50 questions related to astrophysics, climate, and other issues

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Abstract

This article consists of 50 questions related to astrophysics, climate, and other issues. These questions were posted in www.researchgate.net since Aug. 24, 2013 until June 11, 2014. Hopefully these questions can motivate further investigations.

Questions

[1] **Does the universe have a core?**
Recently, michael peck suggests that the universe has a core, see http:// vixra.org/abs/1305.0138. His theory was based on a revised version of general relativity. (Aug. 24, 2013)

[2] **Does the Universe work like a human brain? Is there data supporting this hypothesis?**
This question may relate to complex network, cognitive science and quantum physics. See an article : http://www.livescience.com/25027-universe-grows-like-brain.html and also http://vixra.org/abs/1309.0011 (Sep. 6, 2013)

[3] **Can we extend Silberstein bivector to become quaternion vector to generalize further Maxwell equations?**
See several papers on Silberstein bivector in arxiv for example: http://arxiv.org/pdf/hep-th/0310036.pdf (sep. 13, 2013)

[4] **How can we explain Tifft's quantization of galaxy redshift?**
The reports by Tifft on quantization of galactic redshift are well-known to astronomers. Read for example http://www.vixra.org/abs/1309.0011. See also a recent review on redshift theories by Marmet at http://www.marmet.org/cosmology/redshift/mechanisms.pdf (sep. 20, 2013)

[5] **Does Godel's incompleteness theorem limit Artificial Intelligence?**
Gödel's incompleteness theorems have their own limitations, but so do Artificial Life (AL)/AI systems. Based on our experiences so far, human mind has incredible abilities to interact with other part of human body including heart, which makes it so difficult to simulate in AI/AL. However, it remains an open question to predict whether in the future AI research including robotics science can bring this gap closer or not. See for example http://vixra.org/abs/1303.0072 (sep. 27, 2013)

[6] **Are there alternatives to dopamine hypothesis in order to explain schizophrenia?**
Traditional models of schizophrenia have emphasized dopaminergic dysfunction. Over the last 20 years, however, Limitations of the dopamine model have become increasingly apparent, necessitating development of alternative models. One of these alternative models are glutamatergic models, proposed by Daniel C. Javitt. See his 2010 paper in http://doctorsonly.co.il/wp-content/uploads/2011/12/2010_1_2.pdf (Oct. 9, 2013)

[7] **Will there be a massive hyperinflation soon in the USA because the FRB has already printed too much money out of thin air?**
According to the news, a number of large investors have sold their stocks massively. See http://www.moneynews.com/MKTNews/billionaires-dump-economist-stock/2012/08/29/id/450265?PROMO_CODE=1393F-1. I agree with one thing from this news, that perhaps the Fed has printed too

much money in recent years, so its full effect will take place in the form of massive hyperinflation. In other paper, we have reported that the Fed has issued no less than fifteen trillion of us dollars to several banks. See our paper in http://vixra.org/abs/1307.0097. What do you think? Is that hyperinflation possible to happen? (Oct. 15, 2013)

[8] **Is it possible to control gravitation using an electromagnetic field?**
American interest in 'gravity control propulsion research' intensified during the early 1950s. Literature from that period used the terms anti-gravity, anti-gravitation, barycentric, counterbary, electrogravitics (eGrav), G-projects, gravitics, gravity control, and gravity propulsion. Their publicized goals were to develop and discover technologies and theories for the manipulation of gravity or gravity-like fields for propulsion.
Although general relativity theory appeared to prohibit anti-gravity propulsion, several programs were funded to develop it through gravitation research from 1955 to 1974. The names of many contributors to general relativity and those of the golden age of general relativity have appeared among documents about the institutions that had served as the theoretical research components of those programs.
This question is intended to explore possibilities to control gravitation using an electromagnetic field. See also: http://en.wikipedia.org/wiki/United_States_gravity_control_propulsion_research (Nov. 22, 2013)

[9] **Is Frank Tipler's Omega Point hypothesis supported by observation?**
Caution: I am not sure about this topic, and I never read Tipler's papers and books except for one paper, but it seems that his ideas are quite interesting to ponder.
An interesting page to begin with is http://www.aleph.se/Trans/Global/Omega/. It is mentioned there that according to Frank Tipler it is possible for intelligent beings to process and store an infinite amount of information in the universe, if certain conditions are fulfilled. His definition of Omega Point is essentially a future c-boundary which is a single point and an Aleph state, where information processing continues indefinitely along at least one world-line gamma all the way to the future c-boundary of the universe. i.e. Life never dies out.
Tipler himself describes his own Omega Point here: http://129.81.170.14/~tipler/why.html. He cited other scientists, like MacCallum, Barrow, Yorke etc. MacCallum has shown that a three-sphere closed universe with a single point future c-boundary is of measure zero in initial data space. Yorke has shown that a chaotic physical system is likely to evolve into a measure zero state if and only if its control parameters are intelligently manipulated. Thus life (which near the final state, is really collectively intelligent computers) almost certainly must be present arbitrarily close to the final singularity in order for the known laws of physics to be mutually consistent at all times.
In the meantime, I searched today in arxiv.org to find clues on this question, and only found 13 papers by Tipler, two of them are seemingly quite related to this question: http://arxiv.org/abs/gr-qc/0003082 and http://arxiv.org/abs/0704.0058.
While his ideas seem interesting from philosophical or theological viewpoint, as far as I know, they lack support from observation/astronomical data. So, what is your opinion? Thank you and best wishes. (Dec. 13, 2013)

[10] **Why does there exist similarity between brain cells and the Universe? Is it just a coincidence or Pareidolia?**
The universe may grow like a giant brain, according to a new computer simulation.
The results, published Nov.16, 2012, in the journal Nature's Scientific Reports, suggest that some undiscovered, fundamental laws may govern the growth of systems large and small, from the electrical firing between brain cells and growth of social networks to the expansion of galaxies.
"Natural growth dynamics are the same for different real networks, like the Internet or the brain or

social networks," said study co-author Dmitri Krioukov, a physicist at the University of California San Diego. See the complete papers by Dmitri Krioukov in arxiv.org (http://arxiv.org/pdf/1203.2109.pdf and also http://arxiv.org/pdf/1310.6272.pdf), or summary in http://www.livescience.com/25027-universe-grows-like-brain.html.

