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REVIEW ARTICLE

REVOLUTION IN PHYSICS: A COARSE JOURNEY FROM PHYSICAL PHENOMENA TO METAPHYSICAL LAWS - A BRIEF REVIEW

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ABSTRACT

In this present era, the natural science, like physics, soars so high an apex in its studies and researches that it startles us and dazzles our eyes. It has been possible due to a coarse passage of journey from natural phenomena to the apriori laws of thought, or better say, a journey from physics to metaphysics. In this paper I am not going to deal with the success of physics but only to highlight its philosophy of searching.

INTRODUCTION

We know physics is the study of Nature and its laws. We expect that all the different events in nature take place according to some basic laws, and revealing these laws of nature from the observed phenomena, is the task of physics. Thus by observing such phenomena like the falling of an apple from a tree and seeing the requirement of more force to push a full shopping cart than an empty one, physicist like Sir Isaac Newton discovered the law of gravitation and the laws of motion. Physics is concerned with such basic laws which are applicable to all events of nature. Now this science (physics) today is efficacious to all the domain of our life including Bio and Medical science. But physics was not such a unique science almost two and half of a century ago. What is called 'physics' today, it was then called 'natural philosophy'. At that time physics was the searching of empirical objects. Then, after so long later, it comes to the highway of science when the name of Galileo and Torricelli connected. They did not content themselves merely with the observation of facts what was given in experience, but introduced experiment. By means of experiment they compelled nature to produce processes in which they are interested and thus to answer their questions as to the causal conditions under which they take place. Thus they discovered an ideal method of investigation and thereby arrived at the royal road of science.

(ii)

In our previous section we have told that physics is 'the study of nature'. Now the expression 'the study of nature', I suppose, deserves some clarifications. Here I cannot conceal my temptation to cite the example of the great physicist R.P. Feynman to explain the expression mentioned above. Suppose, someone is ignorant of the rules of chess, but allowed to watch the game. If he watches the game for a long time, he may find out some of its rules, the players follow to give their move, though it is a very difficult task to perform. Similar is the case of Physics. The nature around us is as if a great chess and she (nature) herself is the player of the game and the events of the nature are the moves of the play. The Physicists here observe the game and try to find out the laws behind the nature's play by trial and error method of learning. They frequently chase for the new law and abandon the old one as false. In this way we see that the Geo-centric view of Ptolemy discarded and the heliocentric view of Copernicus took its place. Of course, we have to remember that the scientists do not frame the laws as is the case of chess play. They only discover the laws and give them names. Newton did not frame the law of gravitation or the laws of motion, but only find them out and name. Now, in course of the journey, there may appear new phenomena and if those laws are unable to explain them, the scientists do not hesitate to change them, as was once done by Copernicus and

Einstein. Copernicus replaced Geo-centric view of Ptolemy and Einstein propounded the theory of Relativity against Newton's law.

(iii)

In case of the study of nature a physicist has to take the help of Mathematics. Here they go hand in hand. Once Aristotle called Physics 'Applied Mathematics'. There may be some exaggeration, yet they are co-related to each other. Mathematics is as if the language of Physics. The Physicists reach their goal by the help of calculation served by Mathematics. Otherwise it would be much more difficult to discover, understand and explain the laws of nature or to say that the gravitational force between two masses is proportional to the product of the masses and is inversely proportional to the square of the distance apart, is more difficult than to write

$$F \propto \frac{m_1 m_2}{r^2}$$

So if we know the basic rule (in Fig-1) about the force between two particles, we can use the technique of integral calculus to find what will be the force exerted by a uniform rod on a particle placed on its perpendicular bisector. Hence the importance of Mathematics in the study of Physics can never be ignored. Still, we cannot say Mathematics itself is Physics. It may rather be said that Mathematics is the carrier of Physics as language is the carrier of thought. As a person, being poor in grammar and vocabulary, cannot express his thoughts and feelings clearly, so also the study of Physics and its explanation will be poor or even more difficult, if our knowledge of mathematics is not so clear. Hence it may be said that in the expedition of Physics, mathematics acts as the deluxe coach and helps it to reach its destination.

(iv)

Now let's come to the point. In its expedition Physics ultimately anchor its ship to the shore of Metaphysics. But how? Question like this may crop up as metaphysics, we generally know, the study of the supernatural Reality like God, soul and the world beyond the panoramic screen of this empirical world. Aristotle called it the 'First Philosophy'. Then how can the goal of Physics is to reach the domain of metaphysics, while they both deal with the opposites --- the physical and the non-physical world? Is it not an absurdity? The answer is, 'Certainty not' and this is what I am going to say in this section. At the outset, I have told that Physics goes from natural phenomena to apriori laws of thought or understanding. Now, the term 'apriori' need some clarification. 'Apriori' means pure i.e., non-empirical. The term 'apriori' indicates independent of all experiences or all impressions of the senses. Of course, by the phrase 'independent of experience' I do not mean something supernatural, but only mean the non-sensuous. The laws that the physicists discover are in that sense 'apriori'. Necessity and universality are the two criteria of this apriori laws.

Of course, these two criteria are not inseparable as, that what is necessary is universal and that what is universal is necessary. Physics venture to discover such apriori laws. So the goal of Physics is to reach the domain of Metaphysics that deals with such apriori truth. We may entitle this metaphysics as 'natural metaphysics' in lieu of 'speculative metaphysics' that deals with the supernatural Reality like God, soul etc. But the question may crop up again, if the laws of Physics are quite apriori where there is no admixture of anything empirical. To answer this question apriori laws may be divided into two --- pure apriori and mixed apriori laws. In Mathematics we get the shining example of pure apriori laws. For example, 'the straight line between two points is the shortest'---is a pure apriori law that has not the slightest admixture of experience. But the laws of Physics are not apriori in this sense. They are mixed apriori as there is always the tinge of sense-experience. For example, 'Every change has its cause' is a mixed apriori law of Physics. If we want to get the idea of 'change' we have to depend on the natural phenomena related to sense-experience. Without the help of these phenomena we can never come to this conclusion or explain this law of causality. Thus the laws discovered by the Physicists are all mixed apriori laws. The law of gravitation or the laws of motion, as we have already mentioned in the introductory section also based on the natural phenomena like the rotation of the moon around the earth or the reactionary force of a gun-firing pushed the gun backward. Hence the laws of Physics are mixed apriori i.e., what I want to say, metaphysical.

Now, this passage from Physics to Metaphysics is not smooth or easy enough, but rather too difficult and coarse. Hence the Physicists have to make a revolution in thought and processes of their study of nature. But it is not that, their strife is stopped here, but with the help of those laws they try to reach the Zenith-point. Thus we see, in 1883 John Michell basing on the law of gravitation inferred the existence of the 'Black Hole' and in 1916 Albert Einstein basing on his 'General Theory of Relativity' inferred the existence of the same. Physicists now expect that through this Black Hole one may be able to reach the other world, though it is still the subject-matter of science fiction. So it seems that one day this dream comes to be true and then Physics will ultimately embark on the throne of Metaphysics.

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