Magic of physics, math tricks and an observer - with his own brain

FQXi Essay Contest: Wandering Towards a Goal
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Abstract: Here we talk that our bitter lessons have been consigned to oblivion. Disputable divisions of physics have degenerated to a kind of elitist - unproductive genre of creativity because of arbitrary, unreasonable methodology. There is an actual opportunity to come to a high-grade realistic science by returning to natural thinking and objective scientific approaches. To do this we need to overcome the imposed firm convictions with tremendous psychological and political significances. *De facto,* it is banned to do in present physics, by historical or other circumstances unclear to us.

Keywords: *FQXi contest, Physics methodology, Physics problems*

Instead of prologue

We are obligated to mention first, the thematic questions of FQXi contest are becoming more interesting with the time; "*what the nature of time is?*", "*it from bit or bit from it?*", "*is it trick or truth mathematics?*" etc. Moreover, a new very significant question is offered to thinker–brothers now; *"how can mindless mathematical laws give rise to aims and intention?"* It intrigued me so that I have not withstood to present my brief answer below (chap. 2). One of the previous themes, however, on the role of the observer, exceeds our expectations by its deep meaning that may open real opportunity to returning the confusing science onto the right path, which seems to be the main task of the community, in my naive viewpoint. Therefore, with reader's permission, I will start from this, linking it to the present valuable one as well as the others, to get some useful conclusions.

1. On the observer's role

- How can we assert that the Earth revolves around of Sun when we see the opposite? (Critics)
- We have to distinguish the reality from the seen! (Copernicus)

The essence of the question is; "*what does it mean to be an observer?"* In my uncritical view:
a) ***The "observer" is the main figure in natural science; it is not accepted to speak anything certain about his central role, by some historic circumstances. By the same, tacitly assumed that he is an ideal person who uniquely rates all the revealed facts, generalizes these and gives us a doubtless picture of reality.***
Thus, the concept of "observer" can be equalized to an infallible teacher, defining the whole value of our science by his own ability and rightness of actions. Then we can hope that one nice day the following questions may also sound in the community - who are the "official scientists" (our actual teachers) who voluntarily take up full responsibility of studying and teaching us how our world was created by God? Or, - how does our advanced theorists do this noble work, leaving aside the lawful others, as for example - where from did they get

their indisputable priority in this, or such heavy burden, - to do this incredible job for humanity?

For me personally, it is little bit difficult to trust that they can realize this through math operations with symbols on the paper, without previously thinking; how useful they spending their time, as well as of the huge means providing to them?

I also look very pessimistic at traditional experimental ways to study primordial "bricks" of the substance by collisions of few elementary particles, somewhat known to us, increasing their energy, as much as it becomes technically possible. The essence of mentioned attempts, however, may get a simplest explanation with desire.

As we see, modern physicists are hoping to get a new significant opening, same as those done by famous pioneers ***E. Rutherford***, ***J. J. Thomson*** or, Sir ***Chadwick*** at their time, increasing the power and dimensions of used equipments, as much as it allow the investment. The long-term efforts show that this intelligible approach cannot be productive same as before. It seems no one yet would like to put the natural questions why is it so and why does this way bring to a deadlock situation always? However, such simplest judgments may bring to a very serious conclusion as shown in Ref. [**1**]

We imagine the fair indignation of honorable specialists with such unusual opinion and allegations. They will probably say to themselves; "it seems this guy does not even know about ***LHC*** and ***Higgs boson***, about the latest Nobel awards etc., and he intends to teach everybody!" Therefore, I would like to ask readers not to see only cheap sarcasm in these lines, as this demand might open some key problems. I will use here simplest "unscientific" approach only because the examined problems are actually related to our logic, psychology as well as our morality, more than to the tech and math. On this, let me bring one parable invented by me:

> *You have probably seen how a poor bee collides to the glass, when the open window is near! Let us imagine that we know bee language and we advise him to take a little bit right. – What do you think the bee will answer? You are right! He will send us somewhere far and he will continue meaningless attempts to pass through the glass! Let us suppose then, one of the bees interrupts his fatal job and explains us why he cannot follow our advice.*
> *It is also easy to guess what he will say; "it is well known with thousands of years' of bee's experience that shortest way to freedom is the direction to light. So, there is no reason to go left or right in such critical moment by following unsolicited advices!"*

Author dare to assert that present ideology of physics very much corresponds to confidence of the depicted bee community, with known evidences. Therefore, he just encourage researchers to make some break in their works to think with open eyes; on what are they actually spending huge efforts, time and money? I cannot think that someone can see conspiracy or something harmful here, apart from possible benefits. I realize that such intention, to give lessons to everybody, looks doubtful and very immodest, by ethical rules in scientific environment. I am forced to remind, that remarkable quality of modesty sometime becomes incompatible with desirable usefulness that often creates explainable unwelcoming situations for the "immodest" people, as we know. In view of above, I just ask readers to show necessary patience to go back about 400 years, to Rome city, to examine this issue together, on the example of shocking episode of history:

In the Flower Square there was a big noise. Shopkeeper Giuseppe has shut his door and hurried there with others to see what was going on. He saw in the centre a loony philosopher and a poet Giordano, tied to the pole of the autodafe, waiting for the fire and he inquired:
- Why do Holy Fathers have to burn this poor, harmless man?
Someone explained what the matter was:
- Is he harmless? Looking into the eyes of everybody, he persistently claims that our Earth revolves around the Sun!
- What are you saying! He is the Devil!
Then godly Giuseppe made a cross and solicitously asked:
- Do you think the fuel will be enough?

Such dialogue seems probable considering the dominant conviction of that time. We know that the Holy Fathers have done very wrong things, because of "immodesty" of their opponents, in fact. Of course, we are more educated and tolerant in our time. However, we can comprehend one more important thing from here:

b) ***We do not have any real guarantee of protection of present science from politicization and its degeneration to a kind of confession in our days too!***

Moreover, the Holy Fathers' formally were more justified than the freedom of present reviewers, moderators, journal editors and their founders etc, often banning ideas with the own vision (or, for some formal reasons). At least, the presence about ten thousands bitterly protesting scientist-oppositionists must tell us something on this. Meanwhile it is not so difficult to conclude:

c) ***The sad historical lessons must oblige us to deeply examine and understand the important circumstances of creation of hard contradictions in viewpoints of different researchers to avoid fatal mistakes, conditioned with our silently formed convictions***

I think that scientific methodology should have some difference from political, where everything is very "clear" at the beginning; "the correct is what is useful for our task and our own party"! Scientists however, must take care to establish the productive and common rules that will be indisputable-useful for everybody. Based on these judgments we decide for ourselves:

d) ***The scientific methodology must be objective, based on natural laws, independent from arbitrary decisions that will discredit the concept of any science at all***

I shall assert that this demand does not have proper respect in present physics and in the scientific media. It means there are no indisputable common principles and methodological rules which may cause (it causes!) unsolvable contradictions in views and hard confrontations between different groups and schools of researchers, depending on their educations, on formed mentality, personal inclines etc. The extremely different views and interpretations of the same subject have found place in problematic divisions of nowadays physics as explainable consequences. Thus, the necessity of application of some strong regulations and criteria to separation of "scientific works" from "unscientific" has arisen. As we know, it was done by our teachers, leading ideologists at their time, with known to them principles or recipes, which has been considered then as indisputable forever. Then it becomes lawful the next moral question – whether it is correct to instruct others to do something some way in future, if we are unable do it at our time? There is no exaggeration, as this has taken place in physics a century ago, by the decision of majority that was canonized with time!

e) ***The matter concerns to declaration of quantum relations as "a new kind of natural law", in contradiction to cause-effect laws, accepted earlier as the unique and universal principle of nature, based on the large group of facts***