Nonetheless, it is also possible that such a similarity is caused by merely coincidence or a psychological effect called Pareidolia, see for instance: http://en.wikipedia.org/wiki/Pareidolia. (dec. 16, 2013)

[11] Is it possible to convert gravitational energy directly into electrical energy?

There is an interesting paper by Fran de Aquino available at http://vixra.org/abs/1205.0119, which suggests that it is possible to convert gravitational energy directly into electrical energy. The abstract of his paper is as follows: "We show that it is possible to produce strong gravitational accelerations on the free electrons of a conductor in order to obtain electrical current. This allows the conversion of gravitational energy directly into electrical energy. Here, we propose a system that can produce several tens of kilowatts of electrical energy converted from the gravitational energy."

Considering that there is formal analogy between gravitational theory and electromagnetic theory, then it seems that such a proposition is possible, at least theoretically. But I am not sure yet if his "theory" can be turned into a practical technology. And if it is indeed possible to convert gravitational energy into electrical energy, will it imply potential destruction of natural gravitational field? My curiosity is on possible damage caused by the use of Earth gravitational energy. (Dec. 20, 2013)

[12] Are there scientific proofs of the existence of God?

It is very interesting for me to ask this question. I asked this question first to a professor in a seminar while I was a young college student back in 1990. Then I forgot about this question for years.

Then yesterday (12/29/2013) a midnight dream reminded me to this old question again. Then I searched in google for some clues. It is interesting to find out that there are new interests on ontological proof written by Godel around 70s. One article says as follows:

"That is where Christoph Benzmüller of Berlin's Free University and his colleague, Bruno Woltzenlogel Paleo of the Technical University in Vienna, come in. Using an ordinary MacBook computer, they have shown that Gödel's proof was correct -- at least on a mathematical level -- by way of higher modal logic. Their initial submission on the arXiv.org research article server is called "Formalization, Mechanization and Automation of Gödel's Proof of God's Existence." "

source: http://www.spiegel.de/international/germany/scientists-use-computer-to-mathematically-prove-goedel-god-theorem-a-928668.html. See also http://arxiv.org/abs/1308.4526.

Another interesting source is of course wikipedia: http://en.wikipedia.org/wiki/Existence_of_God.

(Dec. 30, 2013)

[13] Is the Universe a computer or Turing machine?

There are many scientists who suggest that the Universe behaves like a computer. For example, John Archibald Wheeler suggests that "Its are from Bits", which means that all entities come from computer bits. Wolfram also worked from the same inspiration: The universe seems to behave like a vast cellular automaton. (see this article: http://www.wired.com/wired/archive/10.12/holytech_pr.html).

But many other physicists do not agree with such a hypothesis, such as Steven Weinberg (see his 2002 article in http://www.nybooks.com/articles/archives/2002/oct/24/is-the-universe-a-computer/?pagination=false).

In this regard, J.D.Barrow has claimed that if our universe is a computer program, then all the laws of physics must involve computable functions (Barrow 1991, p205). A computable function is defined to be a function whose value can always be calculated by performing a finite sequence of well-defined steps, often called an 'effective procedure'. (URL: http://philsci-

archive.pitt.edu/1891/1/UniverseCreationComputer.pdf). (Jan. 2, 2014)

[14] **Has global cooling taken place now instead of global warming?**
Yesterday i saw a news in television that says in U.S.A. the temperature in many regions go down as low as minus 51 degree celcius, and the bad weather has caused about 2,500 flights have been cancelled. I don,t know whether such bad weather also happens in europe, russia, and other countries. My question is: does it mean that what happens in the world nowadays is global cooling rather than global warming? For an introduction to global cooling, see an article by Frum at http://edition.cnn.com/2013/11/19/opinion/frum-global-cooling-impact/. I have also read some articles by Dr. Hathaway who says that global cooling is caused by low solar activity in recent years. (Jan. 7, 2014)

[15] **Is fine structure constant related to Shannon information entropy?**
As we know there are many papers in literature trying to derive or explain fine structure constant from theories. Two of interesting papers are by Gilson and by Stephen Adler (see http://lss.fnal.gov/archive/1972/pub/Pub-72-059-T.pdf), other papers are mostly based on speculation or numerology.
In this regards, in December 2008 i once attended a seminar in Moscow State University, Moscow. The topic of that seminar is relation between fundamental constants. Since the seminar was presented in russian language which i don,t understand, i asked a friend about the presenter. And my friend said that the presenter was Prof. Anosov. I only had a glimpse of his ideas, he tried to describe fine structure constant from Shannon entropy. I put some of his ideas in my note book, but today that book is lost.
I have tried to search in google and arxiv.org to find out if there is paper describing similar idea, i.e. to derive fine structure constant from Shannon entropy, but i cannot find any paper. So if you know that paper by Anosov or someone else discussing relation between fine structure constant and Shannon entropy, please let me know. Or perhaps you can explain to me the basic ideas. (Jan. 7, 2014)

