Higgs Essay

Vita Principalis: Road to Single Mathematical Particle

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Abstract

Three weeks after announcement of discovery of Higgs particle at LHC we discuss this discovery from the point of view presented previously in (1) in the form of predictions, and from what we had argued before in (2-5). We argue that behind Standard Model there might be another level of discernible reality which we call reference of life (4). We show how we can connect it with the vision in the general sense and *vita principalis* and how it could be connected with what we discover as mathematics (3). We argue that mathematics is a form of *creatio ex nihilo* but only in its weak form where the proper agent is the vision or *vita principalis*.

Key words: Higgs boson, LHC, mathematics, theoretical physics, vision, life organization, principle of life, *creatio ex nihilo*.

Introduction

Three weeks after the announcement of discovery of Higgs particle at LHC we discuss the result from point of view of mathematician who is not particle physicist. One point of reference could be the author's article (1) about the question, before we knew whatever result from LHC. But, before we start to compare what we speculated then and what we know now, let us turn attention to what we have today. Two things come out from what we see today. One is the greatest achievement that the whole world now celebrates on occasion of the announcement of finding the particle, Higgs particle or Higgs-like particle plus the old great achievement of the contemporary physics and all scientists around these LHC projects which lead to the discovery. The other thing is the crossroad where physics now stands. Before this discovery we had relatively clear picture of structure of matter in attire of Standard Model, and we had only to question about one last building block to be checked for existence in the real physical world, that of theoretically predicted Higgs boson that would be responsible for masses of particles in the real world. Many physicists in the world still believe that the discovered Higgs-like particle actually is expected Higgs particle and only some short time, say, until the end of the year, would be necessary to confirm this fact. But we don't believe in miracles, at least, in this type of miracles, and are ready to question where we are now, the more because we had already made similar kind predictions some years ago in (1), written originally in 2007.

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Are we to celebrate before knowing what the festivity is about?

Someone could ask what to celebrate when we haven't yet made certain what had been discovered. But, if we look back in the history of physics with aim to find when physics had some certainty about its statements then we could find some reverse proportionality – the more confidence we had in what is sure in physical science the less it was confirmed by the physical science itself. The first real shock for physics was theory of relativity. Shortly after recovery, came another shock, quantum mechanics that is not overcome still nowadays. Are we to expect that physical science would grant us some quiet harbor that would return us in the certainty of nineteenth century?

All what we have seen indicate another direction, in the direction of uncertainty and new undiscovered realms. Only short time ago we had only two dark problems, dark matter and dark energy. Short-lived shock came when superluminality was assumedly discovered or was it? When "Higgs uncertainty" signaled, we had to wait bravely, prepared already to acquiesce without Higgs boson. The little bump in one hundred twentieth GeV energy range saved Higgs Boson (6) and allowed CERN to announce the discovery. Yes, discovery came as the savor even though without knowing what was discovered.

If we look at what we have without grumbling about we don't know yet, it is clear that we are witnessing the greatest discovery. Physics once more turns out to be one of the most successful sciences that show the way for other sciences. LHC gave the discovery and is to provide scientists around the world with greatest amount of data for analysis. The way how physical science works with the help of LHC and all support around it show new perspectives that paid off in this last discovery. The series of LHC experiments open new era for whole physical science.

On what is discovered

One way to appreciate the discovery would be to say that the theory around Higgs boson, the scalar field, the symmetry breaking and mass causing for particles was very successful picture that allowed completion in some way of the Standard Model. This theory seems to allow a complete picture of physical reality. Only physicists became too trusted in this theory that all could be settled simpler than the reality was.

But how the theory behind Higgs mechanism works? We are again asking – why all this work? By the way, we have much more working physical theories, at least, for some time, than empirical theories without theoretical support at all. As a fact, physicists might have forgotten times when they had only empirical theories without extravagant mathematical theories. In reality, theories are plenty multitude, that arrange in the queue as if waiting for better times for them to repeatedly take some responsible place in the picture of the universe. And all of them work, well, up to some limits, but, nevertheless, work. Well, what we call string theory might be characterized as collection of collections of theories. Is this to be called effect of Dirac and Wigner (7-8)? The answer is maybe.