Detailed presentation of all aspects of this unprecedented case in history of physics, as well as the attempts to examine the old and long disputes accompanying it, is impossible here. There are large literatures on this subject and we can suggest some of the approaches, as Ref. [**1**], [**2**]. We would like only to invite readers' attention to that:

f) ***The introduction of a new methodology a century ago was adopted in virtue of the decision of majority and not on the base of factual, unequivocal arguments***. ***Thus, we can evaluate this important turn of physics as a pure political action that must be incompatible with any scientific methodology, by definition*** (**d**)

Otherwise, too many simplest questions arise, for example - what would happen to physics if majority supported other decision then? A more serious question becomes:

g) ***If the laws of nature can be not universal then it becomes possible to involve other kind of laws too, - when this may seen as necessary in other complicated cases (!)***

This question, in context of observer's role, is brightly reflected in one of ***Einstein's*** witty remarks on the quantum representation (QR); "if I stand opposite the moon then I can say that it does not exist?" The right answer, according to QR, can be; "we don't care the moon is there or not; we are using a kind of operative rules that give quantitative description of phenomena that we look at. If we need to look at the opposite direction then we can use ***other kind of rules***!" Above-said seems somewhat reasonable from the formal viewpoint. All the subtlety of the matter is that these same quantitative rules, which managed to get, built or, somehow organized by researchers, became elevated to the rank of natural laws, as those determining the behavior of the moon, for example. Thus, the permissibility of different kinds of laws was declared and used in the classical physics and in QR, depending on phenomena and observers in fact. It is a clear manifestation of subjectivity, which cannot be acceptable in realistic science, as we have decided above (**d**), (**f**). Meanwhile, we live with this reality for more than 100 years. We are coming to next conclusion:

h) ***Many unsolvable cognitive problems in physics have arisen artificially, because of subjectivity of the "observer" as well as permissibility of different kinds of descriptions that has been implemented (permitted) a century ago***

In this limited volume I can announce, that many strange - surprising questions and long disputes in physics can be illustrated and get their reasonable interpretations in the above presented context. Particularly, the matter concerns to QR and to Special and General Relativity theories (SR) & (GR). It can be judged by Refs [**1**], [**2**], [**3**].

Now we shall formulate the next important question to build a realistic science in future:

i) ***How can we find the ideal observer who will be able do his job properly, to give us unique - universal and objective laws of nature as we declared*** (**a**)

To solve this question, we must first take care that the results of observations directly depend on the frame (system) of observation. I.e. these will be subjective and different in different frames. It demands additional operations to find the common–universal view of the observed phenomenon that will be acceptable for everybody. Thus, the fatal contradiction between ***Giordano Bruno*** and Holy inquisition can be easily reduced to a difference of their used frames of observations only. This question was well examined and developed by ***Galileo*** in his time. However, ***Great Copernicus*** was well aware of the huge

significance of observation frames earlier, who offered the ***heliocentric frame*** little bit before of the unfortunate Bruno (probably it was unknown to the Holy Judge!)

The most interesting thing, from methodological viewpoint, on which we would like to draw attention, is the bright didactic significance of this history that was well ignored after!

As we see, Copernicus involves here the ***perfect-imaginary observer***, who "looked" from the Sun. It means the following; the movements of planets seems to us (i.e., from Earth) in complicated paths that are very difficult to describe by some rules. If we imagine that we look at this from the Sun (by making necessary calculus and transformations) then we can get a new picture of planets' movement. We will see these beautiful and much easier to describe. The talk is about ***Kepler's Laws*** that were established on this way, and then ***Newton's gravity law***, as well as the ***classical Celestial mechanics*** in general.

