Some anomalies associated with the Sun

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Abstract

Three anomalies associated with the Sun are discussed. The water in the solar system is older than the Sun. There is also evidence for water in the photosphere as well as the existence of a solid conductive layer in the photosphere consisting mostly of calcium ferrite. These findings are discussed in the framework provided by the TGD view of the formation of astrophysical objects.

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1 Introduction

Three anomalies associated with the Sun are discussed. The water in the solar system had been found to be older than the Sun. There is also evidence for water in the photosphere as well as the existence of a solid conductive layer in the photosphere consisting mostly of calcium ferrite [E2].

These findings are discussed in the framework provided by the TGD view of the formation of astrophysical objects [L9].

1. Contrary to the standard view, planets and other structures of the stellar system would be formed in explosions of the Sun induced by a transformation of dark matter (in the TGD sense) to ordinary matter liberating energy.

2. Dark nuclei identified as dark protons sequences at monopole flux tubes would be formed by dark fusion in the transformation of cosmic strings to monopole flux tubes. Dark nuclei would transform to ordinary nuclei and liberate almost the entire nuclear binding energy. This "cold fusion" would give rise to prestellar objects gradually heated to the ignition temperature of the ordinary nuclear reactions [L2, L4, L3].

3. The TGD view of the gravitational Planck constant introduced by Nottale [E1] is a third key element of the model and the huge value of $\hbar_{gr}$ predicts that gravitational quantum coherence is possible in astrophysical scales. Nottale proposed a model for the solar system as analog of a hydrogen atom and this model inspires the TGD based view in which orbits can correspond also to ellipsoidal surfaces or ellipses. The Bohr orbits $n = 1$ and $n = 2$ seem, however, to be missing. An intriguing finding is that the radius of the lowest Bohr orbit with $n = 1$ is with 13 per cent accuracy the radius of the photosphere. Could this orbit correspond to the conductive layer proposed by Moshina? Is also a layer with the Bohr radius of $n = 2$ orbit present?

Even water could have emerged before the initiation of nuclear reactions and the formation of solar core and. Also other elements, even those heavier than Fe (their formation is poorly understood in the standard model), could have emerged already at this period.

The big question mark is how solid matter is possible in the conductive layer at a temperature about 5,800 K of the photosphere. TGD suggests the possibility that the dark monopole flux tube layer parallel to the solar surface suggested by the model of the solar cycle discussed in [L10] serves as a shield against the radiation from the interior of the Sun so that the temperature of the layer can be low. This mechanism would also shield the biosphere from cosmic rays and solar wind. Interestingly, the photosphere has an anomalously low temperature.

2 Why is the water in the solar system older than the Sun?

It has been found that water in the solar system is older than the Sun (see `https://rb.gy/3noqn4`). By looking at the water on protostar V883 Orion, at a distance of 1,305 light-years from Earth, scientists found a "probable link" between the water in the interstellar medium and the water in our solar system. Water molecules in Orion have a similar deuterium-to-hydrogen ratio that in the solar system. That likely means our water is billions of years older than the sun. The finding is analogous with the finding that some stars and galaxies are older than the Universe.

2.1 ZEO based explanation

A possible TGD based explanation for the observation that water at Earth is older than the Sun could be based on zero energy ontology (ZEO) forming the basis of the TGD based quantum measurement theory solving the basic paradox of quantum measurement theory.

1. In ZEO, the arrow of geometric time changes in the ordinary state function reduction, which means that systems live forth and back in geometric time. By this forth and back motion, the evolutionary age of the system is different from the temporal distance from its moment of birth. This explains the existence of stars and galaxies older than the Universe and could also explain why the water at Earth is older than the Sun.

2. In the TGD based quantum biology water is a living system in the sense that it is characterized by a large value of effective Planck constant (second basic difference from standard quantum theory) implying long quantum coherence scales. This makes the geometric duration of a life in a given time direction long and therefore increases the evolutionary age of water. In living matter, Pollack effect occurs at physiological temperatures and means a formation of phase of water with effective stoic

3. The evolutionary age for water on Earth could be longer than for water in the Sun since the environment is different. Earthly environment makes the phase transitions producing the

fourth phase of water discovered by Pollack [I2, L1, I4, I3] and discussed from the TGD point of view in [L1]. It has   effective stoichiometry $H_{1.5}O$ and has properties suggesting the change of the arrow of time. These phase transitions occur at the physiological temperature range.

At physiological temperatures the phase transitions changing the arrow of time could take more often and the life cycle with a given arrow of time would last longer. This is so because the magnetic body of water, carrying dark protons,   makes it a macroscopic quantum system. The periods with a reversed arrow of time have been much longer (larger h_{eff} is the essential reason). Therefore the water on Earth could be older in the evolutionary sense.