Well, but the case of Higgs boson was quite extraordinary because of its simplicity and compactness. In the beginning the light and all what light-like and luminal, and then symmetry breaks, and particles turn from luminal to subluminal, and we have our real world. All we needed for this nice world was but one particle – Higgs boson. But only one particle?

What could be hiding behind Higgs-like particle?

If we want Higgs mechanism of how masses of particles arise to retain, but are to loose particle itself, what could be that in place of this particle? As particle is already as if discovered? In (1) we tried to apply the idea of multitime that was introduced by D. Bohm (9), we were speaking of cone of creation (1). But here we remember idea of Richard Feynman of one electron, and ask – Are we not to abandon many particle world in favor of one particle world? Actually Standard Model is forcing us for such idea where it already serves as sort of description of this common particle. We were used to look on particles as in the order how we discovered them, first electron, then proton, then neutron, and so on. Now with Standard Model which unites the measurable and discovered and only predicted particles we may start to change this view on all of them. They are all something *One*. Physicists used mathematical description of particles in form of Standard Model. Now they might be forced to apply next idea that Standard Model with all its symmetries and group actions is not only description, but description or image on some higher level of some common particle, and in that case discovered Higgs-like member is some projection of this common particle.

The Standard Model as level of reality for *vita principalis*

Why physicists don't tend to consider Standard Model (SM) itself as sort of some reality, but only description of reality? The question already contains answer: SM is description of reality. Nature may know nothing of symmetries in it and in elementary particle organization particularly. Why SM works, physicists don't know, but are not very unhappy about it, because SM works and works beautifully.

But, what if there could be some level of reality found that could correspond to SM like particle world and even better? We claim that such level of reality exists and it is the reference of life, what we call *vita principalis*, or, principle of life (4, 2, 3, 5). If we are on the right way, SM may turn out to be theory not only for particle physics but for *vita principalis* too. There SM plays the role of how we see the world. We may state even more affirmative: life sees the world in the same way how it is organized in it (2, 5). It may be said otherwise – Life can't see anything outside how it is organized in the world. Even more, if we are the creatures who are within, life we can't see anything outside what doesn't pertain to life or what is not seen by life. For us who are within life, vision and organization of life is the same: we see in the same way how we are organized in the world.

Mathematics as simplest possible world and as *creatio ex nihilo* and as a form of vision

To persuade oneself how vision in general is connected with *vita principalis*, we are to see what is mathematics that gives us ways to see world deeper than we used to? We argue that mathematics is the simplest possible ways how things are organized and built, and how these ways are presented in *vita principalis* (3). Because of this we may look on mathematics as reference system of life (4). When we speak about mathematics, we mean that what we discover as mathematics. But in wider sense mathematics is the vision in the most general sense present in *vita principalis* that from side of human beings isn't discernible from *vita principalis* itself. Because of this we may speak about mathematics as form of vision in the general sense, of that part of vision that we are able to discover or discern. Other forms of vision we have given in us as our abilities, to see, to understand, to have language ability, to know languages and to be skilled in their use, and so on. Other forms of vision are these integrated in our functioning as life systems that are not directly accessible to us, say, blood circulation system in our bodies. We maintain the principle that vision and life organization from behind reference of life are identical.

If we know mathematics is part or a form of vision, we may see easier what role it plays in our investigation of physical reality. We see physical reality via reference of life, and, thus, mathematics in the direct way shows organization of all what we see. But we can't see anything outside this vision ability given by *vita principalis*. And in this way mathematics stands for us as the level of reality that we are to recognize as reference of life. If we remember that mathematics is the simplest possibly world organization then the concept of world creation formula – *creatio ex nihilo* – appears before us in very natural way. But we may see the proper meaning of these words when we apply them for vision or life organization. It is life or *vita principalis* that appears before us as *creatio ex nihilo*, and mathematics, in its weak form, that we are able to discover, is that which represents this ability of cre*atio ex nihilo* in our minds.