[16] **Can an organic battery be a cheap renewable energy solution?**
A team of Harvard scientists and engineers has demonstrated a new type of battery that could fundamentally transform the way electricity is stored on the grid, making power from renewable energy sources such as wind and sun far more economical and reliable, as reported two days ago in Nature (January 9th, 2014).
The Harvard team reports that the battery, which they say can be applied on a power-grid scale, uses naturally abundant and small organic compounds called quinones rather than electrocatalysts from costly precious metals such as platinum.
Quinones would be inexpensive to obtain and can be found in green plants or synthesized from crude oil. The battery designed by Harvard scientists and engineers used a quinone molecule that's almost identical to one that's found in rhubarb. The quinones in the Harvard team's battery are dissolved in water, which also prevents them from catching fire. These hydroquinones would perform a similar function to metal electrocatalysts such as platinum, because the molecules can store electrical energy efficiently.
My question: Can this new discovery of organic battery be cheap renewable energy solution? Your comments are welcome
For more info, see:
(a) http://www.cbc.ca/m/news/#!/content/1.2489300; and
(b) http://news.harvard.edu/gazette/story/2014/01/renewable-energy-breakthrough/; and also
(c) http://www.seas.harvard.edu/news/2014/01/organic-mega-flow-battery-promises-breakthrough-for-renewable-energy (Jan. 11, 2014)

[17] Can gravitation be expressed as information? Is there evidence for it?
First, we can recall a phrase coined by the late John Archibald Wheeler: "It from bit." That phrase seems to indicate that physics has the origin in information bit, be it gravitation or particle physics. Second, in 2010 a dutch physicist Erik Verlinde proposed that gravitation has an entropic origin. His paper is On the Origin of Gravity and the Laws of Newton (http://arxiv.org/pdf/1001.0785.pdf), and the abstract goes as follows: "Starting from first principles and general assumptions Newton's law of gravitation is shown to arise naturally and unavoidably in a theory in which space is emergent through a holographic scenario. Gravity is explained as an entropic force caused by changes in the information associated with the positions of material bodies."
I think there are other papers suggesting the plausible connection between gravitation and entropy, but Verlinde's paper seems one interesting example.
So, can gravitation be expressed as information? Is there evidence for it? And is there limitation for this relation? What is your opinion? Your comments are welcome.
Other source: http://www.science20.com/hammock_physicist/it_bit_case_gravity (Jan. 16, 2014)

[18] Is Lorentz-invariant gravitation theory a valid alternative to general relativity?
Krogdahl in his critique to general relativity suggests that we should better consider Lorentz-invariant cosmology (see http://arxiv.org/pdf/0711.1145.pdf).
I tried to search on this issue and only find few articles discussing Lorentz invariant gravitation theory, one of them from wikiversity, see http://en.wikiversity.org/wiki/Lorentz-invariant_theory_of_gravitation. Then i can only locate few papers discussing Maxwell-like Lorentz-invariant gravitation theory, one of them is perhaps worth mentioning here that is by Jeffrey Kaplan, David Nichols and Kip Thorne from Caltech. They summarize DSX paper, their paper can be found at http://arxiv.org/pdf/0808.2510.pdf. (Jan. 27, 2014)

[19] Is the General Theory of Relativity equivalent to the Ginzburg-Landau theory of superconductivity?
There is a quite recent paper (2011) by Santiago-German which says that the Einstein's general theory of relativity is formally equivalent to the Ginzburg-Landau theory of superconductivity (http://arxiv.org/pdf/1112.1179v1.pdf). He further wrote that this fact lead us to suspect that the superconductivity of gravitation ought to be a real physical process occurring in the outskirts of galaxies.
Such a proposition seems to support previous articles by Horowitz (you can search at google.com), suggesting connection between General Relativity and superconductivity. There is also a paper sometime ago by Kholodenko and Ballard, saying that in dimensions three and higher the famous Ginzburg-Landau equations used in theory of phase transitions can be obtained (without any approximations) by minimization of the Riemannian-type Hilbert-Einstein action functional for pure gravity in the presence of cosmological term. See their paper at http://arxiv.org/abs/gr-qc/0410029.
If such a proposition is correct, then perhaps we can view some problems in cosmology from new angle. Not only dark matter but perhaps the solar system and planets can be viewed as superconductors too. Other possible analogy is between cosmology and condensed matter phenomena such as superfluidity. This analogy has been explored for instance by G. Volovik et al. (Jan. 29, 2014)

[20] Has >60C room temperature superconductivity been discovered?
Today i read a news that 65C room temperature superconductivity has been achieved by increasing dielectric constant. You can read that news (19/01/2014) at http://www.superconductors.org/65C.htm. The experiment uses titanium instead of silicon.
For a background theory, you can read a book on rtsc by Andrei Marouchkine, with title: Room temperature superconductivity, 2006, Cambridge. The book is available online at

http://arxiv.org/pdf/cond-mat/0606187.pdf. (Jan. 31, 2014)

[21] **Are we shifting towards a new Little Ice Age starting from this year?**
I just read some comments that the temperature of the world is declining, see
http://iceagenow.info/2012/, and that the world is shifting towards a new Little Ice Age soon.
For a background story on Little Ice Age, see wikipedia for example.
There is also a prediction since 2010 by Dr. Habibullo Abdussamatov, head of space research in St.
Petersburg-Russia, who said that the new Little Ice Age will start from 2014. See:
http://www.nexusmagazine.co.nz/blog_files/9779288cff1cd6ded5f25e9fb1456c7b-35.html.
With regards to extreme low temperature in various regions in North America since january this year,
perhaps this prediction is becoming reality.
However, there is recent paper by Dr. Morner, who writes that the new Little Ice Age will take place
within 15 years from now. See his paper at http://www.pattern-recogn-phys.net/1/107/2013/prp-1-107-
2013.pdf. (Feb. 7, 2014)

[22] **Are herbal remedies safe for cancer treatment?**
I once had a colleague in a university, he was a professor of postgrad studies. About three years ago he
suffered a bladder cancer, see for example: http://www.cancer.org/cancer/bladdercancer/. Then he took
a surgery abroad, but it seemed that the cancer was spreading. So he decided to take herbal remedies
besides taking chemotherapy.
I am not sure what happened then, except the fact that two years ago he passed away. I dont know
exactly if his condition worsened because of cancer grew or not. But this story makes me ask about the
safety and effectiveness of herbal remedies. Some people think that herbal remedies have better
credibility over other alternative medicines.
So do you agree that herbal remedies are safe for cancer treatment? Do you have experience. Thank
you.
For a background on herbal use for cancer, see for instance: http://www.cancerresearchuk.org/cancer-
help/about-cancer/treatment/complementary-alternative/about/harm/the-safety-of-herbal-products-and-
medicines (Feb. 10, 2014)

