Pinnacle Advanced Physics (ISSN: 2360-9443)

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Research Article Vol. 2 (5), 2015.

Universalities in the Complex Science

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Accepted 28 October, 2015

ABSTRACT

By identifying Universalities in the Complex Science, we give a clear definition of this discipline and promote it to an independent discipline. We also define weak and strong interdisciplinary and apply it in different areas of Complex Science.

Keywords: Confined Quantum Field Theory, weak and strong interdisciplinary, Relativity, Superconductivity, Super fluidity.

Introduction

In the consulting situations we hear often the words, complicated, complexity, and complex and so on.

A successful consulting work would be when a consult provides its client a simple and transparent solution. This of course is easier to say than accomplish it in reality.

By this simple introduction let's go to the main purpose of this article.

Here we will give a basic definition of the complex science which not been done before. And identify the universalities in the complex science and in this way promote it to an independent discipline.

In this article we use the word complication for the problem arising in one discipline and preserve the vocabulary "Complex Science" when more disciplines are involved.

The reader surly has some familiarity with the disciplines like mathematics physics economy and so on.

If we start to talk about quantum you may protest and say, you as a consult must simplify and not terrify the people by mentioning quantum physics.

It is said (by populist and of course not serious scientist) that there are only twenty people in the world that understand the quantum physics. If you have patience, you will find out at the end of the article that this is just a myth.

Little words about mathematics

Between all disciplines in the science mathematics has a unique position. The reason is that in mathematics we have no internal contradictions; sorry in a sense we have always contradictions. And these contradictions are solved immediately by separating and clearly defining objects in mathematics. In fact all elements and objects either generated by the process of solving and avoiding contradictions or if some object inters the mathematics by some definition must not be in conflict by already established elements. Therefore all contradictions are solved already from the beginning.

Lets for the moment do not go deeper in this question and simply accept that mathematics does not make mistake.

The other reason for us to accept that mathematics makes no mistake is that all mathematical parts and logic are connected together and if we question one part of it then the whole mathematical system will collapse and we should wait for the aliens to come to the earth and give us their own mathematics. This is not valid for other disciplines.

(Of course mathematics must have confrontation with the outside world, which is another question that we will come to it later.)

Of course mathematics has axioms and common for all disciplines is that they must have axioms.

I do not want to take the time of the reader to talk too much about axioms and I am sure that the reader knows what axiom is. But I cannot prevent myself to mention the phrase "axiom hierarchy".

The reason of introducing this phrase will becomes clearer later in the article.

Quantum

Why I suddenly use the word quantum?

The word quantum has a magical attraction. Some people use this word to sell detergents. They are more intelligent than I am. They know how to earn money.

I am not neither a businessman nor a magician. But why I use this word?

I will use this word as a compass.

We will hike through the jungle of complex science and therefore we need a compass.

Going back to what we said about complication and complex science. Of course if we are butterfingers no matter what kind of problem we want to solve we may complicate the situation. And this is not what we mean by complex science.

We said before that complex science deals with the solution to the problem involving several discipline, at least two or more. It means overlap of several disciplines.

For some years ago there was a conference in Shanghai named Complex 2009. Somehow I was placed in the working committee to judge about received contributions. And I did my duty the best I could. But I find necessary to contribute myself by an article. Guess what. My own article was rejected.

The reason is also part of "Complex Science" that we will go through later on in this article.

However after defining complex science as a multidisciplinary domain. I classified multidisciplinary into two categories.

The weak interdisciplinary and strong interdisciplinary.

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Now a day it is modern to talk about paradigm and paradigm transition. Establishing a new paradigm is easy to say, but in reality is much much more difficult than one may imagine.

It demands even new vocabularies like weak and strong multidisciplinary. And much much more. And one which is most essential is a compass. A goal far far away.

Sightseeing through jungle of complex science

I will guide you through this sightseeing, but as a lazy scientist that I am, I will let you come to your own conclusions. My experience says that seldom people oppose their own conclusion. There are lot of places plants and animals to look at. But I will take you to the places that are essential for formulating and establishing "Complex Science".

You do not need to be expert in relativity or quantum for coming to some meaningful conclusion.

Particles moving faster than velocity of the light

If you followed the news you may observed the news that some people at CERN claimed existence of some particle moving faster than velocity of the light. They did some experiment and measurement and calculation. They could not prove anything. I want to be as neutral as possible in spite that before all these activity I presented in some conference a theory which could be some orientation in this question. Here I mean presentation of "Confined Quantum Field Theory", which is a support of the relativity.

But suppose you are advisor for some government and in that position they may ask you.

Should we finance such experiment?

Wasn't it established for long time ago according to the special theory of relativity that a particle cannot go faster than light?

An opposite question may be like that.

Shouldn't we question a theory just because it was established a long time ago?