2.2   Objection

There is however an objection against the ZEO based explanation.

1.   The TGD view of the formation of planetary systems predicts that planets are formed in explosions throwing matter from the Sun. The water on Earth should therefore originate from the Sun or from the protostar Sun.

2.   There is indeed evidence against the idea that water on Earth originates from melted meteorites: they are now known to be extremely dry. This leaves non-melted meteorites, chondrites, as one particular option (`https://rb.gy/wwob8l`).

3. There is also evidence for water in the Sun from Nasa (`https://rb.gy/wc9vl7`)! There is even a proposal that the water on Earth might have arrived from the Sun (see `https://rb.gy/t1yaz8`)!

    The idea about the presence of water in the Sun looks insane in the standard physics framework but in the TGD Universe the water molecules could reside at the monopole flux tubes of the magnetic body of the Sun.

2.3   Could water emerge already before the formation of the solar core?

How can the water on Earth be older than the Sun if it originates from the Sun?   The simplest answer is that also the water in the Sun is much older than the Sun.

1.   This is possible in the TGD view of the formation of astrophysical systems [L9, L10], in particular stellar cores [L3, L2, L4] and would conform with the findings, which led to the proposal that water to solar system has migrated from say Orion. Now this is not needed.

2. First the analog of "cold fusion" would have led to the formation of protostar at much lower temperature but already produced dark analogs of nuclei as dark proton sequences, which would have spontaneously transformed to ordinary nuclei and liberated essentially all nuclear binding energy. This would have led to the formation of water molecules already before the ordinary nuclear fusion started. This prestellar history would be universal and the same in the protostar Orion and in the protostar Sun. For this option, ZEO is not necessary and it would conform with the findings. Of course, the water in living matter could be evolutionarily much older than the water elsewhere in the solar system.

3   Does Sun have a solid surface?

There are indications for the presence of elements other than water near the surface of the Sun. The findings discussed by Moshina [E2] suggested already about 17 years ago that the photosphere has a rigid conductive layer. This layer could also contain water.

One of my first speculative applications of the evolving TGD view of dark matter (roughly 15 years ago) and of the TGD based interpretation of the Nottale's formula [E1] was the proposal that   could be interpreted as a TGD counterpart for a Bohr orbit, not as an orbit but a spherical layer [K3, K2].

At that time I had no ideas about number theoretic interpretation of the dark matter hierarchy nor a general view of the formation of astrophysical objects in terms of a transformation of dark

energy of cosmic strings to dark matter at monopole flux tubes in turn transforming to the ordinary matter [L9].

3.1 TGD view of the planetary system

The recent view of the formation of planets and their moons and rings indeed allows spherical layers having as representative Oort clouds; torus-like flux tubes having as representative the rings of Jupiter; and ordinary planets.

1. They would be formed in a phase transition in which the gravitationally dark matter associated with a bubble formed by monopole flux tubes transforms to ordinary matter and can be also localized to lower dimensional structure. The analog of localization in state function reduction in astrophysical scale taking place in measurement would be in question. For instance, the formation of a planet would correspond to a measurement of a momentum direction and radial distance for a delocalized state described approximately by the analog of hydrogen atom wave-function.

2. The Nottale model predicts that the inner planets Mercury, Venus and Earth correspond to Bohr orbits with $n = 3, 4, 5$. What about $n = 1$ and $n = 2$ orbits? For Earth one has $n = 5$ and from the radius of Earth orbit, which is $AU = 1.5 \times 10^8$ km by definition, the radius of $n = 1$ orbit given by gravitational Bohr radius a_{gr} and is $a_{gr} = AU/25 \simeq 6.0 \times 10^6$ km. The radius of the photosphere is $R = 6.96 \times 10^6$ km giving $a_{gr}/R \simeq .87$. $n = 1$ Bohr orbit or Bohr shell with radius $R_1 = a_{gr}$ would be just below the photosphere. $n = 2$ Bohr orbit would correspond to the radius $R_2 = 2.4 \times 10^7$ km. Is there any evidence for a spherical layer or a ring, at this distance?

3. If the mass of the layer of thickness ΔR is the same as that of Mercury ($.055 \times M_E$) with radius $R_M = .38 \times R_E$ and the density of the layer is the same as that of Earth, one obtains the estimate $\Delta R = (R_M/R_1)^2 R_M/3 \sim 3.2$ m. The layer would be extremely thin. If the mass is Earth's mass, ΔR increases by the factor $.38^3$, roughly by two orders of magnitude.