[23] **Can Proca equations explain electrodynamics in superconductors?**
Martin Tajmar wrote a paper in 2008 with title: Electrodynamics in superconductors explained by
Proca equations (see http://arxiv.org/abs/0803.3080). In his paper he tried to describe electrodynamics
of superconductors using Proca equations and massive photon.
My question is: considering the complexity of superconductors, can they be explained by Proca
equations, in particular the room temperature superconductors? (Feb. 13, 2014)

[24] **Can quantum mechanics be derived from Boltzmann equation?**
Two weeks ago I asked to Prof. Friedwardt Winterberg about his 1995 paper, where he derived
quantum mechanics from Boltzmann equation (Z. Naturforsch. 50a). This paper is interesting because
it seems to be more consistent compared to Nelson's derivation of QM. Furthermore Winterberg's paper
starts with Planck aether assumption.
In physics, specifically non-equilibrium statistical mechanics, the Boltzmann equation or Boltzmann
transport equation (BTE) describes the statistical behavior of a thermodynamic system not in
thermodynamic equilibrium. It was devised by Ludwig Boltzmann in 1872. See
http://en.wikipedia.org/wiki/Boltzmann_equation.
Therefore it appears very interesting to find theoretical connection between Boltzmann equation and
quantum mechanics. Other paper which discusses link between Boltzmann equation and quantum
relativistic kinetic theory, is Escobedo et al., EJDE, 2003. See:

https://www.ceremade.dauphine.fr/~mischler/articles/18BQRelectronic.pdf (Feb. 15, 2014)

[25] **Is it possible to explain gravitation from the Higgs boson?**
It is known that Higgs mechanism is right but the theory does not fully explain mass and gravitation (see for instance http://www.higgs-boson.org/).
In the meantime, there is a rather old paper by M. Consoli where he tries to make connection between Newtonian gravity and Higgs condensate (Url: http://cds.cern.ch/record/404050/files/9910372.pdf).
Another paper by Paul S. Wesson suggests a connection between scalar field 5D gravity and the Higgs field of particle physics. See http://arxiv.org/ftp/arxiv/papers/1003/1003.2476.pdf.
For more recent reference, see for example Dejan Stojkovic (http://arxiv.org/abs/1305.6960) who discusses implications of the Higgs discovery for gravity and cosmology. The abstract goes as follows: "The discovery of the Higgs boson is one of the greatest discoveries in this century. The standard model is finally complete. Apart from its significance in particle physics, this discovery has profound implications for gravity and cosmology in particular. Many perturbative quantum gravity interactions involving scalars are not suppressed by powers of Planck mass. Since gravity couples anything with mass to anything with mass, then Higgs must be strongly coupled to any other fundamental scalar in nature, even if the gauge couplings are absent in the original Lagrangian." (Feb. 18, 2014)

[26] **Is DME a viable alternative to diesel fuel?**
DME (Dimethyl ether) is a clean, colorless gas that is easy to liquify and transport. Chemically speaking, DME Is the simplest ether compound, with a chemical formula of C_2H_6O. DME can be derived from many sources, including renewable materials for example biomass. See
http://www.aboutdme.org/index.asp?bid=234
Considering these advantages, some scientists suggest that DME can be an alternative for diesel fuel in the future. See for example:
http://www.cpi.umist.ac.uk/eminent/publicFiles/brno/MSU_Dimethyl_Ether.pdf.
Other scientist suggests that DME can be produced from natural gas. See for example:
http://www.sae.org/events/gim/presentations/2013/greszler_anthony.pdf (Feb. 20, 2014)

[27] **Are there natural treatments for schizophrenia?**
Dr. Maureen Roberts describes how one can withdraw from psychiatric drugs. See
http://jungcircle.com/schiznatural.htm. Other useful reference is :
http://www.schizophrenia.com/treatments.php.
I have one friend who suffers schizophrenia but he has experienced bad dreams and anxiety frequently even after he takes the medication. So do you think he can take natural treatment besides the prescribed psychiatric drug? And if yes, then what kind of natural treatment? And is it safe to take such natural treatment? (Feb. 20, 2014)

[28] **Is there an aether? If yes, then what are its implications?**
On November 24th, 1951, Dirac published a letter in Nature, asking: Is there an aether? He argued based on his new electrodynamics theory that aether is necessary. He concluded his letter with the following words: "Thus with the new theory of electrodynamics we are rather forced to have an aether." See: http://www.fisicateorica.me/repositorio/howto/artigoshistoricosordemcronologica/1951b%20-Dirac1951b.pdf.
Before Dirac, Einstein himself remarked in his Leiden lecture (1920) that: "According to the general theory of relativity, space without ether is unthinkable..." (see
http://www.spaceandmotion.com/Physics-Albert-Einstein-Leiden-1920.htm). Therefore it seems worth to reconsider aether, for instance there is a theory known as Einstein-aether gravity. An entry in wikipedia reads as follows: "...is a generally covariant modification of general relativity which

describes a spacetime endowed with both a metric and a unit timelike vector field named the æther. The theory has a preferred reference frame and hence violates Lorentz invariant." (ref: http://en.wikipedia.org/wiki/Einstein_aether_theory)

However we know that Einstein-aether theory has limitations. For review of Einstein-aether theory, see: http://arxiv.org/abs/gr-qc/0410001. (Feb. 21, 2014)