For those who want to come little bit closer to some answer I just remind that complex science basically deal with multidisciplinary problem.

Which disciplines are involved here?

We will answer to this question later.

If you can see, then something is wrong

When you look around, there goes billions and billions of light beams in any direction, why there is no collision between them. Why they do not change each other's directions. To see it most beams come from the objects directly towards our eyes?

You may ask what this has to do with experiment of finding particles moving faster than the velocity of the light to do.

Perpetual motion machines

1. Perpetual motion machine are hypothetical machines that can do work indefinitely without an energy source.
2. This kind of machines is impossible as it would violate the first or second law of thermodynamics.

These two statements you often observe in the literature concerning Perpetual motion machines.

Are these two statements identical?

Chemistry

So far we talked little bit about mathematics and gave it a special and unique position in the jungle of discipline. Then I took you around to some shows of what mostly is known to be physicist concern. But now I will take you to some chemistry show.

The year was 2004. And I participated in a pedagogical work shop at white house. No not the white house in Washington. There is a house called Capitalio in Habana, Cuba. The house is identical with the one in Washington. Any way the workshop was about how to teach physics to the kids at school. There Professor Job from Germany demonstrated an exciting experiment. The experiment was as follow. He had a plastic duck mounted on an axis and could swing forth and back. In front of the duck he had a glass of water. It was a show of a duck drinking water.

The strange thing about it was that the duck could swing indefinitely without an apparent source of energy. It could be a perpetual motion machine. Professor Job was not a magician. In fact he was one of the most respected scientists I have ever met. When I insisted to explain the energy source involved. He said chemical potential. And when I wanted him to make a more detail and closer explanation, he repeated again and again "CHEMICAL POTENTIAL". Why he insisted in this way we will come back to that later.

Thermodynamic

I hate Thermodynamic. Human's future is threaded by global warming. If it was not first and second law of thermodynamic we had not this problem. To be serious my hatred is extremely personal. It started for very long time ago, may be more than thirty fives years ago. I was an undergraduate student at physics department. I had no friend at the thermodynamic class room. Therefore my friends where atoms and molecules in the air jumping up and down and moving in every direction due to the heat.

I talked with these atoms and said that if they becomes friends and hand in hand move in one direction they will give useful energy and we can solve human's problem. Also defeat the law of thermodynamic.

One day I constructed an invention. It was two capsules connected by a valve. One of them had air and the other vacuum or out of air. We could open the valve for the air going from one capsule to the other one in two different situations. One when the two were in horizontal positions and the other when one was above the other, and then bring them to the horizontal position. In this way we could show that these two hated laws of thermodynamic first and second could be violated. One night I could not sleep and at two o'clock at night called the professor to talk about my invention. I apparently waked up the professor that was very polite and his job was

to not mention that I am crazy. Answered "Can we talk about this tomorrow."

Days went to month, months went to years and years became decades. All was forgotten if it was not that about thirty five years later I was invited by Chinese government to participate in one of the AP-SUMMIT`s. There among the speaker was Dr. Yuh-Huei Shyu. From Taiwan. He in his speech he said we must save humanity and insisted that we can use gravitational forces to created energy.

Thanks to the Chinese governments generosity we could sit in the five stars hotel bar until late at night and I insist that energy cannot be created out of nothing and he insisted that we can use the gravitational energy and so on.

So far I guided you to see some shows in the complex science.

It was about quantum, particles moving faster than light, if you can see then something is wrong, perpetual motion machines, chemistry, thermodynamic.

I may look like an amateur. But I know what I am doing.

It is time for me to introduce some of my vocabulary.

And you me discover that what I say now, make more sense.

Definitions

Weak interdisciplinary and strong interdisciplinary

Weak interdisciplinary is the case when two or more Discipline collaborates.

Strong interdisciplinary is the case when one discipline questions one of the basic element of the other.

Axiom and axiom hierarchy

Dear reader, do you know what an axiom is. I just looked at Wikipedia. It says;

> Axiom is a premise so evident as to be accepted as true without controversy. Let put it in practice. We can see around us. The light beams from the objects come directly to our eyes. Can be something more evident than that. The light beams cannot change direction by other light beams crossing their ways.

Is it clear that we cannot affect the light just by light?

Is it an axiom?

Then what is "light interference".

For not so a long time ago, I participated in a conference in Rhodes. The conference was about "Statistical Physics". I presented "Application of the Confined Quantum Field Theory in the Statistical Physics".

I had an argument with the session leader. I said that an electron is not a point but it is a bounded manifold. The leader said;

> Physics is like this. We see something, make an idealized model and calculate. That's it.

This made me angry….no principle…Just pragmatism…then what is principles good for? If we make our roles and model according to each upcoming situation.

What I will here is to put in your memory "AXIOM HIERACHY".