Transforming Standard Model into One Particle Model

Let us remember Richard Feynman and his one electron idea. The idea that each type of particles stands actually for one single particle in nature is nothing strange. Only this one step is needed to assume that all types of particles comprise one single particle. Is it not possible model for universe? But things turn even simpler if we have come to this level of comprehension. We are not to imagine that, so and so, in the nature we have only one particle, and for reasons not known to us we perceive this single particle as many particles. The reason to come to one particle lies quite in other part of our existence. The only particle is *mathematical particle*. Where the difference lye? The mathematical particle is the stage on which we see the universe from the *reference of life*. How things are arranged in the world outside us we don't know, and we hardly can come to understand something there, if we can't perceive the simple fact that what around us as if exists actually is only what we see. It doesn't mean that nothing exists outside us, but we see in other topology and multiplicity than the world outside us exists, or more precise, we see in mathematical disguise all where this "all" exists in reality in quite other disguise that is not perceivable for us directly. The distinctiveness (2, 3) we possess is our comprehension that nature could not possess in that quality how we have it.

Perceiving world as mathematical particle

We describe mathematically world as we see it. But these words are to be understood directly. Thus, backwards should be right too. We see the world how we describe it mathematically. The seeing here is the same vision in most general sense as before.

What we see in general and how we see is the same, what we try to understand being behind mathematics and equal with mathematics. The only difference is how it occurs to us. Seeing is integrated in us on levels of our constitution, but mathematics as we generally use this term we exercise on very primitive level like how children learn to speak or to walk, but even much more slowly. But on most general level seeing and that behind mathematics is the same. If seeing and our living is programmed in us as in living creatures, to understand mathematics is not. Similarly, as our blood circulation in us where heart is the main organ: it is in us constituted for functioning in us, but not for exploration from outside. If we want to explore it scientifically, we must elaborate methods for that reason, what should require for us enormous efforts, whilst the blood in us is running with ease as creator has established. In the same easy way, the function of our vision and our life support within us are the same. These things function with ease as how living world is created, how all grows, arises, and dies. On the other hand, if we want to understand all this, and when we with much effort try to squeeze something out from there on what concerns its organization we receive what we call sciences and mathematics. When we shape mathematics with patterns from world around us and from physical experiment, we get physical science.

What we get as a result of our efforts we see already now. We have Standard Model as theory how matter could be organized, that is well supported by physical experiment. We go on and now, having LHC, we may organize physical experiments on much highly organized level that before ever. We have beautiful mathematical theories as it seems to us. We are on the right way. We must go on. We must prosper.

The only obstacle to us is how primitive all our understanding is. Along with developing technical skills we are to develop general understanding of things in general. We must think on levels that comprise all experience of all centuries before us. Do we have all this in mind? Or we get arrogant with our technical capabilities, forgetting previous centuries and people from then and their experience? Do we understand limits of science and scientific methods? (See 5 & 3). Do we know all this sufficiently well that we don't need be reminded of these things?

Conclusions

The ideas we have developed here and before are very general and simple. The obstacle is that they require us to abandon the principle of reductionism that is reigning in contemporary sciences. On the other hand, we should not neglect results received from position of reductionism. What we advocate is to use both reductionism and where possible to go outside it. But is it possible? We argue that it is possible and suggest ways for such reasoning. Mathematics is one of the key notions to overcome uncontrolled reductionism. One of our conclusions in this respect is that we must study the mathematics with much more effort than ever before ever (3).

This is worth repeating. The second idea which we should apply is the indivisibility of life – what we call *vita principalis*.

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