[29] **Can time be viewed as scalar temporal field?**
According to I.B. Pestov (2004), time can be viewed as scalar temporal field. In his paper with title New Concept of Time and Gravity, he wrote: "A new concept of internal time (viewed as a scalar temporal field) is introduced which predicts the existence of matter outside the time and allows one to solve the energy problem in General Relativity. It is demonstrated that introduction of the temporal field as an objective property of physical systems permits one to derive the physical laws of the electromagnetic field (the general covariant four-dimensional Maxwell equations for the electric and magnetic fields) from the geometrical equations of this field. It means that the fundamental physical laws are in full correspondence with the essence of time. On this ground, from the geometrical laws of the gravitational field the physical evolution equations of this field are derived. Two characteristic solutions of these equations are obtained (including the Schwartzschild solution)." See his paper at: http://www1.jinr.ru/Preprints/2004/105%28E2-2004-105%29.pdf. His other paper is: http://arxiv.org/abs/gr-qc/0507131.
While his theory may lack observability so far, I think his new concept of time seems worth to consider further, especially considering some puzzles in cosmology such as dark matter.
Btw, I met Pestov once around 2009 while he was giving a lecture on "Self-organization and gravity" (in Moscow), but at the time I only asked him some questions which are not related to his suggestion that time is scalar temporal field. I think his 2004 paper is more relevant with the question above. (Feb.22, 2014)

[30] **Is Sarah Becker's fully renewable US electricity system a realistic plan?**
Sarah Becker et al. just released a new paper (arXiv: 1402.2833) where she and her colleagues including Mark Jacobson suggest a new plan for fully renewable US electricity system. Their title is: Features of a fully renewable US electricity system: Optimized mixes of wind and solar PV and transmission grid extensions.
The abstract goes as follows: "Wind and solar PV generation data for the entire contiguous US are calculated, on the basis of 32 years of weather data with temporal resolution of one hour and spatial resolution of 40x40km2, assuming site-suitability-based as well as stochastic wind and solar PV capacity distributions throughout the country. These data are used to investigate a fully renewable electricity system, resting primarily upon wind and solar PV power. We find that the seasonal optimal mix of wind and solar PV comes at around 80% solar PV share, owing to the US summer load peak. By picking this mix, long-term storage requirements can be more than halved compared to a wind only mix. The daily optimal mix lies at about 80% wind share due to the nightly gap in solar PV production. Picking this mix instead of solar only reduces backup energy needs by about 50%." (Feb 24, 2014)

[31] **Does fine structure constant vary with direction of space?**
Over the years, many physicists have wondered whether the fundamental constants of nature might have been different when the universe was younger. If so, the evidence ought to be out there in the cosmos where we can see distant things exactly as they were in the past.
One thing that ought to be obvious is whether a number known as the fine structure constant was different. The fine structure constant determines how strongly atoms hold onto their electrons and is an important factor in the frequencies at which atoms absorb light.

If the fine structure were different earlier in the universe, we ought to be able to see the evidence in the way distant gas clouds absorb light on its way here from even more distant objects such as quasars. That debate pales in comparison to new claims being made about the fine structure constant. In 2010, John Webb at the University of South Wales, one of the leading proponents of the varying constant idea, and a few cobbers said they have new evidence from the Very Large Telescope in Chile that the fine structure constant was different when the universe was younger.

While data from the Keck telescope indicate the fine structure constant was once smaller, the data from the Very Large Telescope indicates the opposite, that the fine structure constant was once larger. That's significant because Keck looks out into the northern hemisphere, while the VLT looks south.

This means that in one direction, the fine structure constant was once smaller and in exactly the opposite direction, it was once bigger. And here we are in the middle, where the constant as it is (about 1/137.03599…)

So, do you think that fine structure constant varies with direction in space?

For further reading on this issue, see http://www.technologyreview.com/view/420529/fine-structure-constant-varies-with-direction-in-space-says-new-data/.

Refs:

arxiv.org/abs/1008.3907: Evidence For Spatial Variation Of The Fine Structure Constant

arxiv.org/abs/1008.3957: Manifestations Of A Spatial Variation Of Fundamental Constants On Atomic Clocks, Oklo.

Included here you can also find a 2004 ApJ paper by John Bahcall, who is a proponent of varying fine structure constant. (URL: http://www.sns.ias.edu/~jnb/Papers/Preprints/Finestructure/alpha.pdf) (Feb 26, 2014)

[32] **Can quantum nonlocality be explained using (complex) Maxwell equations?**

Quantum nonlocality belongs to one puzzling feature of quantum mechanics, which some people think as unexplained using classical theories. But there seems a possibility to explain quantum nonlocality using Maxwell equations or complex Minkowski approach.

See for instance, Wheeler-Feynman absorber theory, which is an interpretation of electrodynamics derived from the assumption that the solutions of the electromagnetic field equations must be invariant under time-reversal symmetry, as are the field equations themselves. Ref. http://en.wikipedia.org/wiki/Wheeler%E2%80%93Feynman_absorber_theory. This theory is related to Transactional Interpretation of Quantum Mechanics suggested by John G. Cramer, see http://en.wikipedia.org/wiki/Transactional_interpretation.

Another approach is proposed by Amoroso and Rauscher, who suggest complex Minkowski theory to explain nonlocality (Ref. http://vixra.org/pdf/1305.0055v1.pdf). But they derive complex Maxwell equations elsewhere (Ref. http://vixra.org/pdf/1305.0099v1.pdf). Perhaps the role of complex geometry to explain nonlocality cannot be overemphasized, as Hadamard once wrote: the shortest path between two truths in real domain passes through the complex domain. (url: http://homepage.math.uiowa.edu/~jorgen/hadamardquotesource.html) (Feb 27, 2014)

[33] **Are there vortices associated with the wave function of a single electron?**

There is a recent publication in PRL (Feb. 2014) by Schmidt et al., which says that there are vortices associated with the wave function of a single electron. Their abstract is as follows: "We present measurements and calculations of the momentum distribution of electrons emitted during the ion-atom collision ... which show rich structures for ion scattering angles above 2 mrad arising dominantly from two-electron states. Our calculations reveal that minima in the measured distributions are zeros in the electronic probability density resulting from vortices in the electronic current." (ref. http://journals.aps.org/prl/abstract/10.1103/PhysRevLett.112.083201, or see: http://arxiv-

).
This paper reminds me to Kobayashi and Shimbori's paper (2001) suggesting that there is vortex solution of Schrodinger equation. (ref. http://arxiv.org/pdf/cond-mat/0103209.pdf). (Mar 4, 2014)

[34] Does the Sun's core consist of iron instead of hydrogen? And what is its implication to solar energy sources?

