

Physics stops where Natural Metaphysics Starts

Introduction

We may understand the possibilities of physics by attempting somehow to define it. To define it is to make it finite, to expose its boundaries and its limitations. We could say that physics is about experiences and theories described & tested in our physical reality. This essentially means that physics requires from the start, that whatever it discovers about the universe must be formulated in terms of space and time for the purpose of testing. This pre-requisite is at the same time a prejudice that prevents physics from asking and answering questions pertaining to the actual existence of those very elements it requires. Therefore, physics cannot ask the questions of whether or not space or time really exists in the universe. This is the limit of physics. The questions of the actual existence of space or time in the universe are metaphysical questions, questions that natural metaphysics could ask and answer. To believe otherwise would be to pretend that our physical relationship with the universe is so special that it is in fact a true and ultimate representation.

This is the present situation and we do not have the choice but to use a metaphysical approach to answer these final questions about what really exist out there. This essay will make an overview of essentials like truths and truth systems, the working of philosophy and science and the importance of logic, not just for our mathematics and sciences but also, for this universe. As required, we will build a proper natural metaphysics. This exploration will give indications as to the possibilities of physics, once it acquires a metaphysical and logical understanding of the universe. If we consider everything physics has accomplished without knowing what the universe is really made of, just think of what it could do if it did.

Truths and Truth Systems

We will start this essay by giving a clear and operational definition of what a truth is. This is necessary because we all have our own ways to gauge the truth about what we read and hear. With a common definition of truth, we will have a better understanding of what knowledge is about. Also, we stand a better chance to come to the same conclusions at the end of this essay.

A truth is an absence of choice. This includes the usual term of “fact” for physical observations and the demonstrated logic of ideas. The strongest absence of choice is a demonstrated or postulated impossibility. A possibility is somehow just possible; but an impossibility is certain. This is why we recognize the truth value of an impossibility. It is not by chance that the foundation of great theories each rests on an impossibility. As was noted by Prigogine,

“Let us observe that curiously, the two great revolutions in physics over the century have been precisely connected with the inclusion of impossibilities in the frame of physics. In relativity a fundamental role is played by the velocity of light which limits the speed at

which we may transmit signals. Similarly Planck's constant h limits the possibilities of measuring simultaneously position and momentum.”(1)

From an impossibility, consequences are deduced and tested, leading to more related truths. These truths along with the original impossibility are parts of a truth system. We define here the complete truth system as a starting impossibility, a subject matter and rules of operation. The thing with a truth is that, logically, it is only true in the context of the truth system that produced it. In other words, truths from two different truth systems do not logically mix. This will be illustrated with the following example.

Our perceptual reality, unaided, is a truth system because we have no choice as to how to perceive it. These choices have already been made and locked into our genetic make-up, our physical and mental abilities and limitations. The impossibility to perceive certain wavelengths and certain sounds or resolve certain fast events etc. is what defines the truth system we call our reality. So, in the evening when we see in the sky the sun, the moon and a star at the same moment, this coincidence constitutes a truth for us. And when we realize with physics that the sun is about 8 minutes away, the moon about one second away and the star probably a few million years away, it is also true. We know that these three subjects cannot be both, at the same moment and away in time. As the example shows, these two statements are two truths from two different truth systems and they should not be logically compared as we did. (Relativity is more of a mathematical bridge between a pseudo-metaphysical model of the universe and our physical reality). Also, this is why in principle, the two truth systems of Quantum Mechanics and General Relativity, for example, shall not logically meet. Each system is based at the origin on a different impossibility and addresses different subject matters. Furthermore, a *physical* Theory Of Everything (TOE) does not appear feasible. The only point of convergence of these truth systems is in the understanding of the underlying reality. A theory of everything can only be found within a single truth system, i.e. it must be self-consistent. There are as many truth systems as there are impossibilities, subject matters and rules. Any constraint is a partial impossibility that will create a new truth system and a new set of truths.

Now lets see how this definition of truth and truth system can be used to better understand the workings of philosophy and science.

Philosophy and Science

Philosophy is the exercise of the choices that are left to make. To the same age-old questions, Philosophy keeps answering, by choosing in the contemporary conceptual material available. Consequently, most philosophies are answers reflecting and limited to a specific era. In philosophy, one attempts to answer a question by making a series of choices supported by the appropriate explanation in order to come to a conclusion. The next person may, in tackling the same question, make different choices and come to a different conclusion. Such a conclusion that may be different for a different person is called an opinion. Philosophy is a system of opinion, not a truth system. This is logical because no truth, defined as an absence of choice, can be demonstrated by a sequence of choices, no matter the explanation. The freedom of choice, which constitutes the exploratory power of philosophy, is also its limitation. Beyond great wisdom, direction and understanding, it can never produce by choice a single truth.