3.2 Evidence for the existence of the conductive solid layer in photosphere

Is there any empirical evidence for the proposed view?

1. There was already 15 years ago evidence that there is a solid surface with radius of $n = 1$ Bohr orbit. Recently new satellites have begun to provide information about what lurks beneath the photosphere. The pictures produced by Lockheed Martin's Trace Satellite and YOHKOH, TRACE and SOHO satellite programs are publicly available on the web. The SERTS program for the spectral analysis suggests a new picture challenging the simple gas sphere picture [E2].

   The visual inspection of the pictures combined with spectral analysis has led Michael Moshina to suggest that the Sun has a solid, conductive spherical surface layer consisting of calcium ferrite. The article of [E2] provides impressive pictures, which in my humble non-specialist opinion support this view. Of course, I have not worked personally with the analysis of these pictures so that I do not have the competence to decide how compelling the conclusions of Moshina are. In any case, I think that his web article deserves a summary.

2. Before the SERTS people were familiar with hydrogen, helium, and calcium emissions from the Sun. The careful analysis of the SERTS spectrum however suggests the presence of a layer or layers containing ferrite and other heavy metals. Besides ferrite, SERTS found silicon, magnesium, manganese, chromium, aluminum, and neon in solar emissions. Also elevated levels of sulphur and nickel were observed during more active cycles of the Sun. In the gas sphere model these elements are expected to be present only in minor amounts. As many as 57 different types of emissions from 10 different kinds of elements had to be considered to construct a picture about the surface of the Sun.

3. Moshina has visually analyzed the pictures constructed from the surface of the Sun using light at wavelengths corresponding to three lines of ferrite ions (171, 195, 284 Angstroms). On the basis of his analysis he concludes that the spectrum originates from rigid and fixed surface structures, which can survive for days. A further analysis shows that these rigid structures rotate uniformly.

    The existence of a rigid structure idealizable as a spherical shell in the first approximation could by previous observation be interpreted as a spherical shell corresponding to $n = 1$ Bohr orbit of a planet not yet formed. This structure would already contain the germs of iron core and of crust containing Silicon, Ca and other elements.

3.3 Standard physics does not favor the existence of the layer

Standard physics does not favor the existence of this kind of layer.

1. The solids become typically liquid at the temperature of about 5800 K prevailing in the photosphere (https://rb.gy/rgvhpg). Ordinary iron and also ordinary iron topologically condensed at dark space-time sheets, becomes liquid at temperature 1811 K at atmospheric pressure. Using for the photospheric pressure p_{ph}, the ideal gas approximation $p_{ph} = n_{ph}T_{ph}$, the values of photospheric temperature $T_{ph} \sim 5800$ K and density $\rho_{ph} \sim 10^{-2}\rho_{atm}$, and idealizing photosphere as a plasma of hydrogen ions and atmosphere as a gas of O_2 molecules, one obtains $n_{ph} \sim .32n_{atm}$ giving $p_{ph} \sim 6.4p_{atm}$.

    This suggests that calcium ferrite cannot be solid at temperatures of order 5800 K prevailing in the photosphere (the material with highest known melting temperature is graphite with melting temperature of 3984 K at atmospheric pressure). Thus it would seem that dark calcium ferrite at the surface of the Sun cannot be just ordinary calcium ferrite at dark space-time sheets. A more reasonable option is that there is new physics allowing to have a low temperature at the layer.

2. There is also a problem with the existence of water in the photosphere. The bond energy is 4.4 eV per bond so that the total bond energy is 8.8 eV. The peak energy of blackbody radiation is given by $E_{peak} = 2.4 \times 10^{-4}T/K$ eV and 8.8 eV is below the thermal energy of order 12.1 eV associated with the photospheric temperature $T = 5,500$ K so that water molecules are not be stable at these temperatures.

3.4 Could the TGD based new physics allow the layer?

The following speculative explanation for the solid surface is an updating of the earlier proposal [K3, K2].

1. In the model of the solar cycle in terms of monopole flux tubes, the flux loops at the surface have inner and outer parts. The inner parts are always parallel to the solar surface and reside below it. Outer parts form flux loops extending outside the photosphere. With a 11 year cycle, the long monopole loops return to thin parallelepiped configuration, which splits to short monopole flux loops by reconnections, which then reorganize to flux tubes with opposite polarity. Could these monopole flux loops be accompanied by a solid surface of ordinary matter with the radius of $n = 1$ Bohr orbit.