We now need to turn our attention to the intriguing question; to which of the observer the mentioned laws relate - to the ***real observer*** (on the Earth) or to an Imaginary observer? In other words – which one of them can see the correct laws by observations? The answer is clear to us; the imaginary observer only can see the fundamental laws and actual movements of the planets and confirm these. As we see, we need to pass into imaginary system of observation using judgments and calculus (for transformation of the systems), and we need to return to our real system (using opposite transformation) to get the possibility of checking up our conclusions - that we doing in the imaginary system! Thus, actually**, *we only believed in the existence of the beautiful orbits of planets and laws of Celestial mechanics, in virtue of our logical judgments and math calculus, and we do not observe these directly!*** Therefore, it is possible to assert that these two analytical means can only work in organic links to each other; it will be just meaningless to look them and use them as separate kinds of sciences! Then we can assert:

j) ***An unprecedented methodological misconception took place in physics a century ago with introduction of*** QR***, considering the subjectivity of observer's role and application of formal-quantitative descriptions, separate from logical judgments***

Reader can find a large literature, reflecting hard disputes on this issue continuing nowadays too. As a result, it has caused a division of natural science into two totally different, incompatible by their ideology and methodology, separate sections ***(classical and formal-mathematical physics).*** Within dominant viewpoint, such reality looks now an inevitable necessity, as the order of things that must be the base of the future physics.

Some stubborn people, however, continued protesting, trying to construct a more convincing science. I will refer only to the opinion of a respectful for me professor ***Lee Smolin***, Ref. [**4**], who sees solution of arisen problems with QR in the opportunity ***to interpret quantum relations and phenomena based on cause-effect laws***. This approach means revision of the ideology and returns physics to the realistic way (see: Normal science). We can look at the mentioned opportunity within the context of the above-described Copernicus's methodology that we have taken as the basic principle:

k) ***We need to consider*** QR, SR *&* GR ***as seeming results of real observers in real systems; we need to open their causal-objective essence in the perfect-imaginary systems, to get the opportunity of continuing future development of realistic science*** (**i**)

We have presented our key principle that much corresponds to viewpoints of ***Schrödinger***, ***de Broglie*** and other coryphées. This task is not removed yet from the agenda of a small quantity of realistic thinkers, who dare to go against the official ideology and dominant majority. Meanwhile, certain necessary (*ad hoc*) recipes and additional

operative instructions have been involved by reformers, openly or silently, to protect their arbitrary decision and the imposed unnatural methodology. The described reality corresponds to imposition of holy dogmas that was done with good purpose too, - to save the “truth” from the “heresy”! The absurdity of the situation is that there are no hints of where the "right way" is and “correct science” is that needs to be protected, as these are the key tasks of basic research that we need to solve yet! The imposed methodology brought to a number of natural questions and fair protests of many distinguished physicists. However, the Galion of "correct science" continues to go on its unshakable path more than a century and the strange - unusual questions become more and more than their reasonable answers. Particularly, FQXi competition themes are brightly reflecting this.

2. Math and physics

- How can mindless mathematical laws give rise to aims and intention? (Question from FQXi contest)
- This may happen, if … aims and intentions can be mindless! (Author)

The question on relation of math and physics seems so trivial to me that it can hardly be pertinent to discuss it now, on the background of uncountable-incredible achievements of science and tech, where math plays not the last role. This unusual necessity, however, just clearly evidences that physics is in incredible confusion as such questions never arise in the brains of any worst economists, businesspersons, engineers etc, who also use math in their daily jobs, as physicists. We already have some hints from previous chapter - whence come such strange - amazing questions. It is easy to realize that theorists have put themselves into absurdly-stalemate situation, with application of artificial methodology, by the same resigning from ability of natural thinking, given to us by God (**1**- **j**).

The matter is that our seeming reality was somewhat “distorted” because of subjectivity of our results of observations (measurements). This “distorted” view of phenomena does not give us the necessary opportunity to compare our subjective results and imaginations to the objective laws of nature, to make reasonable - correct conclusions.