On the other hand, science follows a path of absence of choice. From facts and impossibilities, science will deduce the inevitable chain of consequences stemming from

it. Any experiment or demonstration must be reproducible by anyone with the same result without a choice. But there is also a time when science has to do some philosophy and exercise a few choices. Because we don't know everything, we have to fill in the blanks in order to proceed with a new theory. This is the moment of lucid humility when we acknowledge our ignorance and assign some values or meanings, by choice, to the variables and concepts required for the theory. At that moment, our choices and assumptions will be based on various reasons. It may be religion, as was the case for Newton with space and time. As God's perfect creations, Newton had to assign universally uniform properties to space and time. The meaning or value chosen may come from intuition, insight or just a shared contemporary belief. This gray area between science and philosophy, we could call the "Board of Assumptions", is of the utmost importance. This is where the result of fundamental science is first felt. A successful theory will allow us to go back to the board of assumptions and to knock off a few of the choices. It will tell us that where we previously exercised a choice, we in fact did not have the choice and that somehow, it is impossible to be otherwise. This is what the theory of special relativity did with our conceptions of space and time. We may say that knowledge is about gaining truths and losing choices. Failure to realize the loss of these choices is tantamount to not understanding the theory.

Natural Metaphysics

As the word entails, the metaphysics of nature is about that which cannot be experienced directly, but has to be deduced from experience. This is not the study of a weird and spooky property of nature or dark underworld. This is simple logic. For us to experience an object is to establish a binary relationship in which we acquire from the object signals that we process and transform. The content of this experience that is essentially information is totally determined by our limitations and inherent attributes. A host of studies in perception and neurobiology already tell us how much these signals are massaged, shopped up and integrated. We *create* our own reality out of only a small selection or window from all the signals the universe offers. In other words, the information we acquire tells us just as much about our limitations than about the universe. The work of natural metaphysics would then be to understand and dissociate that part of our knowledge that is about us from the part that is about the universe itself. It would consist in keeping what we learned about the universe while avoiding the prejudice intrinsic to physics. Both General Relativity and Quantum Mechanics produce models of the universe that are pseudo metaphysical representations. By requirement, these models must carry the dimensions necessary for testing. Physics, we must insist, does not have the capacity nor the right to indulge in any metaphysical inquiry or claim about what the universe really is.

This metaphysical dissociation is not understood, even in our everyday language. When the scientist says that the universe IS this or that, what he means is "appears to us" as this or that. To say that something 'IS' is a metaphysical claim. Failure to understand the difference may lead one to believe he has acquired a metaphysical knowledge, when in fact he hasn't. When we ask about the "Nature" of time, for example, we inquire about what time is by itself, not about how we perceive it. To ask about the "nature" of something is to commit oneself to the metaphysical analysis of that thing. Conversely, one cannot ask a metaphysical question and at the same time prescribe an answer from physics.

By understanding this dissociation, metaphysics can be used to deduce from physics, new aspects of the nature of the universe. But first, a proper system of natural metaphysics must be built, along its subject matter.

The Subject Matter of Natural Metaphysics

The universe has existed and evolved by itself for about 14 billion years, before we ever got around to be and experience it. So, the universe has substance to support its lasting existence and an internal cause to support its spontaneous evolution. These concepts of substance and cause are the two pillars of natural metaphysics. The human unaided experience of our reality is just the ephemeral relation we established with a substance, relation that exists only for and makes sense only to us, the observers. A substance really exists by itself in the universe, while an experience requires our presence and a substance. What is a substance? We define a substance as something that exists by itself, and that can have different forms and properties while remaining of the same nature. Ice, water and steam are apparently of the same nature. This is an illustration, but not an example, because water is divisible into other constituents as molecules, atoms etc. of an apparently different nature. A substance is fundamental in that it is indivisible into components of a different nature.

