 - (a) Zero energy ontology suggests that magnetic body is carrier of the metabolic energy in some sense.
 - (b) The transfer might not be the really important aspect. The transfer of negentropic entanglement from nutrient in some sense might be of equal importance.
 - (c) The liberation of metabolic energy could take place in a phase transition in which p-adic length scale increases and h_{eff} is reduced so that the length of flux tubes is not changed. This induces a coherent quantum transition in the sense that large number of particles can liberate cyclotron energy as cyclotron energy scale is reduced in the reduction of magnetic field strength. As protons flow from thinner flux tube with smaller h_{eff} to thicker one, similar reduction of cyclotron energy takes place and the energy is liberated and would be received by ATP synthase to form ATP from ADP. This mechanism could be universal and work also in other situations.
 - (d) At quantitative level the $h_{gr} = h_{eff}$ connection supported by gravimagnetic anomaly claimed by Tajmar et al and giving support for the hypothesis that dark EEG photons decay to biophotons gives support for the picture. The metabolic energy quantum for proton of order .5 eV is consistent with the identification as cyclotron energy difference for proton over mitochondrial membrane. The hypothesis $h_{em} = h_{eff} = h_{gr}$. makes also sense in the case of motor defined by ATP synthase transforming ADP to ATP.
3. What could be the mechanism of energy liberation? A model for Pollack's findings provides further guidelines.
 - (a) Every fourth proton is dark and is transferred to the regions outside the exclusion zone.
 - (b) Dark matter corresponds in TGD Universe to phases with nonstandard value of Planck constant: $h_{eff} = n \times h$ phases at the "magnetic body" of the system (negatively charged region now). Magnetic body corresponds in Maxwell's theory to the magnetic fields generated by the system. Magnetic body consists of flux quanta (flux tubes and sheets).
 - (c) If dark protons with say size scale of atomic size reside at flux tubes, one can assume that they form strings forming dark atomic nuclei. Also ordinary nuclei consist of strings of dark protons and strings of neutrons.
 - (d) The quantum states of dark protons consist of 3 quarks and a simple model involving rotational symmetry around the axis of dark proton string predicts that the states of dark proton can be arranged into groups which correspond to DNA, RNA, amino-acids and possibly also tRNA molecules. Vertebrate genetic code can be realized as a natural correspondence between DNA/ RNA and aminoacids.

- (e) Negatively charged region could define pre-biotic cell and water would be primitive prebiotic lifeform. The voltage would be the analog of the resting potential. The transformation of dark protons to ordinary ones would liberate metabolic energy so that primitive metabolism and photosynthesis would be realized.
4. What could be the mechanism of energy liberation? A model for Pollack's findings provides further guidelines. The exclusion region with magnetic body allows to speculate about what might happen in $ADP \rightarrow ATP$ process and how ATP might store metabolic energy.
- (a) The strings of dark protons would be analogous to basic bio-polymers serving as the basic fuel of metabolics hydrolyzed in metabolism. Basic biopolymerstend to be negatively charged and could be accompanied by dark protons strings and the liberated metabolic energy might be stored to these strings.
- (b) Could metabolism have developed from the transformation of dark protons to ordinary ones as the counterparts of exclusion zones transform back to ordinary water and potential difference disappears? Generalizing: a phase transition reducing h_{eff} for dark protons could be in question.
- (c) The flow from the exterior part of flux tube to inner portion with smaller value of h_{eff} in the case of mitochondria?
- (d) The notion of high energy phosphate bond is somewhat mysterious. ATP is negatively charged and one can wonder whether it could be accompanied by exclusion zone assignable to the negatively charged phosphates. Also DNA strands and many other biomolecules carry negative charge due to the phosphates. Could the metabolic energy be stored to the magnetic body of ATP or of phosphate and eventually liberated by flow of protons to flux tubes with weaker magnetic field. The fundamental role of proton transfer in biochemistry suggests this.
5. Does metabolism actually correspond to transfer of negentropic entanglement between nutrient A and some fixed system B. Could this system be identifiable as gravitational Mother Gaia (MG)?
- (a) Negentropic entanglement (NE) would be transferred. Nutrients would be negentropically entangled with some thing very crucial for life. MG? Gravitational NE with MG would make possible dark EEG, etc... Basic formula is $h_{gr} = GMm/v_0, v_0$ the rotational velocity at surface at the surface of Earth.
- (b) Formula generalizes to em case: $h_{em} = Z_1 Z_2 e^2 / v_0$ and would apply to ATP synthase being consistent with $h_{gr} = h_{em} = h_{eff}$. Em flux tubes could reconnect with gravitational flux tubes for $h_{gr} = h_{em}$.
- (c) Nutrient-MG NE can be transferred: $N-MG \rightarrow P-MG \rightarrow ATP-MG \rightarrow R-MG$ (N for nutrient, R for receiver).
- (d) Mechanism: reconnection of magnetic loops associated with various molecules. N/P/ADP/R has this kind of loops.
- (e) Critical comment: I have used to speak about personal magnetic body. Can this be consistent with gravitational Mother Gaia hypothesis? Is personal magnetic body em body with $h_{em} = h_{gr}$. so that it can communicate with gravitational Mother Gaia. Nutrients are dead and negentropically entangled with gravitational Mother Gaia. Does this allow to conclude that during life we are negentropically entangled with our em body and in biological death entangle with gravitational Mother Gaia? This would conform with spiritual teachings.
- (f) In this picture the basic purpose of metabolism would be the transformation of gravitational NE to electromagnetic NE: basically transfer of information from collective level of consciousness to lower levels to be processed and further enriched and to be returned back to MG in biological death: nothing is lost! Biological death itself would be reconnection transforming flux tube bonds to em magnetic body to MG.