For years, scientists have assumed that the sun is an enormous mass of hydrogen. Galileo was the first to propose that the sun is filled with gas. But Dr. Oliver Manuel says iron, not hydrogen, is the sun's most abundant element. IF his suggestion is true then it may imply that the source of solar energy is different of the presently held theory of hydrogen fusion.

In principle, Dr. Manuel suggests that the hydrogen-filled sun hypothesis is obsolete. See:
http://arxiv.org/ftp/astro-ph/papers/0410/0410569.pdf

Reference to Dr. Oliver Manuel's papers:
"An iron-rich Sun and its source of energy," Proceedings of the 8th International Symposium on Nuclei in the Cosmos, Vancouver, BC, Canada, 19-23 July 2004 (Manuscript submitted for publication)
http://www.omatumr.com/abstracts2005/IronRichSun.pdf

Others:
1. "Xenon in carbonaceous chondrites", Nature 240, 99-101 (1972)
www.omatumr.com/archive/XenonInCarbonaceousChondrites.pdf
2. "Strange xenon, extinct super-heavy elements, and the solar neutrino puzzle", Science 195, 208-210 (1977) http://www.omatumr.com/archive/StrangeXenon.pdf
3. "Solar abundances of the elements," Meteoritics 18, 209-222 (1983);
http://tinyurl.com/224kz4
4. "The Sun's origin, composition and source of energy", Abstract 1041 , 32nd Lunar and Planetary Science Conf., Houston, TX, March 12-16, 2001, LPI Contribution 1080 (2001).
http://www.omatumr.com/lpsc.prn.pdf
5. "Composition of the solar interior: Information from isotope ratios," Proceedings of SOHO 12/GONG Conference on Local and Global Helioseismology: The Present and the Future, 27 Oct-1 Nov 2002, Big Bear Lake, CA, U.S.A. (ESA SP-517, editor: Huguette Lacoste) pp. 345-348 (2003):
http://www.omatumr.com/abstracts/gong-2002.pdf
6. A Journey to the Core of the Sun: Chapter 2 - Acceptance of Reality (Jan 2014)
https://dl.dropboxusercontent.com/u/10640850/Chapter_2.pdf (Mar 13, 2014)

[35] Is there formal correspondence between Poisson brackets and commutators using complex coordinate?

In a 1966 paper, Strocchi shows that there exists formal correspondence between Poisson brackets and commutator brackets using complex coordinate. His paper was published in Rev. Mod. Phys. 38, 36 (URL: http://journals.aps.org/rmp/abstract/10.1103/RevModPhys.38.36). His abstract goes as follows: "By introducing complex canonical coordinates, classical and quantum mechanics may be embedded in the same formulation. In such a way, the connection between Poisson brackets and commutators, canonical transformations and unitary transformations, etc., become apparent. This formulation is also particularly suitable for discussing the classical limit of quantum mechanics and for quantum-statistical mechanics." (Mar 20, 2014)

[36] Are virtual particles really constantly popping in and out of existence? Can laser make them real?

Virtual particles are indeed real particles. Quantum theory predicts that every particle spends some time

as a combination of other particles in all possible ways. These predictions are very well understood and tested.

Quantum mechanics allows, and indeed requires, temporary violations of conservation of energy, so one particle can become a pair of heavier particles (the so-called virtual particles), which quickly rejoin into the original particle as if they had never been there. (see Scientific American, Oct 9 2006, http://www.scientificamerican.com/article/are-virtual-particles-rea/)

Recent methods claim that lasers will be able to make virtual particles real:

"Next-generation lasers will have the power to create matter by capturing ghostly particles that, according to quantum mechanics, permeate seemingly empty space."

The uncertainty principle of quantum mechanics implies that space can never be truly empty. Instead, random fluctuations give birth to a seething cauldron of particles, such as electrons, and their antimatter counterparts, called positrons.

These so-called "virtual particles" normally annihilate one another too quickly for us to notice them. But physicists predicted in the 1930s that a very strong electric field would transform virtual particles into real ones that we can observe. The field pushes them in opposite directions because they have opposite electric charges, separating them so that they cannot destroy one another."

(see New Scientist 2010, http://www.newscientist.com/article/dn19327-lasers-could-make-virtual-particles-real.html)

(Apr. 1, 2014)

[37] **Is mind-reading real or fake phenomenon?**

According to an experiment led by Stanford neuroscientist, Josef Parvizi, one can see what others think, at least under special conditions. See http://scopeblog.stanford.edu/2013/10/15/mind-reading-in-real-life-study-shows-it-can-be-done-but-theyll-have-to-catch-you-first/

Such mind reading phenomenon has been debated for a long time, where some people believe in mind reading possibility while others think that it is a fake phenomenon. Some physicists believe that mind reading can be related to biological effect of quantum reality.

I have several friends who believe they can read the others's mind. Most of those friends are women. Or perhaps some women do have such mind reading ability?

Personally i don't think that psychic mind reading is real. I think it is something more related to psychological guess rather than mind reading, just like what you do while you play chess or bridge or poker, you try to 'read' what other people's think, but that does not mean you can do mind reading. A good movie discussing mind reading is perhaps Red Lights. (Apr 12, 2014)

[38] **Are there simple proofs of Fermat's last theorem?**

Beside rigorous proofs of Fermat's last theorem, there are relatively simple approaches to arrive at the same conclusion. One of the simple proofs is by Pogorsky, available at http://vixra.org/abs/1209.0099. There is also a website called www.fermatproof.com which gives an alternative proof, and also a review paper by P. Schrorer at : http://www.occampress.com/fermat.pdf.