The Rules and impossibility in Natural Metaphysics

If absolutely anything could happen in the universe, we can safely assume that it would be just a big mush of something. Instead of that, we have behaviors and regularities that allow us to derive the laws of physics that attest to the constraints of an internally consistent truth system. Consequently, not everything is possible in the universe and, there must be at least one rule of impossibility that defines the universe as it is. It so happen that this rule is the inescapable consequence of admitting that something really exists. To admit that something really exists is also to admit that it may not exist. Here is why. One can understand the concept of metaphysical existence as “something that somehow makes a difference”. And this something cannot make a difference if its existence and non-existence are the same or, if its non-existence is not possible. This requirement of a possible non-existence also mean that the existence of a substance must obey the logical rule of non-contradiction. This rule of logic basically says that, a state or statement cannot be both and at the same time its own opposite, or for values, have more than one value. This shows that a universe made of real substance that exists must obey the rule of non-contradiction as well as the other rules of logic inferred from it.

Mathematics

Mathematics is also a truth system and it must start with an impossibility. This is where we say that 1 does not equal zero. By this, we declare the existence of 1 by presenting and comparing it to the opposite of its existence; zero or nothing. (Of course, the existential opposite of 2 or 43 is also zero or nothing) Only then can the presence and absence of 1 be accounted for and addition and subtraction be performed. We also understand that zero is not just your regular opposite, like minus 1 or anything else. It is nothingness, and it does not add up as in $0+0=0$. Truly, mathematics is based on computing existence. Also, because 1 does not equal zero and never can, existence must be conserved. So how do you logically make a whole universe out of nothing, assuming we started with nothing? With a trick, of course ...

How many substances?

How many substances are there in the universe? The logical rule of non-contradiction is the most fundamental rule of logic, as the basis of mathematics, science etc. We did not really invent logic, but we took it from our observation of the regularities of this universe. And it is no surprise that the very rules of the universe permeates and transcends all ways of human experience. The universe not only obeys logic, but since the universe has been evolving by itself, it must also be able to *operate* on logic, i.e. work by logical operations like addition and subtraction of the substance. According to the great wisdom of the teacher; “ We can’t add apples and oranges”. This is the problem presented by logical operations on different identities or nature. Consequently, a universe that is operational on logic can only admit one substance. In other words, the universe would not know how to deal logically with more than one substance.

Two comments come to mind here. First, the uncanny effectiveness of mathematics may come from the logical working of the universe itself and the fact it does not have to bother with identities i.e. apples and oranges. It is all one and the same stuff that we are computing, the identity of which is of no consequence until our computing involves the whole universe. At that moment, numbers don’t add up anymore (75% of matter unaccounted for) and the identity of the substance has to be established and all its variations understood and accounted for. Secondly, a successful physical equation including different entities like mass, energy and the speed of light, can only be viewed as being *logical* as long as we accept the unspoken understanding that these entities in fact represent, in the underlying reality, different aspects of the same nature, logically computable. There is only one substance and, in a sense, we already knew the answer...

The Truth System “Universe”

The universe is now taking form as a complete truth system. We have at least one rule of impossibility, namely the rule of non-contradiction. We have a subject matter, a single substance, yet to be identified. We have rules of operation as the basic rules of logic; addition, subtraction, substitution etc. We may safely assume that because this single substance makes the whole universe, the *Cause* will have to be some type of property or operation on that substance. Before we may give an example of a logical operation on the substance, we need to know what the substance is. First of all, if this substance really makes the whole universe and everything in it, chances are that we already know something about it, in a form or another, and even have a name for it. Now how would it be possible for us to have some knowledge of this metaphysical substance? Well, we have to remember that we have some metaphysical appreciation of this universe by way of our consciousness and memory... In order to find out what the identity of the substance is, we must first create a logical beginning for the universe and see what substance is logically allowed in it.

Logical Creation of the Universe

The rule of impossibility of the truth system “universe” is the logical rule of non-contradiction. If we assume that nothing existed at the start, we could face a contradiction by suddenly making something to exist. Such a contradiction would not be logically acceptable. A contradiction is two contrary statements or states at the “same time”. Something exists and nothing exists. If these two contrary states were to be separated by time i.e. making them to be “not at the same time”, they would be individually acceptable while remaining as a whole, a global contradiction. The only candidate substance capable of both existence and insulation from the contrary statement is time itself. “Time” is our mystery substance. Of course, “time” is a fairly large and fuzzy concept that will be clarified below. (“space” can’t provide that insulation since it is a creation of our reality; not a real metaphysical entity. See below).

Logical Operation

O.k.! We are rubbing our hands! We got ourselves a universe of time. Now, let's make it work. Because time, from this beginning, has sprung by itself into a whole universe, we may safely assume that it is a dynamic substance or process. (this is established later with the “Cause”). And, as we understand dynamical processes, they must be doing something at a certain rate, a rate that may very well vary. This dynamic process may lead to a variety of rates of the process and some changes like increasing rates and decreasing rates. A dynamic substance is very rich in that it allows the emergence and existence of a host of possible variations (time derivatives) while remaining all of the same nature and consequently operational under logic. Let us have an example of a logical operation on the substance.