We have looked and silently declared our seeming-distorted quantitative relations as the “correct picture of reality”, considering these as "fundamental" in the nature. Then we fall into hard contradictions with the cause-effect relations that we have believed as the basic principle of nature. The theorists have found the "best" solution of problems in the creation kinds of uncritical, unclear - unusual, invisible - unprovable hypothetic things, with all their properties and peculiarities, necessary to “explain” the phenomena that were difficult to understand. Meanwhile, this approach has been rejected long ago by realistic thinkers as elementary-trivial and unscientific (see: ***Newton’s “I contrive no hypotheses”,*** and ***Occam’s razor***). This, however, was reanimated by reformers, because of difficulty of the situation. Critical remarks can be so much that it is impossible to present. Reader can judge on this from mentioned references.

We have talked above why disputable sections of present physics correspond more to confessional doctrine than to natural science, - because the modern formal physics has been put above the objective criticism and logical arguments that were accepted in scientific methodology as default. The formed reality forced theorists to apply different kinds of speculative tweaks, to somehow to push the basic science. Another unprecedented “innovation” becomes:

a) ***With implementation of new methodology and ideology, which factually substituted the laws of nature in modern formal physics, the significance of math apparatus was elevated to some unexplainable - mystical level.***

I think it may be enough to remember that ***mathematics has been our valuable language - tool, created and developed by us to make our job easier***. As we see now, it has become some omnipotent - cabalistic knowledge, with hurried hands of advanced theorists, who have long believed that it may guide them to incredible new successes! (*)

I well realize that above-said may look same as telling thousands of respectful people that they are suffering from some serious intellectual problems, hoping to help them by this. It is actually a very complicated case, same as to convince deeply pious persons to change their religion. With all my excuses, this problem needs to be solving a first before we can hope that physics may break out from the cage of accumulated incredible misconceptions.

On the other side, however, the question can be easily resolved if theorists agree to examine elementary – obvious arguments that they have banned to do themselves! If, for example, ***initially they use the physical units next to numerical values in the formulas*** (as it does every specialist in other fields of activities!), then they will get rid of many such cognitive mysteries. As it is known, any accountant, or half-educated supervisor strives not to mix up the number of loaded tons with the quantity of workers or with the sum of their salary etc, otherwise all their reports will become some useless nonsense. Meantime, the units of numbers give us some important hints and certain instructions on what kinds of math operations and for what purpose we can do to get some useful and significant results.

I am forced to mention with a clear conscience, the unbelievable fact of the refusal of majority of leading theorists, to use physical units in their quantitative considerations from the beginning. Meantime, we must say for justice, that this happened not only because of stupidity. It seems right to spend time on this intriguing question, in virtue of its huge importance. We will bring first, the following definition of the significance of mathematics:

b*) The mathematical apparatus was formed and developed as a separate, abstractly descriptive - analytical tool, by the way of abstraction and generalization of quantitative properties of material objects, reflecting conservation laws in the nature.*

There should be nothing new here for the reader, so we can hope everybody will agree to definition (**b**). We can suggest next explanation on the mentioned problem, connected to application of high level of math in problematic divisions of physics. As we see, the high performance math apparatus is an abstract - unitless composition, generalizing certain kinds of facts related to material objects (**b**). The matter is, theorists faced huge problems in the opposite operation, i.e. choosing readymade powerful equations, valuable operators etc, to apply to a concrete purpose, because of absence of units as well as necessary criterions on permissibility of this or other action in concrete case. With reader's permission, we will present the situation by joke; "We know that all roads lead to Rome, but we do not know how come back to our village." (†) The jokes and criticism can be more on this issue but we will restrict ourselves to the following important remark:

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* As we see by offered contest question, such role of math it seems doubtful for the FQXi team

† Above-said may to illustrate the problems of arising zeros and infinities, with interruption of functions, problems with the ***definition of boundary conditions*** of functions and too many others, from technical viewpoint.

