

TGD inspired theory of consciousness and living systems: Part I

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Abstract

Topological Geometro-Dynamics (TGD) proposes a unification of fundamental interactions by identifying space-times as 4-surfaces in 8-D space $H = M^4 \times CP_2$, whose geometry codes for standard model symmetries and geometrizes known fields. Point-like particle is replaced with 3-surface (3-space). One ends up with the notions of many-sheeted space-time and magnetic body (MB) central in TGD inspired quantum biology. p-Adic and adelic physics follows from the extension of physics to describe also the correlates of cognition and imagination. Adelic physics predicts a hierarchy of Planck constants labelling phases of ordinary matter interpreted as dark matter: the predicted quantum coherence in arbitrarily long scales is crucial for quantum biology. Quantum TGD replaces standard ontology with "zero energy ontology" (ZEO) replacing quantum state as time=constant snapshot with zero energy state (ZES) identified as a superposition of deterministic classical time evolutions - kind of quantum program.

In this part of the article TGD proper and the arguments behind TGD inspired quantum biology are considered. In part II the arguments leading to TGD inspired theory of consciousness will be discussed.

Keywords: Biology, consciousness, unified theories, geometrization of physics, quantum measurement theory.

1 Introduction

In the sequel the basic ideas of TGD inspired quantum theory of consciousness and biology are considered [Pitkänen, 2014] [Pitkänen, 2017d, Pitkänen, 2018a] (see <http://tinyurl.com/ycxm2tpd> and <http://tinyurl.com/yyyk6fu8>). Topological Geometro-dynamics (TGD) [Pitkänen, 2006, Pitkänen, 2016a] (see <http://tinyurl.com/y5byyh2>) is a 41 year old proposal for a unification of fundamental interactions based on new view about space-time inspired by the problem of General Relativity (GRT) with classical conservation laws ("energy problem"). Matter makes GRT space-time curved leading to the

loss of the symmetries of Minkowski space M^4 of Special Relativity (SRT). Poincare invariance implies the conservation laws of energy, momentum, and angular momentum via Noether's theorem lost in GRT.

If space-time is a 4-surface in space of form $H = M^4 \times S$, S some compact space with very small size, space-time isometries are raised to those of H to regain Poincare symmetries. $S = S = CP_2$ codes for the symmetries of standard model.

TGD proper as a physical theory involves several threads.

1) Classical TGD at space-time level: $X^4 \subset H = X^4 \subset M^4 \times CP_2$. The new elements are many-sheeted space-time topologically non-trivial in all scales, and topological field quantization implying that physical systems have field identity, field body, in particular magnetic body (MB) [Pitkänen, 2010d, Pitkänen, 2010c] (see <http://tinyurl.com/yxpomw9y>).

One ends up to a geometrization of gravitational field and gauge fields of the standard model as induced fields. The QFT limit is obtained by replacing the sheets of many-sheeted space-time with slightly curved region of M^4 and identifying gauge potentials and gravitational field as superpositions of induced fields at various space-time sheets.

2) Quantum TGD replaces Wheeler's superspace with the "World of Classical Worlds" (WCW) as the space of 3-surfaces, which are by holography in 1-1 correspondence with space-time space-time surfaces identified as preferred extremals (PEs) of the basic variational principle and analogous to Bohr orbits: classical physics becomes an exact part of quantum physics [Pitkänen, 2010a, Pitkänen, 2010b] (see <http://tinyurl.com/y3pvcull>). Einstein's geometrization of classical physics extends to that of quantum physics. The geometry of WCW and physics is highly unique from its mere existence requiring maximal group of isometries: a result proved by Freed for loop spaces [Freed, 1985].

3) Number theoretical vision is also a part of TGD (see <http://tinyurl.com/y4cto4go>). p-Adic number fields serve as correlates of cognition and imagination. Space-time is replaced with a book like structure having both real and various p-adic space-time sheets as pages. The outcome is adelic physics as fusion of various p-adic physics [Pitkänen, 2017a] (see <http://tinyurl.com/ycbhse5c>). The extensions of rationals (EQ) induce extensions of p-adic numbers fields and of adeles giving rise to a hierarchy of physics having interpretation in terms of evolution induced by the increase of the complexity of the EQ. Adelic physics leads also the hierarchy of Planck constants $h_{eff}/h_0 = n$ with n identified as dimension of EQ making possible quantum coherence in arbitrarily long time scales essential for understanding living matter.

Second aspect of number theoretical vision are classical number fields: reals, complex numbers, quaternions and octonions. $M^8 - H$ correspondence [Pitkänen, 2017b, Pitkänen, 2017c] (see <http://tinyurl.com/y5c4vnjj>) allowing to interpret complexified M^8 as complexified octonions allows to map surfaces of M^8 identified as roots of octonionic polynomials to PEs in $H = M^4 \times CP_2$.

4) Twistor lift of TGD generalizes ordinary twistor approach [Pitkänen, 2018c] [Pitkänen, 2018d] so that 4-D masslessness implying problems in twistor approach is replaced with 8-D masslessness so that masses can be non-vanishing in 4-D sense. 4-D space-time surfaces are replaced with the analogs of their twistor bundles for which twistor structure is induced from 6+6-D twistor space of H - a product of twistor spaces of M^4

and CP_2 . Twistor space has Kähler structure only for M^4 and CP_2 [Hitchin, 1981]. Since Kähler structure is necessary for the twistor lift of TGD, TGD is unique. One outcome is length scale dependent cosmological constant taking a central role in the theory.

2 TGD based quantum biology

One can approach TGD inspired quantum biology by making questions.

Problem #1: How to understand coherence of living systems? If only bio-chemistry is involved, we would be sacks of water and sacks of water do not climb in trees or write poems. Could quantum coherence induce the coherence? What entity serve as intentional agent and how it could realize its intentions?