Superconductivity and Super fluidity

The year was 2003, the month was July and the place was Rio de Janiero. The conference was MG10. I was invited or accepted or something likes that to present "Confined Quantum Field Theory".

The main session and big conference rooms were of course reserved for string theory.

I was sitting and pretending that listening to the one that was talking about string theory. One man in the back row stretched forward to say something to me. He was like a school child that has not done his homework and feeling guilty.

He said;

> I really did not understand this Cooper pair in explaining superconductivity.

Shame on you and all people like you. We are listening to string theory in eight dimensions. How you dare to come here at all.

But I am kind and explain to you.

First this eight dimensions. It is easy to understand. First think of a world in n dimension then put n=8.

Now Cooper pair.

When two electrons come together, each one has spin half.

(Spin half is a topological property, it says something about the internal structure of an electron).

Half plus half is one (spin one is a topological properties of other particles that have the name boson).

If it is difficult to understand it, think that you have two men that they are twenty years old. What happens if you put them together? It is clear that you get a man that is forty years old. Isn't it?

If it is still difficult to understand how two electrons goes together to become a boson. Think like this.

Super fluidity and superconductivity basically are the same.

Therefore you must know that two helium also goes together to make a boson.

When two helium with such a complicated structure with number of protons and neutrons and many more electrons can go together to build up a boson, then it is easy to understand how two electrons can go together.

If you puzzled and ask what happens to the electrical charges????, from at going from fermions to boson. Since electrical conductivity is mainly due to electrical charge. If here it vanish we have no electricity at all, and if it do not vanish electrical charges create resistance and it does not matter if you call them fermions or boson.

Then the answer is clear. In quantum everything is possible.

When an object can be in two places at the same time, then you may expect this miracle too.

Art

Above we used sarcasm as an argument. Of course a good sarcasm can be considered as a kind of art. Later we will come to this point that art may play a role in complex science. For not a while ago I participated in a symposium organized by European Alliances for innovation. There were a lot of interesting people. As it is customary in these occasions one present him usually by visit card and try to impress people as much as possible by showing self as important as possible. It was a girl with the name Marlene from France.

I said "I am doing work in theoretical physics". I thought this must impress her. And she said "I was doing theoretical physics too. Everything is already done in theoretical physics. Unification is done and there is nothing more to be done. Of course unification is in eight dimension, but done is done."

I ask her, what are you doing now? And she answered "Innovation in art".

Do you want to know the role of art in the Complex Science? then read this article to the end.

More than observation

So far in our safari we observed many places. I list them here;

1. Mathematics.
2. Quantum.
3. Particles moving or not moving faster than the velocity of the light.
4. If you can see, then something is wrong.
5. Perpetual motion machines.
6. Superconductivity and Super fluidity
7. Art

Then let dare and take one step and go from observation and do some question. In the point two "Quantum" we find that a particle can be in two positions at the same time. And in point three "Particles moving or not moving faster than the velocity of the light."

Can we ask how they measure the velocity of a particle that can be in two positions at the same time?

If you talk with people that are expert in the relativity they will tell you;

What? In relativity every point has a well-defined position.

If you ask people in quantum they will say that there is no problem that a particle that can be in two different position at the same time.

That is you that is not intelligent enough to understand it.

Our solution is that we should not talk with them at the same time.

Accept that each one of them are a world for itself with its own axioms, vocabulary, their own task and job. We must respect them and let them do their work. In other word have respect for each discipline. We may also hear people say, quantum deal with micro physics but relativity works with macro physics. We should not let one interfere the others job.

The other solution is to understand that there exist something that we call strong interdisciplinary. By our definition the case when one discipline questions one of the basic element of the other.

Axiom hierarchy

Now slowly we are coming closer to the central point of this work. We are not going to argue for what we say in this paragraph. The reader should accept statements here more as postulates of the complex science.

Each discipline has its own methods, roles, postulations, axioms…..or whatever you may call them. Of these objects some of them are more local and others are more general. All these roles are acceptable if we shrink enough their applications domains. Contradictions arises when two roles which are different get overlap.

These contradictions are solved either by separating their domain or one of them fold for the other or totally leave the common domain.

Therefore we do not use expression right or wrong and mostly replace it by weaker or stronger. And postulate that such method, roles, postulations, axioms…..or whatever you may call them, are stronger if their area of validity is larger than the other. This creates what we call axiom hierarchy.

And we postulate that the discipline which has a basic axiom which is stronger in an overlap domain is stronger and eventually win.

Confined Quantum Field Theory deals mainly with the conflict between the mathematics and relativity on one side and the old or wrong quantum on the other side. And mathematics and relativity will win. Strong interdisciplinary which seldom happens. From historical point of view after a period of chaos establishes a stronger base for the science.

In an area which is covered by many disciplines we may apply the roles of complex science. Here different situations or scenario can be identified.