Another numerical experiment was performed by me around eight years ago (2006), which showed that if we define $k=(a^n+b^n)/c^n$, where a,b,c are triplets corresponding to Pythagorean triangle (like 3,4,5 or 6,8,10), then k=1 if only if n=2. It seems that we can generalize the Fermat's last theorem not only for n>2 but also for n<2. But of course my numerical experiment is not intended to be a rigorous proof. Our paper is available at http://vixra.org/pdf/1404.0402v1.pdf, based on 2006 version article. (Apr 21, 2014)

[39] **Can Schumann resonance be used to improve human brain's function?**

Schumann resonance can be loosely defined as resonant frequency of earth and ionosphere if they are modeled as waveguide. The frequency can be written as: f=7.5n Hz, where 7.5 Hz is defined as

fundamental frequency (n=1). See http://www.hese-project.org/hese-uk/en/papers/schlegel_schumann.pdf
Some people think that Schumann resonance may be used to improve human brain's healthy function, because it corresponds to alpha state of brain. (May 8, 2014)

[40] **Does anyone have a clue about the present location of the original Menorah?**
It is well known that there are three symbols of ancient Israel, i.e. the Ark of the Covenant, the original Menorah of Tabernacle, and the tablets of stone from Sinai where the Ten Commandments were supposedly written. All of these three symbols were lost since the Shlomo's First Temple was destructed by the Babylonian army. See http://www.torah.org/features/holydays/templemenorah.html.
And perhaps the first Menorah was lost even since the Israeli crossed the Jordan river.
But considering a report by Bob Cornuke (History channel) that the Ark of the Covenant is probably located in the Church of Mary from Sion, in Ethiopia, then it seems quite possible to also find a clue on the present location of the ancient Menorah. Some years ago, I even read a fiction book suggesting that the original Menorah, made of a single block of gold, is located somewhere in an underground cave in an old city in Egypt.
I think the original Menorah is one of the most iconic symbols of archaeology, so if anyone knows possible locations of that piece of ancient Israel please kindly share here.

[41] **Is it possible to find an exact model of an electron based on the solution of the wave equation?**
Today I found an interesting paper by G. Poelz (retired from Hamburg University) which suggests that electrons have wave character, see http://arxiv.org/pdf/1206.0620.pdf. Basically he describes an electron model based on the solution of the wave equation in spherical coordinates (see Appendix 6.2 in his paper). This would need the use of spherical Bessel functions of the first kind (see for instance: http://mathworld.wolfram.com/SphericalBesselFunctionoftheFirstKind.html).
Interestingly, I found that George Shpenkov also uses a similar method to describe not only electrons but other atoms as well, based on the solution of the wave equation in spherical coordinates. See his page at this www.researchgate.net or at http://shpenkov.janmax.com. Shpenkov asserts that his method is different from the electron cloud model based on the Schrodinger equation.
While of course this kind of electron model may be different from the standard picture, it seems to be able to fulfill Louis de Broglie's vision in his Nobel lecture: Wave nature of electrons. (see http://www.nobelprize.org/nobel_prizes/physics/laureates/1929/broglie-lecture.pdf)

[42] **Is there a good PHP textbook for scientific applications?**
For some months I have been looking for a good textbook on how we can use the PHP language for scientific and engineering applications, but so far I have not found any. For example, I'd like to know how to solve differential equations using PHP code. So if somebody knows any good PHP textbooks on this topic (downloadable ebook is preferable), please kindly let me know.

[43] **Is it possible to describe solar system (planetary orbits) using self-organized criticality theory?**
It is known that solar flares show power law characteristics, so it may also be related to critical self organization (see Guido Boffetta et al., PRL, 1999, http://personalpages.to.infn.it/~boffetta/Papers/bcgvv99.pdf). SOC is a concept introduced by Per Bak, Tang et al. (BTW) to explain complex dynamics of various phenomena, and this concept has been used to explain many phenomena like earthquakes, economic fluctuations, etc.
My hypothesis is that SOC can be used to explain the origin of the solar system too, especially planetary orbits, alas so far I do not find any equation yet which is based on SOC and can be used to

derive numerical predictions of planetary orbit distances in solar systems. We know that planetary orbit distances in solar systems can be explained by many models such as Titius-Bode law, wave mechanics, wave equation and Lane-Emden equation.

[44] **Is it really true that the Universe experiences accelerating expansion?**
According to Standard Model cosmology, the universe experiences accelerating expansion, which creates the need for dark energy models.
But I read other possible theories, for example Lemaitre-Tolman-Bondi (LTB) model which suggests that there are large structures (void) which introduce inhomogeneity in the Universe. See for instance: http://arxiv.org/abs/0709.2044.
Therefore it seems that the homogeneous-isotropic assumption of the Standard Model is questionable. Another possible explanation is Kashlinsky-Tsagas's dark flow model. Basically it says that the observed accelerating expansion is a mere illusion. See http://www.nbcnews.com/id/44690771/ns/technology_and_science-science/t/accelerating-universe-could-be-just-illusion/#.U4vYcvFhiK1

[45] **Is there a connection between self-organized criticality and human cognition?**
In a rather old paper, Wagenmakers, Farrell and Ratcliff (2005) suggest that it is difficult to introduce Self-Organized Criticality and nonlinear dynamics to explain human behavior. They write: "the absence of a specific model for how self-organized criticality produces the observed behavior makes it very difficult to derive testable predictions. The authors conclude that the proposed paradigm shift is presently unwarranted." See the paper included here or find their paper in this link: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1404501/pdf/nihms2267.pdf.
However, in a more recent paper, Ramos, Sassi & Piqueira (2011) argue that SOC can be used to predict human behavior. (see http://cbpfindex.cbpf.br/publication_pdfs/RamosSassiPiqueira2010.2010_07_05_11_50_10.pdf).
Therefore, it seems that there are two different opinions, i.e.: (a) SOC cannot be used in the field of human cognition and psychology and general, (b) SOC is useful to predict human behavior. In this regards, perhaps we can also consider that there are special circumstances where human being can experience critical phenomena, for example there are some people who can jump on high fences or walls when they are in danger (for example running from fire or dogs etc). So it seems that in certain circumstances, it is possible to use SOC to explain human behavior.