We have the vacuum as being made of the time process. And then we have matter. Being a universe made of a single substance, matter has to be also made of the time process, but obviously a different arrangement of time, we will just call a “variation”. So, what happens with matter and the vacuum? A simple logical substitution is what happens. Wherever matter is present, it replaces the time process. This is because of the rule of non-contradiction. In one place, the process of time cannot be both variation and non-variation of the process of time. In other words, anything that is not the simple process of time exists by replacing it. Sure, the time process itself exists, as the dynamic background. But what usually concern us most are every other variations of the time process that constitute the foundations of our reality based on experience. The process of time itself is not something that we can experience directly, for if we could, we would be technically blind, a bit like a goldfish in a glass of milk.

Finding the “Cause”

We need to go just a little further in order to identify the second pillar of natural metaphysics; the “Cause”. For this, we will go to the best and simplest laboratory for the study a spontaneous event; the gravitational fall.

We saw above that matter replaces time by logical substitution. As the “vacuum”, the time process happens everywhere, in all directions. This process or evolution in a constraint free universe takes on the shape of something like an explosion. This can be inferred from exploding stars and other constraint free processes. By comparison to this explosive time process, our piece of matter appears inert. Matter therefore constitutes an explosive deficit in the process of time, basically, a place where less time is coming from. Let us now look at the phenomenon of gravitational fall.

It appears, that a falling apple (any piece of matter) is moving in a spontaneous way towards the ground. That is what we see and experience. But we also understand, from above, that the matter of the Earth creates a time deficit around it. We equally understand from general relativity that time does effectively run slower near the ground than above it. If we combine observation and understanding, we come up with the following conclusion. Matter moves spontaneously from a place where time runs faster toward a place where time runs relatively slower. (Remember that General relativity is a *physical* theory, built and meant to be tested in our reality. The pseudo-metaphysical models it produces cannot be used as a metaphysical understanding of the universe). How can we explain this logically? First, We can stop the falling apple with our hand. This spontaneous event is not a certainty but rather a probability. We then rephrase by saying that matter has a higher probability to exist or be where it can stay longer. How does slower time rate equate with staying longer? This can be understood in the following way. The rate of passage of time is already built into our language and equations as “per second” or $1/T$. A slower rate means a larger denominator or bigger T i.e. longer time of stay. Existence is always more probable where time runs relatively slower. It also says that, because existence of variations is about replacing a dynamic substance, existence is in fact itself a process, not a state. A differential in the rate of the time process is the “Cause” for the spontaneous unidirectional motion of matter in the gravitational field. Because the metaphysical universe is a logical system, it cannot allow for any other cause. This is because there would be no logical reason available for choosing the precedence between two different logical causes. On a cosmological note, the slowest time possible is no time at all or nothingness. We may explain in this way the “explosion” and spontaneous expansion of the universe, not in a ballistic sense, but in the sense of an infinitely recursive process.

In order to help visualize the operation of logical substitution, here is an illustration of an explosive deficit. Lets say we have a large strong room filled with a mixture of gases that will explode in the presence of light. A balanced mixture of hydrogen and chlorine would do. The walls of the room are fitted with flash lamps so as to initiate the explosion pretty much at the same moment everywhere in the room. Now we suspend from the ceiling and one meter apart two billiard balls each by a thread. When the explosion is set off by the lamps it happens in every point of the room except where the two balls are because they are inert and they do not contribute to the explosion. This explosive deficit is felt away from each ball, with a maximum deficit running between the two balls. The overall pressure will push the two balls toward each other ... Or is it the lower pressure between them pulling them together? It is in fact both, as a pressure differential that tends to bring them together. This illustration is a physical demonstration where we have a pressure differential doing the job, right? Yes, but a proper metaphysical analysis of this event must and will in the end also expose a time process differential as the cause! This is because at the fundamental metaphysical level there is only one possible cause for motion in the universe, for gravitational fall, for inertia, for clouds to move in the sky or waves to roll on the ocean etc.

A word on gravity.