    The interior portion of the gravitational monopole flux loops would carry dark matter with $\hbar_{gr} = GMm/\beta_0$, $\beta_0 \simeq 2^{-11}$ and corresponding gravitational Compton length $\Lambda_{gr} = GM/\beta_0 \simeq 6 \times 10^3$ km, which happens to be in a good approximation the radius of Earth.

2. Could the monopole flux tubes shield the ordinary matter at the layer from the effects of the radiation arriving from the solar interior in the same way as they would shield the biosphere from the cosmic radiation and solar wind? Could the radiation from the solar interior be caught by monopole flux tubes and leave the Sun as a solar wind?

3. If there are stable water molecules in this layer, its temperature should be rather low. If the water is in liquid or solid phase, the temperature must be of the order of the temperature at Earth. This inspires a crazy question: could the monopole flux tubes carrying gravitational

dark matter allow even chemical life inside this layer [L7, L6]? How low the temperature of dark matter at the flux tubes can be and is it possible to estimate it using the existing data?

4. The cyclotron energies of dark particles are proportional to $\hbar_{eff} = \hbar_{gr}$. Could this allow us to transform the arriving high temperature radiation from the solar interior to a low temperature radiation at the monopole flux tubes from which it could leak out as solar wind? Could even the radiation from the solar interior arrive along radial gravitational U-shaped monopole flux loops and have a low temperature? If so, the magnetic body of the solar interior would be an astrophysically quantum coherent system and very different from what we believe it to be.

The above posed questions of course sound totally crazy in the standard physics framework but we really have only the standard physics based view of what happens in the Sun. Quantum gravitational coherence in astrophysical scales might change our views completely.

3.5   Could TGD view of quantum gravitation allow nuclear life?

The prevailing dogma is that life is always chemical. The above considerations force us to challenge this dogma. Just for fun, one can therefore play with the thought that fractality of the TGD Universe could allow life at temperatures prevailing in the solar interior.

This life should be based on nuclear physics instead of chemistry. The realization of the genetic code [L8, L5] in the TGD framework relies on dark proton (or possibly nucleon) sequences. According to the TGD based view of nuclear physics [K1], the ordinary nuclei also correspond to sequences of nucleons at monopole flux tubes, which form a kind of nuclear spaghetti. Therefore the realization of also nuclear genetic code could rely on nucleon sequences. The chemical realization of the genetic code could be seen as the next step in evolution.

1. Gravitational magnetic body carrying gravitationally dark matter and consisting of the mopole flux tubes would still be the controller. The average magnetic field at the surface of the Sun is indeed about $2B_E \simeq 1$ Gauss. Just for definiteness, one could assume that the scale for the strength of the monopole magnetic field is twice that for the monopole flux tubes at the surface of Earth that is $2B_{E,mono} \simeq 4B_E/5 \simeq .4$ Gauss.

2. The scale of cyclotron energies for $\hbar_{gr} = GMm/\beta_0$, where $\beta_0 \simeq 2^{-11}$ is assumed in Nottale's model, would be scaled up from that at the surface of Earth by the factor $x = (M_S/M_E) \times (\beta_{0,E}/\beta0, S) \times (B_S/B_E)$. For $\beta_{0,E} \simeq 1$ prevailing in the Earth's magnetosphere, this would give $x \simeq 2.5 \times 10^9$.

   For the energy 1 eV of a photon in biophoton wavelength range one the energy $E = h_{eff}f$ would scale up to 2.4 GeV, which corresponds to more than 2 proton masses! This looks non-sensible.

3. However, in the outer magnetosphere of Earth where $\hbar_{gr,S}$ is expected to prevail, the values of B_E are in the range 1-10 nTesla, which means that the scale of the magnetic field (and also monopole flux) is reduced by about 5×10^{-5}. This would reduce the dark cyclotron energy ratio to $x = 1.25 \times 10^5$. 1 eV energy would be scaled to the range of .1-1.0 MeV, which corresponds to nuclear binding energy scale.

4. For $\beta_{0,S} = 2^{-11}$ the lowest solar Bohr orbit has a radius slightly larger than the radius of the photosphere, so that it cannot correspond to the matter in the interior of the Sun.

   For $\beta_{0,core} = 1$, the lowest Bohr radius would be $r_B = 4\pi GM/\beta_{0,core} = 6\pi$ km, which makes 2π solar Scwartschild radii. The value of x would be $x = 5 \times 10^5 B_{core}/B_E$, and for $B_{core}/B_E = 1$ the biophoton energy scale of 1 eV would scale up to .5 MeV, which corresponds to the mass of electron and to the nuclear binding energy scale.

Maybe nuclear life at the solar core and even in the outer magnetosphere of Earth might be considered.

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