[46] **Is the Sun primarily comprised of condensed matter?**
According to conventional paradigm, the sun is assumed to consist of hot gaseous plasma. But that assumption is not supported by direct astronomical evidence.
Another idea is suggested by Dr. Oliver Manuel, who proposed that the Sun's core consist mainly of iron and the source of energy in the sun is not fusion but neutron repulsion.
But Prof. Pierre-Marie Robitaille has different idea. He suggests that the Sun is primarily comprised of condensed matter. In a recent report, he argues that there are 40 evidences supporting his hypothesis. See http://www.ptep-online.com/index_files/2013/PP-35-16.PDF.
If Robitaille's hypothesis holds true, then it could imply that the process inside the Sun may be modeled as Condensed Matter Nuclear Science.

[47] **Is modern pharmacy a remedy or more like a poison?**
According to Fritjof Capra in his book: The Turning Point, modern medicine and pharmacy suffer from Cartesian dualism.
But i think the problem goes back in time to ancient Greek. For example, etymologically the word "pharmakos" means a human sacrificed to the gods. And "pharmakon" has ambivalent and paradoxical

meaning of both remedy and poison (see http://flutuante.wordpress.com/2009/08/01/pharmakon-the-cure-or-the-poison/). And it seems this mythology has legacy too to the present time. For instance, drugs like cocaine can be used for anesthese purpose, but in larger dose it can be lethal. Vaccination was often made of bacteria, which sometimes it can be lethal for infants (although such incidents were often neglected statistically). And sting of bees has been found to have healing effect for some types of illness, while it can also be harmful.

Another paradoxical example of modern medicine is overall low contribution of chemotherapy to cancer survival. According to a report, chemotherapy makes a minor contribution to cancer survival (around 2.3% in Australia and 2.1% in USA), although the situation also depends on the type of cancer in question (see http://weeksmd.com/2009/01/success-rate-of-chemotherapy-21-hunh/). This seems to indicate that there is much room for improvement with cancer treatment.

Furthermore, the language of warfare and battle are often used in medicine world, such as "attack" the HIV causes, "eradicate" polio etc. Such languages indicate that human illness are viewed as enemies. At the other side, in Eastern medicine, various illnesses are viewed as imbalance of the body. A healthy human body is a result if all organs function in harmony. Therefore, the purpose of medicine is to return that harmony instead of attacking the illnesses.

[48] **Can entropic force explain dark energy properly?**
Since Verlinde's proposal that gravitation is related to entropy, there are many papers discussing or extending his hypothesis. In a recent paper, Basilakos and Sola reconsidered entropic-force dark energy (http://arxiv.org/pdf/1402.6594v3.pdf). They wrote: "We reconsider the entropic-force model in which both kind of Hubble terms appear in the effective dark energy (DE) density affecting the evolution of the main cosmological functions, namely the scale factor, deceleration parameter, matter density and growth of linear matter perturbations. However, we find that the entropic-force model is not viable at the background and perturbation levels due to the fact that the entropic formulation does not add a constant term in the Friedmann equations."

[49] **Why is success rate of chemotherapy very low? And is it possible to improve that?**
According to 2004 report by Morgan, Ward, and Barton: "The contribution of cytotoxic chemotherapy to 5-year survival in adult malignancies. ... survival in adults was estimated to be 2.3% in Australia and 2.1% in the USA." (see http://www.ncbi.nlm.nih.gov/pubmed/15630849, or https://www.burtongoldberg.com/home/burtongoldberg/contribution-of-chemotherapy-to-five-year-survival-rate-morgan.pdf).

Although such condition may vary for different types of cancer, it is commonly held that 80% of oncologists will not take chemotherapy if they suffer cancer themselves.

Another possible approach is perhaps herbal chemotherapy, which according to another report may yield 85% success rate. (see http://breastcancerconqueror.com/85-success-rate-with-herbal-chemo/)

[50] **Is it possible to include indeterminacy into definition of differentiation?**
In the attached paper from Gauge Institute (see attachment), the definition of differential in e-calculus is (see page 8):
F'(x)={f(x+e)-f(x)}/e   (1)
where e is defined as an infinitesimal (i.e. it should be smaller than any number but greater than zero). From this definition in (1) it should be clear, that as e approaching zero, it is assumed that the function of f'(x) has the form of a slope (linear). But this assumption has problem in real data of many phenomena, i.e. when the observation scale goes smaller and smaller then it behaves not as a linear slope but as brownian motion. Other applications such as in earthquake data, stock market price data etc. indicate that each data includes indeterminacy (I).

I just thought that perhaps we can extend the definition of differentiation to include indeterminacy (I),

perhaps something like this:

F'(x)={f(x+e)+2I-f(x)}/e.   (2)

The I parameter implies that the geometry of differential is not a slope anymore. The term 2I has been introduced to include unpredictability/indeterminacy of the brownian motion. And it can split into left and right differentiation. The left differential will carry one I, and the right differential will carry one I.

Another possible way is something like this:

F'(x)=(1+I).{f(x+e)-f(x)}/e   (3)

Where I represents indeterminacy parameter, with range from 0.0-0.5.

Other possible approaches may include Nelson's Internal Set Theory, Fuzzy Differential Calculus, or Nonsmooth Analysis.

That is my idea so far, you can develop it further if you like. This idea is surely far from conclusive, it is intended to stimulate further thinking.

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