c) ***The tasks and goals, statement of issues, the concept and ideology of natural science in general have cardinally degenerated to an unreasonable kind of occupation, due to arbitrary introduction of unnatural-artificial methodology in physics, a century ago.***

This change has been dramatic for many indisputable founders of physics, who have preferred to go away from ''official" science. Then, physics has reached there where it is now! I mean its present deadlock condition and global confusion that "leading coryphées" tried to fill out by "shocking openings" from time to time, as in the example of mentioned Higgs boson. I am not going somehow belittle merits of Mr. Peter Higgs and co saying this, because they have well done what that they have been trained to do for long years! I only think to myself; how and for what purpose this new particle, which is busted practically at the same moment as it is born, will be useful, when there are more than ten thousands of different unstable particles as well as some bosons among them? Then, what kind of significant shift it can give, excluding high awards and short euphoria?

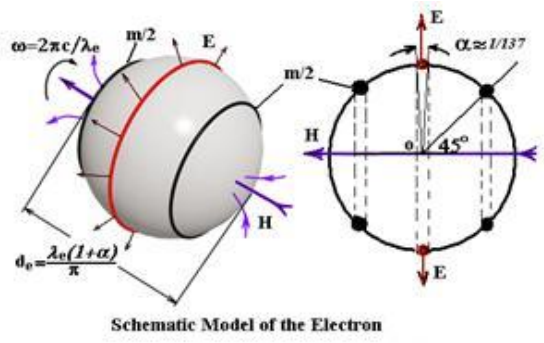

Fig. 1 ‡

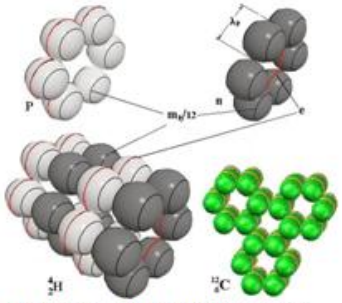

Fig. 2

This must look very doubtful, if we take into consideration that there is such fundamental and much more accessible particle for study as the electron, for example, that lives practically forever (by cosmic scale even!) So, why electron must be of less interest to physicists than any unstable particle? I mean, if we can explain what is electron then we can hope to understand the essence of other particles too, because all of them have many common and similar characteristics. Above-presented judgments clearly say to us that:

d) ***All kinds of particles are formed from the same primordial substance. The huge numbers of different unstable particles cannot represent any interest and perceptivity for study, because of their transient state and common physical essence***

We can briefly say on this; the meaning and significance of such experiments can be compared, for example, to the attempts of opening chemical formula of water by studying possible bubbles, or forms of clouds in heaven etc. having no doubt that we need a very different science for this. I have excused myself already for the immodesty. Therefore, I will just say that many incredible problems of physics have become easily solvable for me based on a methodology developed by me: the small part of this is already known to reader from previous lines. I allow myself to bring here the schematic structures of electron and proton (neutron) not to look unfounded (see: Fig. 1 & Fig. 2). Reader can know more and evaluate this matter from mentioned Refs. [**1, 2, 3, 5**, **6**]

‡ The Fig. 1, Fig. 2 from author's work, Ref. [1, 3]

Epilogue

I can imagine the explainable indignation of many highly respected leaders of basic science from my assertions. However, I believe this is the reality and they will be forced to accept it – now, or later! Why am I talking so confidently? - Because I have already solved for me the main questions that I see are necessary to get conceptually completed science. I need to say these are not the same incredible problems, exciting modern theorists, as the big number of such "actual" questions becomes artificial and meaningless, arising because of presented global confusion. Meantime, I have almost answered FQXi question:

- Mathematics is our "workhorse". You can also compare it with a good camera that reflects a very important side of reality, giving us a great opportunity to analyze, prove and make important conclusions. Thus, it will be a simple lexical mistake to say - "math defines or manages things", since natural laws do this. Thus, mathematics is our tool that cannot work by itself, rule something, or give us useful results without our participation and proper supervision - as any other tool!

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