If we focus to some point or situation, one discipline has the dominated role and the others have secondary. (If not we may call the situation paralyzed). If the main discipline does its job, then what is the problem, everybody happy. This is the case of weak interdisciplinary.

But disciplines do not always fulfill the task they are created for. This causes conflicts with the surrounding disciplines. The problems often get deeper, since those who represent a discipline are not the first to admit that something is wrong with them. Then the needs that once created the discipline get other channels to express it.

This is often the scenario of the strong interdisciplinary.

In our case we used sarcasm to express the needs that must be satisfied by the discipline of the theoretical physics.

How to Cite this Article: Prof. Mohammad Fassihi "Universalities in the Complex Science" Pinnacle Advanced Physics, Vol. 2 (5), Article ID pap_218, 833-837, 2015.

Therefore in the complex science, especially in the case of strong interdisciplinary there is often a hidden discipline. This area often is covered by art.

From observation towards conclusions

So far we have just observed some cases in the complex science and done some superficial conclusion. We will gradually go deeper into the cases to come to the ultimate conclusion.

First step of the analyses is to take pair of disciplines. Let take some example.

1. Physics and mathematics.
2. Physics and chemistry
3. Art and physics
4. Relativity and quantum.

Physics and mathematics

In the weak interdisciplinary the situation is as follow. Physicists make a model of a physical object and the task of the mathematic is just to obey and calculate.

But it is not the case in the strong interdisciplinary. In the strong interdisciplinary each discipline translates the world according to its own axiom and principle. Therefore for the mathematician the physics is mathematic constraint to the physical criteria. If it up comes any disputes here mathematics is the stronger and the winner side, by simple argument that mathematic roles are more global and universal. And we postulated that universal laws are stronger. In fact the basic philosophy of the "Confine Quantum Field Theory" is that the physics is nothing but the mathematics constrain to the space-time and some few number of physical criteria. But we will come to the detail later.

Physics and chemistry

There is nothing exciting when we have weak interdisciplinary in the case physics and chemistry. They borrow each other's definition and measurement and then leave it back and say thanks and they lived as good neighbors. But the situation is extremely different when we come to the strong interdisciplinary. It is customary for the chemist to start with the properties of the substances. It was like that when Dolton forwarded the atomic formulation of the chemical reaction and the chemist wanted to insist that chemistry deal with some property of substances and the property of out coming substance from chemical reaction. Dolton intrusion from physics into the chemistry by insulting their roles, revolutionized chemistry. One may think that is history and now a day's chemistry are so modern that we cannot have a second Dolton. But my dispute with Professor Job at Capitalio in Havana is not so different in nature. Professor Job want to stay and insist in "Chemical potential" without atomic analyses of the chemical potential and see in his experiment what happens to individual atoms. For a physicist chemical potential is an integration of energy and momentum of individual atoms (potential and kinetics and direction of momentum). But for a chemist chemical potential is starting point. One illustrating thing in this dispute is nano-technology. We observe that we cannot always stay with properties of material. In nano the same substance shows extremely different property depending on how much of a material we pick up. Here the starting point of chemist, namely properties of substances shows to be weak.

What we will achieve here is in fact one our goal in this work. Namely transition from disorder to order.

Art and physics

Here we do not try to define art. It is also in the nature of art not to be well defined. It deals mostly with the humans feeling rather than a well organized discipline. But the role of art in the complex science cannot be ignored. If other disciplines of some reason cannot fulfill their task, and the needs cannot be satisfied it arises a vacuum. This vacuum fills of other not especially well defined and well organized actors. Since art is not as other disciplines that are restrictly bounded to roles enjoys an extra dimension of freedom. This extra dimension of freedom is in some cases a strength that can be a source of inspiration for the other disciplines even physics but of course cannot replace it.

Relativity and quantum

Now we are getting close to the central point of this article. And get our result and conclusion. We will deliver all that we have promised to give you at the end. We said that to solve problem in complex science we need a compass. We need a goal far far away.

Physics always being the motor of the industry and high technology.

Quantum deals with the basics elements in physics. Therefore is a good compass. The goal far far away is the transition from disorder to order or reverse entropy or defeat the basic law of thermodynamic. It is the point that humans salvation depends on. In fact the life itself is reverse entropy.

Twenty centuries physics has been dominated by relativity and quantum. But these two disciplines lived together as weak interdiciplinares. When we enter the domain of strong interdisciplinary it starts a war between these two disciplines. Relativity allied by mathematics question the most sacred basic axioms of the quantum. And shake it in its foundations. Reveals all misinterpretation and mistake which ended in establishing the quantum and all false conclusions and absurdities driven by quantum. This war is ended by total victory of relativity and mathematics and a new more powerful quantum emerges which has the name Confined Quantum Field Theory.

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