Proposal for Testing Topological Geometrodynamics

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1 What TGD is and why TGD?

In General Relativity (GRT) the notion of energy is poorly defined: matter makes space-time time curved and symmetries guaranteeing conservation laws via Noether's theorem are lost (`http://tinyurl.com/z5mbc9m`). My proposal for overcoming the energy problem is that space-times are not abstract 4-D manifolds but representable as 4-D surfaces in certain 8-dimensional space-time $H = M^4 \times CP_2$: empty Minkowski space M^4 with points replaced with certain very small 4-D space CP_2 fixed from the condition that standard model symmetries and fields can be geometrized. I call this approach Topological Geometrodynamics (TGD) (thesis in 1982).

The modification can be also seen also as a generalization of string model with strings in 10-D space-time replaced with 3-D surfaces in H with their "orbits" identifiable as space-time surfaces. The connection with string model picture is actually much deeper. By strong form of holography 2-D string world sheets and so called partonic 2-surfaces carry the data needed to construct quantum states and space-time surfaces as solutions of field equations. 4-D space-time is however necessary for quantum-classical correspondence needed to describe measurements.

2 Why TGD could be of earth-shaking significance?

In TGD Universe Planck length scale reductionism is replaced with fractality (`http://tinyurl.com/z5mbc9m`). Non-trivial predictions emerge in all scales from CP_2 length to cosmology.

1. At classical level the notion of many-sheeted space-time emerges. A 2-D visualization is as a hierarchical structure consisting of space-time sheets of all possible sizes extremely near to each other and connected by wormhole contacts (`http://tinyurl.com/hgd5ktv`). Space-time sheets correspond to material objects and we directly observe them. GRT is obtained an approximate description when the sheets are replaced with single slightly curved region of Minkowski space.

   The compactness (finite size) of CP_2 implies topological field quantization: classical electric, magnetic, and radiation fields decompose to topological field quanta (`http://tinyurl.com/zpyu7a8`). Physical systems have field identity, field body (not true in Maxwell's theory). For instance, magnetic field decomposes to flux tubes and sheets giving rise to magnetic body (MB). MB carrying dark matter serves as intentional agent in biological systems. The organism-environment duality is replaced by MB-organism-environment trinity.

2. The construction of quantum TGD leads to a generalization of the notion of super-space of Wheeler to what I call "World of Classical Worlds" (WCW) identifiable as space of 3-surfaces in H. The mere mathematical existence of this infinite-D geometry fixes it highly uniquely and therefore also physics - this is true already for the loop spaces of string model. A huge generalization of the symmetries of super-string models emerges giving hopes about calculable theory.

   One implication is the hierarchy of Planck constants $h_{eff} = n \times h$. I ended up with it first from the observation that ELF radiation has unexpected "quantal" effects on vertebrate brain at cyclotron frequencies for biologically important ions in "endogenous" magnetic field $B = .2$ Gauss. Large h_{eff} means that quantal length scales are scaled up by n and makes possible macroscopic quantum coherence essential for understanding living matter as quantum system and also making topological quantum computation easier. Quantum biology emerges as one thread of TGD.

   The construction of quantum theory forces the replacement of the usual positive energy ontology (PEO) with zero energy ontology (ZEO). Physical state as a 3-D snapshot of time evolution is replaced with 4-D zero energy state analogous to physical event in PEO - pair of initial and final states. Opposite values of conserved quantum numbers - in particular energy- allow to achieve the usual conservation laws. Quantum measurement theory generalizes to a theory of consciousness.

   In ZEO quantum states are superpositions of space-time surfaces connecting the positive and negative energy parts of the states. State function reduction replace the zero energy state with a new one: this solves the basic paradox of ordinary quantum measurement theory

due to the conflict between non-determinism of state function reduction and determinism of unitary time evolution. "Self" corresponds to generalized Zeno effect: a sequence of state function reductions to say positive (negative) energy part of zero energy state. Self "dies" when the first reduction to negative (positive) part occurs. The flow of experienced time and its connection with clock time can be understood. In biology/neuroscience 4-D character implies that functions/behavioral patterns replaced 3-D states of brain.

3. Number theoretical physics. p-Adic number fields - one for each prime $p = 2, 3, 5, ...$, are completions of rationals. The attempt to understand elementary particle mass spectrum led to p-adic thermodynamics (`http://tinyurl.com/gkt7jbt`). p-Adic physics is proposed to define correlates for cognition, imagination, and also intention. The fusion of real physics and various p-adic physics to single coherent whole leads to adelic physics. Information is essential for cognition: the p-adic analog of Shannon entropy can be negative and can be identified as a measure for conscious information.

3 How to test my hypothesis?

I am not an experimentalist and my strategy has been passive in the sense that I have proposed explanations for various anomalies in various branches of physics, biology, and neuroscience. The most promising tests come from particle physics, biology, and neuroscience. Below few examples, which might serve as starting point for planning experiments.

1. Fractally scaled up variants of hadron physics are predicted and simple scaling argument predicts the masses of new hadrons. LHC has begun to show indications for bumps with predicted masses of new hadron physics (`http://tinyurl.com/hen5cgc`). Scaled uper variants of hadron physics could be present also in biological length scales.

2. In biology TGD suggests a mechanism (`http://tinyurl.com/gwasd8o`) generating Pollack's exclusion zones (EZs) (`http://tinyurl.com/oyhstc2`) in terms of transformation of protons to dark protons at magnetic body of EZ. This might explain why for instance DNA is negatively charged. EZs or their generalization could play fundamental role in metabolism: protons running through mitochondrial membrane could be dark as also other biologically important ions. Dark protons could be important in electrolysis and explain what happens in cold fusion (`http://tinyurl.com/gp63pf9`). ZEO allows both arrows of geometric time in living matter: negative energy signals in reversed time direction become possible. One must generalize thermodynamics by introducing the notion of syntropy suggested already by Fantappie. Active metabolism (credit card mechanism/remote metabolism) becomes possible: system gains positive energy as a recoil effect by sending negative energy dark photons to a source able to absorb them. It has been reported that some GUT cells without mitochondria can survive: maybe remote metabolism by sending of negative energy to cells with mitochondria is involved (`http://tinyurl.com/zrps67k`).

3. In neuroscience EEG would make possible communications between MB and biological body. For instance, the recently observed synchrony between hemispheres in absence of corpus callosum couldbe due to magnetic body serving as a "boss" (`http://tinyurl.com/zzn3qxb`). The existence EEG and its strong correlation with brain state and consciousness could be understood in terms of communication of sensory data from cell membranes to MB and control and coordination by signals from MB to biological body. Signals would consist of dark photons with energies $E = h_{eff}f = n \times hf$ (see below) in bio-photon energy range and thus above thermal energies. Bio-photons would result from the transformation of dark photons to ordinary ones.

4 Which field of science or group of scientists does my proposal challenge?

By the fractality of TGD Universe, non-trivial predictions emerge in all scales.