1) Topological field quantization applies to electric and magnetic fields [Pitkänen, 2010c] (see <http://tinyurl.com/yxpomw9y>). For instance, magnetic field decomposes to flux tubes having finite thickness. Radiation fields are topologically quantized to topological light rays. Each system has its fields at separate space-time sheets touching each other only via wormhole contacts: system has field body, in particular magnetic body (MB) having hierarchical onion-like structure corresponding to the hierarchy of space-time sheets.

2) MB serves as the intentional agent using biological body (BB) as motor instrument and sensory receptor. MB controls BB via dark photon dark photon beams with large h_{eff} . The double BB + environment is replaced with the triple MB + BB+ environment. The vision about life as nothing but biochemistry is given up.

3) Experiments of Blackman [Blackman, 1994] and others demonstrated the quantal effects of ELF radiation on vertebrate brain. For the ordinary value of Planck constant these effects are however impossible since the energy $E = hf$ of EEG photons is extremely small. This motivated what eventually became $h_{eff}/h_0 = n$ hypothesis derivable now from adelic physics [Pitkänen, 2017a].

4) Dark matter at the flux tubes of MB corresponds to $h_{eff}/h_0 = n$ phases and induces coherence of visible living matter. The generalization and re-interpretation of Nottale's hypothesis [Nottale and Rocha, 2003], which reads as $h_{eff} = h_{gr} = GMm/v_0$, where $v_0 < c$ has dimensions of velocity and M and m are masses at the ends of the magnetic flux tube along which gravitons travel is essential element. The hypothesis implies that the cyclotron energy scale for charged particle is independent on m . The spectrum of Josephson frequencies for cell membrane is universal but now the energies are inversely proportional to h_{eff} .

Problem #2: How MB uses BB as sensory receptor and motor instrument?

1) Dark photons with large h_{eff} serve as as communication and control tools. Josephson frequencies would be involved with the communication of sensory data to MB and cyclotron frequencies with control by MB. Dark photons are assumed to transform to biophotons [Pitkänen, 2013] (see <http://tinyurl.com/y5z4bog3>) with energies covering visible and UV associated with the transitions of bio-molecules. The control by MB which layers having size even larger than that of Earth means that remote mental interactions are routine in living matter.

2) In ZEO field body and MB correspond to 4-D rather than 3-D field patterns. Quantum states are replaced by quantum counterparts of behaviors and biological functions. The basic mechanism used by MB would be generation of conscious holograms by using dark photon reference beams from MB and their reading. In ZEO also the time reversals of these processes are possible and make possible to understand memory as communications with geometric past. Sensory perception and memory recall would be time reversals of each other and correspond to sequences of SSRs. Motor action would correspond to BSRs.

Problem #3: Why metabolism? Particles with nonstandard h_{eff}/h_0 have higher energy as a rule. For instance, atomic binding energies are proportional to $1/h_{eff}^2$ and thus smaller. Cyclotron energies are proportional to h_{eff} . Metabolic energy is needed to excite particles to dark states and thus to increase their "IQ" .

Problem #4: What is evolution? Evolution as increase of $h_{eff}/h_0 = n$ means increase of the dimension of extension of rationals in statistical sense at least since the number of extensions with dimension larger than given integer n is infinite and those with dimension smaller n is finite: algebraic complexity increases.

Problem #5: What about genetic code?

1) Chemical genetic code need not be fundamental if chemistry is only a shadow of the dynamics of MB: more naturally it would be induced by MB mimicing genetic code at dark level. I have proposed a dark variant of genetic code associated with dark nuclei at magnetic flux tubes [Pitkänen, 2016c, Pitkänen, 2018b] (see <http://tinyurl.com/ya1ny39x>): dark proton triplet would serve as a codon. Dark DNA, RNA, tRNA, amino-acids (AAs) exist and the numbers of various codons and of AAs and also the numbers of genetic codons coding for given AA are correctly predicted.

2) Dark-dark and dark-visible communications are required. Frequency resonance mechanism could be involved with dark-dark communications and energy resonance with dark-visible communications. Cyclotron frequencies of dark protons at the magnetic field of flux tube and Josephson frequencies associated with cell membrane are natural frequencies.

3) Communication requires a code and genetic code is the natural guess. Ordinary codons would be replaced with 3-chords. One could speak of music of light. One ends up with this code from a model for harmony. Music expresses and creates emotions and "music of light" could provide correlates for moods/emotions at the molecular level (see <http://tinyurl.com/y3auow4a>).

There is a connection with Platonic geometries speculated already by Pythagoras. Hamilton cycles at icosahedron *resp.* dodecahedron would realize 12-note *resp.* 20-note scale as closed self-non-intersecting curve connecting neighboring points and going through all vertices. For icosahedron the 20 triangular faces define 20 allowed 3-chords of the harmony: there is a large number of harmonies. For dodecahedron the 12 5-chords associated with 12 pentagonal faces define a unique harmony. There is a natural mapping of 5-chords to 3-chords. The fusion of 2 icosahedral and 2 dodecahedral harmonies gives $20+20+12+12 = 64$ chords allowing an identification in terms of the genetic code. The number 20 of triangular faces relates to the number of amino-acides. The numbers of codons coding for given amino-acid are predicted correctly.

Problem #6: What is morphogenesis? If biology is mere chemistry, its is very difficult to answer this question. If space-time topology is non-trivial in all scales, situation

changes dramatically. All structures - including bio-molecules, membrane like structures, organelles, organs, ... - would be 4-D space-time surfaces, dynamical patterns, and morphogenesis would emerge at classical level [Pitkänen, 2018e, Pitkänen, 2016b].

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