We may define gravitation as a local differential in existence resulting from a differential of the rate of the process of time. Since “existence” is the only requirement for things to be subjected to gravity, all things will equally fall at the same rate (in a vacuum), no matter the shape, mass or composition. From this we also understand that everything that exists by logical substitution will create a time deficit away from it and will all attract each other, *which is the logic of universal gravitation.*

We have excellent physical descriptions of gravitation be it Newtonian or from General Relativity. But they are not logical explanations, simply different points of view. Physics remains the most powerful descriptive and predictive tool, entirely based on our will to do things, and for that, our need to know the rules of the universe as we experience them. But a physical description is made of facts related by an equation, equation that leaves no place for a cause of any sort. Physical description and logical understanding, as the physical “how” and the metaphysical “why” are mutually exclusive.

Testing of natural metaphysics?

A close colleague of mine that is very fond of physics once asked me: “How does one test natural metaphysics”? The question did bother me at first. Then I realized something more about physics. In physics we make theories and guesses that we have to test later. On the other hand, the elements of the present natural metaphysics are built by a sequence of logical inferences. Since logic is the very rule of this system, the logic of the creation of each element of the system is also its proof! Of course, one could understand the question of testing natural metaphysics as the search for a correlation with what is known from physics...

What about space?

Before concluding, we shall address those of you who are still looking for “space”. Space is one of those choices we lost long ago. The moment we found a speed limit in the universe, space was gone and here is why. We may have the capacity to see or think about the meter rule as an object, an instantaneous collection of points being all at the same time. But an operational universe has no choice but to take the time required to send a signal from one end of the meter to the other. This means that, for the universe, the meter is not, in all its part, at the same moment. And so, the “space” that the meter represents does not exist in the real universe. In the underlying reality, there are no objects as we conceive them, as whole in one moment of time. Our moon is but an aggregate of matter across time, only becoming the object “moon” as we consider it or perceive it as being whole in one moment of perception. The spherical shape of the moon, like that of the exploding star comes from the shape of the evolution of the time process itself. Since we are not extended all over the universe, and that we have a finite size, we have a central spherical point of view. This sphere conveniently parts into x, y and z. But these are only the geometry and dimensions of our observer status, not that of the universe. The “dimensions” of the universe are its variety of time derivatives of the time process.

Somehow, this partial picture may bother the quantum mechanics people, for they now, and we all know, that the universe possesses an inherent granularity in particles, quantum states etc. This granularity may have to do with logical existence, which is essentially a binary deal; something exists or it doesn't. There is no middle point and every existence has to be discrete.

Conclusion

This is just an essay and this is why it raises more questions than it answers and why it begs for more complete and formal developments and demonstrations. Yet, what it suggests is the following powerful conclusion. At the most fundamental level that this natural metaphysics offers, the *logical explanation* of something being and happening, is also the actual mechanism the universe uses, to be and happen.

What the universe is made of and what makes it work are answers that stand at the apex of a pyramid of questioning, the base of which sits somewhere 2,600 years ago. The Greek philosophers of the Ionian school knew, we believe, that the universe worked by logic and for that reason, that it had to be made of only one nature or kind of stuff. They came up with air, water or fire. But these were not substances per se. Only later did we somehow understand our relationship with the universe with Plato's cave allegory. Had anyone combined the two after that, they would have found the answer. Maybe a few did find the answer, but have shied away from it. For, to see how we see, to think how we think, or how we create our reality from one single substance may be troubling for our mind.

In this essay, we have defined truth and truth systems, addressed the role of impossibilities and the limits of physics and of its models. In doing so, we made a place for, and created a need for natural metaphysics, as a specific tool for tackling the underlying foundations of this universe. Consequently, this need got us into the task of building natural metaphysics, indistinguishable from its subject matter the universe, while making sure that it was a truth system, with all the elements required to produce a consistent set of truths and new knowledge. The limitations of natural metaphysics are many. For one, without the numbers associated with the metrics of observation, it cannot describe or predict anything directly and physically demonstrable. Physics is recognized as a collection of truth systems of descriptive power of indisputable value for doing things in our reality. And yet, physics could progress even further, beyond its own intrinsic limitations, by learning from the questions and answers of natural metaphysics. With a fundamental and logical understanding of the universe, physics could do just about anything it wants, except a logical contradiction.

Marcel-Marie LeBel
Ottawa, September 09, 2009

Bibliography

(1) Ilya Prigogine, THE REDISCOVERY OF TIME, communication to the symposium on "Religion and the New Physical Sciences: Thermodynamics, Evolution, and God," held at the annual meeting of the American Academy of Religion at Dallas, Texas, 20 December 1983 and sponsored by The Isthmus Institute of Dallas and the Philosophy of Religion section of the AAR.